5.2 AIR QUALITY

The Project includes the construction, operation, maintenance, and decommissioning of up to 850 megawatts (MW) of capacity by a solar power generating facility and its ancillary systems in two phases (Phase I: 500MW [approximately 5,838 acres]/Phase II 350MW [approximately 2,392 acres]). The Project will consist of up to approximately 34,000 SunCatchers. Construction is anticipated to occur over an approximate four-year period beginning in 2010 and ending in 2014. It is estimated that approximately an average of 400 construction and 180 long-term labor jobs will be required.

The Project is located in an undeveloped area of San Bernardino County, California, approximately 37 miles east of Barstow, California and north of Interstate 40 (I-40) between approximately 1,925 to 3,050 feet above mean sea level. The Project is located primarily on Bureau of Land Management (BLM) land within the Barstow Field Office. Approval of the Project Right-of-Way (ROW) Grant Application (Form 299, Applications CACA 49539 and 49537) will result in the issuance of a ROW Grant Permit for use of federal lands administered by the BLM. The Project would require a plan amendment to the 1980 California Desert Conservation Area (CDCA) Plan.

The area where the Project would be constructed is primarily open, undeveloped land within the Mojave Desert. The Cady Mountain Wilderness Study Area (WSA) is located north of the Solar One Site. The Pisgah Crater, within the BLM-designated Pisgah Area of Critical Environmental Concern (ACEC), is located south and east of the Project (south of I-40 by several miles). Several underground and above ground utilities traverse the area.

An approved interconnection letter from California Independent Service Operator (CAISO) has been issued for the Project. The associated System Impact Study (SIS) is located in Appendix H. The SIS indicates that additional upgrades to the Southern California Edison (SCE) Lugo-Pisgah No. 2 Transmission Line and upgrades at the SCE Pisgah Substation will be required for the full build out of the 850MW Project. Supplemental studies performed by SCE and CAISO indicate that capacity is available on the existing transmission system to accommodate less than the 850MW Project.

An on-site substation (i.e., Solar One Substation [approximately 3 acres]) will be constructed to deliver the electrical power generated by the Project to the SCE Pisgah Substation. Approximately twelve to fifteen 220kV transmission line structures (90 to 110 feet tall) would be required to make the interconnection from the Solar One Substation to the SCE Pisgah Substation. All of these structures would be constructed within the Project Site.

The Project will include a centrally located Main Services Complex (14.4 acres) that includes three SunCatcher assembly buildings, administrative offices, operations control room, maintenance facilities, and a water treatment complex including a water treatment structure, raw water storage tank, demineralized water storage tank, basins, and potable water tank.

Adjacent to the Main Services Complex, a 14-acre temporary construction laydown area will be developed and an approximately 6-acre construction laydown area will be provided adjacent to the Satellite Services Complex south of the Burlington Northern Santa Fe (BNSF) railroad. Two additional construction laydown areas (26 acres each) one will be located at the south entrance off Hector Road and the other at the east entrance just north of the SCE Pisgah Substation.

Temporary construction site access would be provided off of I-40 beginning east of the SCE Pisgah Substation and would traverse approximately 3.5 miles across the Pisgah ACEC requiring an approximate 30-foot ROW. Long-term permanent access would be provided by a bridge over the BSNF railroad along Hector Road north of I-40. Equipment may be transported during construction via trucks and/or rail car (through the construction of a siding), that would be located on the north side of BNSF railroad and east of Hector Road or as authorized by BNSF.

Water would be provided via a groundwater well located on a portion of the BLM ROW grant north of the Main Services Complex and transported through an underground pipeline. The expected average well water consumption for the Project during construction is approximately 50 acre-feet per year. Under normal operation (inclusive of mirror cleaning, dust control, and potable water usage), water required will be approximately 36.2 acre-feet per year. Emergency water may be trucked in from local municipalities.

This analysis of the potential air quality effects of the Project thermal solar power plant and its ancillary systems has been conducted according to California Energy Commission (CEC) power plant siting requirements. It also addresses Mojave Desert Air Quality Management District (MDAQMD) permitting requirements for a Determination of Compliance/Authority to Construct and National Environmental Policy Act (NEPA) of 1969 requirements. The analysis is organized as depicted below.

- Section 5.2.1, Affected Environment, describes elements of the local environment that are relevant to an evaluation of the Project's potential air quality effects. 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 central San Bernardino County.
- Section 5.2.2, Environmental Consequences, evaluates the maximum potential air quality effects resulting from the Project's emissions of criteria pollutants [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 phase of the Project, as well as for operation of the installed equipment after electric power generation commences. Because of the nature of the Project, operational emissions will be small; however, a modeling analysis conducted for emissions of nitrogen dioxide (NO_2), CO, sulfur dioxide (SO_2), and particulate matter ($PM_{2.5}$ and PM_{10}) is 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 Effects, addresses the cumulative effects of the Project emissions with other potential new sources of air pollution in the area around the Project.
- Section 5.2.4, Mitigation Measures, describes the emission mitigation measures proposed for Project construction. Emission sources associated with the operational Project will be limited to exhaust from vehicles working on the site in support of solar collector cleaning and

facility maintenance, in addition to a diesel internal combustion engine driver for one backup generator. This engine will only be tested periodically to ensure its operability in the event of an emergency loss of grid power.

- Section 5.2.5, LORS Compliance, describes all potentially applicable laws, ordinances, regulations, and standards (LORS) relating to air quality.
- Section 5.2.6, References, lists the references used to conduct the air quality assessment.

The focus of this assessment of the Project's potential air quality effects 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 is presented in Section 5.16, Public Health and Safety.

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.

The Project will be a newly constructed solar power plant located in an undeveloped area of San Bernardino County, California between Newberry Springs and Ludlow, California, near I-40. Barstow is approximately 37 miles west of the site; Newberry Springs is located approximately 17 miles west of the site; Victorville is approximately 57 miles southwest of the site; and Ludlow is located approximately 13 miles east of the site.

The Project would be bounded as follows:

- to the east by SCE Lugo-Pisgah No. 2 Transmission Line corridor,
- to the south by I-40,
- to the west by the western section line in Section 35 and 2 in Township 9 North, Range 5 East, and Hector Road (between I-40 and the BNSF Railroad; Township 8 North, Range 5 East), and
- to the north by the Cady Mountain Wilderness Study Area.

The Project Site slopes gently to the northeast, with steeper sloping beyond the northeast boundary line. The central and western portions of the Project Site are characterized by low and moderate relief alluvial zones and washes. The few existing residences and farming areas are located approximately 2 miles to the east and 4 miles west of the Project Site boundary. The nearest Class I area is Joshua Tree National Park, approximately 40 miles to the south. Figure 5.2-1, shows the general vicinity of the Project Site; Figure 5.2-2, shows the plot plan and fenceline defining the proposed Project.

5.2.1.1 Climate and Meteorology

The climate of San Bernardino County is classified as a high desert climate characterized by low precipitation, hot summers, mild to cold winters, low humidity, and strong temperature inversions. It is separated from the Pacific coastal regions by the San Gabriel and San

Bernardino mountain ranges to the south and Tehachapi mountains to the 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 to the southwest of San Bernardino County also have a major influence on climate, serving as a meteorological boundary that effectively removes moisture from the marine air flowing inland from the Pacific. An annual wind rose representing data collected at the Barstow-Daggett Airport during 2003 through 2007 is presented in Figure 5.2-3, Annual Wind Rose for Barstow-Daggett Airport. Wind roses for all calendar quarters are provided in Appendix V, Air Quality Data.

The terrain of the Project Area, combined with the strong temperature differentials created by intense solar heating, produce moderate winds and deep thermal convection currents. The combination of subsiding air, protective mountains, and distance from the ocean all combine to severely limit precipitation. The Project Area experiences surface inversions in the early morning hours almost every day of 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 Weather Service (NWS) Station at Barstow Daggett Airport over a 59-year period (1948 through 2007) are presented in Table 5.2-1, Climatological Normals – Historical Temperature and Precipitation Data at Barstow Daggett Airport (Western Regional Climate Center 1948-2007 Monthly Normals). The coordinates of this weather station are: latitude 34°51’N, longitude 116°47’W. The hottest month, July, has a highest mean temperature of 104.2 degrees Fahrenheit (ºF) and a lowest mean temperature of 73.2°F. The coldest month, January, has a highest mean temperature of 60.6°F, and a lowest mean temperature of 35.9°F.

Table 5.2-1
Climatological Normals – Historical Temperature and Precipitation Data at Barstow Daggett Airport (Western Regional Climate Center 1948-2007 Monthly Normals)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Monthly
Highest mean temperature (°F)	60.6	65.7	71.3	79.0	88.2	98.1	104.2.	102.2	95.0	83.3	69.7	61.0	81.5
Lowest mean temperature (°F)	35.9	40.2	45.0	50.9	58.9	66.8	73.2	71.8	65.2	54.6	43.0	35.6	53.4
Precipitation (inches)	0.59	0.48	0.45	0.22	0.07	0.07	0.39	0.38	0.33	0.18	0.29	0.42	3.87

Source: Barstow Daggett Airport, Western Regional Climate Center (WRCC) Web site.
Note:
°F = degrees Fahrenheit

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 about 4 inches on average. Monthly mean precipitation amounts at Barstow range from 0.59 inch in January to 0.07 inch in May and June. During summer, migrating storm systems are blocked by the semi-permanent Pacific high, and rain associated with these storms is scarce. Relative humidity levels are generally very low. In the summer, relative humidity averages 30 to 50 percent in the early morning and 10 to 20 percent in the afternoon.

Desert regions tend to be windy since little friction is generated between the moving air and the low, sparse vegetative cover. In addition, the rapid daytime heating of the lower layer of air over the desert leads to convective activity. This exchange between lower and upper air tends to accelerate surface winds during the warm part of the day when convection is at a maximum. During the winter months the surface heating is not as intense, and the rapid cooling of the surface layers at night retards this vertical exchange of momentum. As a result, winds are generally calmer in winter, except during the passage of frontal storm systems. During all seasons, the prevailing winds are predominantly from the west or west-southwest.

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 health and damage effects review that culminates in pollutant-specific air quality criteria documents, which precede and form the basis for establishment of NAAQS. California has promulgated 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 health and welfare effects of air pollutants. 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 may be exceeded no more than once per year. CAAQS are not to be exceeded.

The ambient air quality in San Bernardino County is monitored at a number of permanent air quality monitoring stations operated by the MDAQMD and California Air Resources Board (CARB). The closest monitoring stations to the Project Site within San Bernardino County are in Barstow, located approximately 37 miles west of the Project Site, Victorville located 57 miles southwest of the Project Site, and in Trona located approximately 70 miles northwest of the Project Site. The Barstow station measures ozone (O_3), PM_{10}, NO_2, SO_2, and CO. The Victorville station measures O_3, PM_{10}, CO, NO_2, $PM_{2.5}$ and SO_2. The $PM_{2.5}$ monitor is operated by the California Air Resources Board (CARB). The Trona station measures O_3, PM_{10}, NO_2, and SO_2. Air quality measurements taken at these stations are presented in Tables 5.2-2 through 5.2-7.

For the air quality effects analysis described in Section 5.2.2.4, Modeling Results – Compliance with Ambient Air Quality Standards, the maximum recorded concentrations from the most recent 3 years (2005 to 2007) at any of the nearest three monitoring stations were reviewed and the most representative data were used to characterize background air quality levels.

Ozone (O_3)

Ozone is an end product of complex reactions between VOC and NO_x in the presence of ultraviolet radiation. VOC and NO_x emissions from vehicles and stationary sources, combined with daytime wind flow patterns, mountain barriers, temperature inversions, and intense sunlight, generally result in the highest O_3 concentrations. For purposes of both state and federal air quality planning, the portion of the Mojave Desert Air Basin inside the Southeast Desert Modified Air Quality Management Area 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 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). The 1-hour federal O_3 standard is no longer in effect in California air basins because there are no EAC areas in California.

Concentration data for O_3 in parts per million (ppm) measured at Barstow, Victorville, and Trona stations are summarized in Tables 5.2-2a-c. As seen in these tables, the 1-hour O_3 CAAQS of 0.09 ppm has been exceeded several times in each year from 2005 through 2007.

The new federal 8-hour average O_3 standard of 0.075 ppm was announced by EPA on 12 March 2008. The new standard was effective 60 days after publication in the Federal Register and replaced the current 0.08 ppm standard. 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 several times. As supported by the data in Tables 5.2-2a-c, 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 of 0.136 and 0.107 ppm, respectively were recorded in 2006 and 2005 at the Victorville station. However, the Barstow and Victorville monitoring stations are located in urban areas and have higher concentrations than would be expected at the Project site. Thus, data recorded at the Trona station, located in a rural area, were deemed to be the most representative background concentrations used in the air quality effects analysis.

Table 5.2-2a
Concentration Data Summary for Ozone at Barstow Station

Year	Highest Concentration for O_3 (ppm)		Estimated Number of Days Exceeding Standards		
	1-Hour	8-Hour	State 1-Hour	State 8-Hour	Federal 8-Hour
2007	0.099	0.088	2	46	25
2006	**0.112**	**0.094**	4	38	19
2005	0.099	0.092	3	49	22

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov ; Last access: October 28, 2008

Notes:

1. Number of days with an 8-hour average exceeding federal standard concentration of 0.075 ppm. Regulatory standard is to maintain 0.075 ppm as a 3-year average of the fourth-highest daily maximum. Therefore, number of days exceeding standard concentration is not the number of violations of the standard for the year.
2. Maximum average values occurring during the most recent 3 years are indicated in bold.
3. National standards, other than those for ozone and based on annual averages, are not to be exceeded more than

Table 5.2-2a
Concentration Data Summary for Ozone at Barstow Station

Year	Highest Concentration for O_3 (ppm)		Estimated Number of Days Exceeding Standards		
	1-Hour	8-Hour	State 1-Hour	State 8-Hour	Federal 8-Hour

once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

4. New federal 8-hour ozone and fine particulate matter (PM2.5) standards were promulgated by U.S. EPA on July 18, 1997. The federal 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

Monitoring site address: Barstow Station, 1301 W. Mountain View St., Barstow CA 92311

O_3 = ozone
ppm = parts per million

Table 5.2-2b
Concentration Data Summary for Ozone at Victorville Station

Year	Highest Concentration for O_3 (ppm)		Estimated Number of Days Exceeding Standards		
	1-Hour	8-Hour	State 1-Hour	State 8-Hour	Federal 8-Hour
2007	0.107	0.090	7	45	27
2006	**0.136**	0.105	9	47	28
2005	0.131	**0.107**	16	53	33

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov ; Last access: October 28, 2008

Notes:

1. Number of days with an 8-hour average exceeding federal standard concentration of 0.075 ppm. Regulatory standard is to maintain 0.075 ppm as a 3-year average of the fourth-highest daily maximum. Therefore, number of days exceeding standard concentration is not the number of violations of the standard for the year.
2. Maximum average values occurring during the most recent 3 years are indicated in bold.
3. National standards, other than those for ozone and based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
4. New federal 8-hour ozone and fine particulate matter (PM2.5) standards were promulgated by U.S. EPA on July 18, 1997. The federal 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

Monitoring site address: Victorville Station, 14306 Park Ave., Victorville CA 92392

O_3 = ozone
ppm = parts per million

Table 5.2-2c
Concentration Data Summary for Ozone at Trona Station

Year	Highest Concentration for O_3 (ppm)		Estimated Number of Days Exceeding Standards		
	1-Hour	8-Hour	State 1-Hour	State 8-Hour	Federal 8-Hour
2007	**0.094**	0.085	0	26	7
2006	0.091	0.084	0	19	9
2005	0.091	**0.086**	0	30	17

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov ; Last access: October 28, 2008

Table 5.2-2c
Concentration Data Summary for Ozone at Trona Station

Year	Highest Concentration for O_3 (ppm)		Estimated Number of Days Exceeding Standards		
	1-Hour	8-Hour	State 1-Hour	State 8-Hour	Federal 8-Hour

Notes:

1. Number of days with an 8-hour average exceeding federal standard concentration of 0.075 ppm. Regulatory standard is to maintain 0.075 ppm as a 3-year average of the fourth-highest daily maximum. Therefore, number of days exceeding standard concentration is not the number of violations of the standard for the year.
2. Maximum average values occurring during the most recent 3 years are indicated in bold.
3. National standards, other than those for ozone and based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
4. New federal 8-hour ozone and fine particulate matter (PM2.5) standards were promulgated by U.S. EPA on July 18, 1997. The federal 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

Monitoring site address: Trona Station, Athol St., Trona CA 93562

O_3 = ozone
ppm = parts per million

Particulate Matter

PM_{10}

Particulates in the air are caused by a combination of 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, and NO_x). Respirable particulate matter is referred to as PM_{10}, which has 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.

Tables 5.2-3a-c show the maximum 24-hour and annual arithmetic mean PM_{10} levels recorded at the Barstow, Victorville, and Trona stations. The arithmetic annual mean 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. The tables show that the state 24-hour average PM_{10} CAAQS of 50 micrograms per cubic meter (µg/m^3) was exceeded in the last three years. The federal 24-hour average PM_{10} NAAQS of 150 µg/m^3 was exceeded only in 2007, when the measured concentration was much higher than the other years. The maximum recorded 24-hour PM_{10} concentration of 358 µg/m^3 in 2007 at Victorville (and the maximum at Barstow) was likely caused by nearby forest fires. The most representative background concentration used in the air quality effects analysis was 86.0 µg/m^3 value recorded in 2007 at the Trona station.

Similar to the maximum recorded 24-hour PM_{10} concentration, the highest annual arithmetic mean for a PM_{10} concentration was 36.0 µg/m^3 in 2007 at Victorville. The most representative background concentration used in the air quality effects analysis was 19.9 µg/m^3 value recorded in 2007 at the Trona station. As shown by this table, the Project Site is in an area designated nonattainment with respect to both federal and state PM_{10} standards.

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

Year	Highest 24-Hour Concentration for PM_{10} (µg/m^3)		Annual Arithmetic Mean for PM_{10} (µg/m^3)	Estimated Number of Days Exceeding Standards	
	Federal	State		Federal 24-Hour	State 24-Hour
2007	**202.0** (103.0)	**194.0 (98.0)**	**29.8**	1	5
2006	80.0	77.0	21.9	0	2
2005	78.0	70.0	25.4	0	3

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov; Last access: October 28, 2008
Notes: Annual arithmetic mean for PM_{10} represents the national annual average.
Maximum average values occurring during the most recent 3 years are indicated in bold.
Values in parentheses are highest second high values. Maximum values were likely associated with nearby forest fires.
The federal PM_{10} standard is 24-hour average (150 µg/m^3).
The state PM_{10} standards are annual arithmetic mean (20 µg/m^3) and 24-hour average (50 µg/m^3).
Monitoring site address: Barstow Station, 1301 W. Mountain View St., Barstow CA 92311
µg/m^3 = micrograms per cubic meter
µm = micrometer
PM_{10} = particulate matter less than 10 microns in diameter

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

Year	Highest 24-Hour Concentration for PM_{10} (µg/m^3)		Annual Arithmetic Mean for PM_{10} (µg/m^3)	Estimated Number of Days Exceeding Standards	
	Federal	State		Federal 24-Hour	State 24-Hour
2007	**358.0** (130.0)	**339.0 (126.0)**	**36.0**	1	4
2006	62.0	56.0	30.5	0	2
2005	61.0	57.0	26.1	0	1

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov; Last access: October 28, 2008
Notes:
Annual arithmetic mean for PM_{10} represents the national annual average.
Maximum average values occurring during the most recent 3 years are indicated in bold.
Values in parentheses are highest second high values. Maximum values were likely associated with nearby forest fires.
The federal PM_{10} standard is 24-hour average (150 µg/m^3).
The state PM_{10} standards are annual arithmetic mean (20 µg/m^3) and 24-hour average (50 µg/m^3).
Monitoring site address: Victorville Station, 14306 Park Ave., Victorville CA 92392
µg/m^3 = micrograms per cubic meter
µm = micrometer
PM_{10} = particulate matter less than 10 microns in diameter

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

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
2007	**86.0**	**80.0**	**19.9**	0	1
2006	83.0	77.0	19.3	0	2
2005	39.0	36.0	17.5	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov; Last access: October 28, 2008
Notes:
Annual arithmetic mean for PM_{10} represents the national annual average.
Maximum average values occurring during the most recent 3 years are indicated in bold.
Values in parentheses are highest second high values. Maximum values were likely associated with nearby forest fires.
The federal PM_{10} standard is 24-hour average (150 $\mu g/m^3$).
The state PM_{10} standards are annual arithmetic mean (20 $\mu g/m^3$) and 24-hour average (50 $\mu g/m^3$).
Monitoring site address: Trona Station, Athol St., Trona CA 93562
$\mu g/m^3$ = micrograms per cubic meter
µm = micrometer
PM_{10} = particulate matter less than 10 microns in diameter

$PM_{2.5}$

Fine particulates 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. 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 $\mu g/m^3$) became effective on 17 December 2006.

The $PM_{2.5}$ data presented in Table 5.2-4 for the Victorville Station (the only station in the vicinity that records $PM_{2.5}$) show no exceedances of the federal 24-hour average NAAQS of 35 $\mu g/m^3$. The highest 24-hour value recorded at this station was 28.0 in 2007. No separate state standard exists for the 24-hour averaging time.

The annual average $PM_{2.5}$ data are also presented in this table. 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 10.4 $\mu g/m^3$ in 2006, which is below the California $PM_{2.5}$ ambient air quality standard of 12 $\mu g/m^3$. These maximum 24-hour and annual concentrations were used as the highest and most representative background concentration in the air quality effects analysis. The Project Site is in an area designated unclassified with respect to both the federal and state $PM_{2.5}$ standards.

Table 5.2-4
Concentration Data Summary for Fine Particulate Matter (PM_{25})
at Victorville Station

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**
2007	**28.0**	9.7	9.7	0
2006	22.0	**10.4**	**10.3**	0
2005	27.0	9.7	--	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov; Last access: October 28, 2008
Notes:
Maximum average values occurring during the most recent 3 years are indicated in bold.
-- = Data not available
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: Victorville Station, 14306 Park Avenue, Victorville, CA 92392
µg/m^3 = micrograms per cubic meter
µm = micrometer
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter

Carbon Monoxide (CO)

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 Barstow and Victorville stations are summarized in Tables 5.2-5a-b. The data in these tables indicate that maximum 1-hour and 8-hour average CO levels comply with the NAAQS and CAAQS of 20.0 ppm and 9.0 ppm, respectively. The maximum 1-hour CO concentration of 3.5 ppm and the maximum 8-hour concentration of 1.6 ppm, from 2006 and 2005 respectively, were used as the highest and most representative background concentration in the air quality effects analysis. As shown by this table, the Project Site is in an area designated attainment with respect to both federal and state CO standards.

Table 5.2-5a
Concentration Data Summary for Carbon Monoxide at Barstow 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	1.4	0.7	0	0	0	0
2006	**3.5**	1.19	0	0	0	0
2005	3.3	**1.34**	0	0	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html; Last access: October 28, 2008

Notes:

Maximum average values occurring during the most recent 3 years are indicated in bold.

All 1-hour concentrations are below the federal and California CO ambient air quality standards of 35 ppm and 20 ppm, respectively.

All 8-hour concentrations are below the federal and California CO ambient air quality standard of 9 ppm.

Monitoring site address: Barstow Station, 1301 W. Mountain View St., Barstow CA 92311

CO = carbon monoxide

ppm = parts per million

Table 5.2-5b
Concentration Data Summary for Carbon Monoxide at Victorville 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	2.1	1.61	0	0	0	0
2006	2.2	1.56	0	0	0	0
2005	**3.3**	**1.63**	0	0	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html; Last access: October 28, 2008

Notes:

Maximum average values occurring during the most recent 3 years are indicated in bold.

All 1-hour concentrations are below the federal and California CO ambient air quality standards of 35 ppm and 20 ppm, respectively.

All 8-hour concentrations are below the federal and California CO ambient air quality standard of 9 ppm.

Monitoring site address: Victorville Station, 14306 Park Ave., Victorville CA 92392

CO = carbon monoxide

ppm = parts per million

Nitrogen Dioxide (NO_2)

NO_x emissions are primarily generated from the combustion of fuels; they include nitric oxide (NO) and NO_2. Because NO converts to NO_2 in the atmosphere over time and NO_2 is the more toxic of the two, NO_2 is the listed criteria pollutant. The control of NO_2 is 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 19 February 2008, the Office of Administrative Law approved amendments to the regulations for the CAAQS for NO_2. The new standards became effective on 20 March 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.

Recorded NO_2 concentration monitoring data at the Barstow, Victorville, and Trona stations are summarized in Tables 5.2-6a-c. As supported by these tables, the MDAQMD has been in attainment of NO_2 for many years. 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. The maximum recorded 1-hour and annual average NO_2 concentrations of 0.087 ppm and 0.022 ppm, respectively, in 2005 at the Barstow station were used as the highest and most representative background concentration in the air quality effects analysis. This high 1-hour concentration of

0.087 did not exceed the state 1-hour standard of 0.25 ppm that existed in 1998. More recent 1-hour NO_2 measurements do not exceed the current 1-hour NO_2 standard of 0.18 ppm.

Table 5.2-6a
Concentration Data Summary for Nitrogen Dioxide at Barstow Station

Year	Highest 1-Hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
2007	0.073	0.020	0	0
2006	0.082	0.022	0	0
2005	**0.087**	**0.022**	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html
Notes:
Maximum average values occurring during the most recent 3 years are indicated in bold. All 1-hour concentrations are below the California NO_2 ambient air quality standard of 0.25 ppm.
All annual average concentrations are below the federal NO_2 ambient air quality standard of 0.053 ppm.
Monitoring site address: Barstow Station, 1301 W. Mountain View St., Barstow CA 92311
NO_2 = nitrogen dioxide
ppm = parts per million

Table 5.2-6b
Concentration Data Summary for Nitrogen Dioxide at Victorville Station

Year	Highest 1-Hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
2007	0.071	0.018	0	0
2006	**0.079**	**0.020**	0	0
2005	0.077	0.019	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html
Notes:
Maximum average values occurring during the most recent 3 years are indicated in bold. All 1-hour concentrations are below the California NO_2 ambient air quality standard of 0.25 ppm.
All annual average concentrations are below the federal NO_2 ambient air quality standard of 0.053 ppm.
Monitoring site address: Victorville Station, 14306 Park Ave., Victorville CA 92392
NO_2 = nitrogen dioxide
ppm = parts per million

Table 5.2-6c
Concentration Data Summary for Nitrogen Dioxide at Trona Station

Year	Highest 1-Hour Concentration for NO_2 (ppm)	Annual Average for NO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)	
			Federal	State
2007	**0.055**	0.004	0	0
2006	0.050	**0.005**	0	0
2005	0.053	0.005	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html

Notes:

Maximum average values occurring during the most recent 3 years are indicated in bold.
All 1-hour concentrations are below the California NO_2 ambient air quality standard of 0.25 ppm.

All annual average concentrations are below the federal NO_2 ambient air quality standard of 0.053 ppm.

Monitoring site address: Trona Station, Athol St., Trona CA 93562

NO_2 = nitrogen dioxide
ppm = parts per million

Sulfur Dioxide (SO_2)

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 larger 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.

Monitored SO_2 concentration data at the Victorville and Trona stations are presented in Tables 5.2-7a-b. The MDAQMD is in attainment for all applicable state and federal ambient standards for SO_2.

The SO_2 data in Tables 5.2-7a-b demonstrate that neither the 24-hour average CAAQS of 0.04 ppm nor the NAAQS of 0.14 ppm has been exceeded in the Project vicinity between 2005 and 2007. The maximum recorded 1-hour, 3-hour, 24-hour, and annual average SO_2 concentrations of 0.033, 0.017, 0.005, and 0.002 ppm, respectively, were used to be the most representative background concentration for the air quality effects analysis.

Table 5.2-7a
Concentration Data Summary for Sulfur Dioxide at Victorville Station

Year	Highest Concentration for SO_2 (ppm)			Annual Average for SO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)				
	1-Hour	3-Hour	24-Hour		Federal 3-Hour	Federal 24-Hour	Federal Annual Mean	State 1-Hour	State 24-Hour
2007	0.009	0.006	0.005	0.001	0	0	0	0	0
2006	**0.018**	**0.012**	**0.005**	**0.002**	0	0	0	0	0
2005	0.012	0.008	0.003	0.001	0	0	0	0	0

Table 5.2-7a
Concentration Data Summary for Sulfur Dioxide at Victorville Station

Year	Highest Concentration for SO_2 (ppm)			Annual Average for SO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)				
	1-Hour	3-Hour	24-Hour		Federal 3-Hour	Federal 24-Hour	Federal Annual Mean	State 1-Hour	State 24-Hour

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html
Notes:

All 1-hour average concentrations are below the California SO_2 ambient air quality standard of 0.5 ppm (1,300 µg/m3)

All 24-hour average concentrations are below the California SO_2 ambient air quality standard of 0.04 ppm (105 µg/m3) and the federal ambient air quality standard of 0.14 ppm (365 µg/m3).

All annual average concentrations are below the federal SO_2 ambient air quality standard of 0.03 ppm (80 µg/m3).

-- = Data not available

Monitoring site address: Victorville Station, 14306 Park Avenue, Victorville, CA 92392

SO_2 = sulfur dioxide
ppm = parts per million

Table 5.2-7b
Concentration Data Summary for Sulfur Dioxide at Trona Station

Year	Highest Concentration for SO_2 (ppm)			Annual Average for SO_2 (ppm)	Estimated Number of Days Exceeding Standards (days)				
	1-Hour	3-Hour	24-Hour		Federal 3-Hour	Federal 24-Hour	Federal Annual Mean	State 1-Hour	State 24-Hour
2007	0.014	0.009	**0.005**	0.001	0	0	0	0	0
2006	**0.033**	**0.017**	0.004	**0.001**	0	0	0	0	0
2005	0.018	0.011	0.004	0.001	0	0	0	0	0

Source: California Air Resources Board (CARB), 2008, www.arb.ca.gov. ; USEPA AIRS, 2008, www.epa.gov/air/data/index.html
Notes:

All 1-hour average concentrations are below the California SO_2 ambient air quality standard of 0.5 ppm (1,300 µg/m3)

All 24-hour average concentrations are below the California SO_2 ambient air quality standard of 0.04 ppm (105 µg/m3) and the federal ambient air quality standard of 0.14 ppm (365 µg/m3).

All annual average concentrations are below the federal SO_2 ambient air quality standard of 0.03 ppm (80 µg/m3).

-- = Data not available

Monitoring site address: Trona Station, Athol St., Trona, CA 93562

SO_2 = sulfur dioxide
ppm = parts per million

Lead

Lead exposure can occur through multiple pathways, including inhalation of air and ingestion of lead in food from water, soil, or dust contamination. Excessive exposure to lead can trigger seizures, mental retardation, or behavioral disorders, and other central nervous system damage. Lead gasoline additives, nonferrous smelters, and battery plants were the most significant contributors to atmospheric lead emissions. Legislation in the early 1970s required gradual reduction of the lead content of gasoline over a period of time, which has dramatically reduced lead emissions from mobile and other combustion sources. In addition, unleaded gasoline was introduced in 1975, and together these controls have essentially eliminated violations of the lead standard for ambient air in urban areas. Lead is not monitored in the vicinity of the Project Site.

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 MDAQMD is in attainment with the state standard for sulfates; there is no federal standard.

Other State-Designated Criteria Pollutants

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

5.2.2 Environmental Consequences

This section describes the analyses conducted to assess the potential air quality effects of the Project. Effects due to the Project would be considered significant if, when combined with background ambient concentrations, they would exceed an ambient air quality standard. These standards are discussed in Section 5.2.5, LORS Compliance. Emissions estimates for both construction and operation of the Project are presented in this section. Dispersion model selection and setup are also described (i.e., emissions scenarios and release parameters, building wake effects, meteorological data, and receptor locations) and analysis results are presented.

5.2.2.1 Project Construction Emissions

The primary emission sources during the construction of the Project would include exhaust from heavy construction equipment and vehicles and fugitive dust generated in areas disturbed by grading, excavating, and erection of Project Sun Catchers and structures. The projected construction schedule has a total duration of 41 months for full buildout of the 850 megawatt generating capacity, which could vary depending on the availability of transmission upgrades by Southern California Edison (SCE) and the actual build rate of Sun Catchers. 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 3.0, Project Description and Location. For purposes of this analysis, the assumed Project construction area would be 7,700 acres for the Project Site, including two 25-acre staging areas, one adjacent to and west of the SCE Lugo-Pisgah transmission line and north of the BNSF right-of-way (ROW), and the second adjacent the Hector Road exit north and east of I-40 and south of the existing underground natural gas pipelines. A third 11-acre laydown area is immediately adjacent the southern portion of the Main Services Complex (MSC).

Fugitive dust emissions from the construction of the Project will result from:

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

Fuel combustion emissions 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,
- pollutant 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 5.2-8, Estimated Construction Equipment Usage Schedule).

Table 5.2-8
Construction Equipment Projection (850 MW)

Construction Equipment Description	HP	D	G	Month After Construction Start																																								
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Aerial Lift (JLG)	120	x		2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Air Compressor	50	x		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Asphalt Paver	120	x		2	2	2	2	2	2	2	2	2	2	1	1																													
Backhoe	120	x		4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6												
Compactor	120	x		5	8	8	8	5	5	5	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	1	1		
Concrete Pump Truck	250	x		1	2	2	2	2	1	1							2	1	1						3	3	3																	
Crane	250	x		1	4	4	4	4	7	7	7	7	7	7	7	7	7	7	7	7	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Dozer	250	x		4	5	3	2	2	1	2	2	2	2	2	4	4	5	4	4	4	2	2	2	2	3	3	1																	
Drilling Rig	250	x		3	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5	5	5	5	5	5																		
Dump Truck	250	x		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	6	6	3	2	2	2	2	2	2	2	2	2	2	2	2					
Flatbed Truck	250	x		6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	2	2	2	2					
Fork Lift	50	x		3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Generator	50	x		2	2	2	2	2	7	7	6	6	6	6	6	6	6	6	6	6	1	2	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1					
Grader	175	x		6	6	6	6	5	6	6	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	1	1	1		
Light Tower	50	x		1	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Loader	250	x		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	3	2	2	2	2	2	2	2	2	2	2	2	2					
Maxi Sneeker (Trencher)	50	x			3	3	1	1	3	3	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6												
Pickup Truck	175		x	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4
Skid Steer (Bobcat)	50	x							4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5												
Telehandler	120	x							3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Water Truck	250	x		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4	4	4	4	4	4	4	4	4	4	4	4	2	2	2		
Welding Machine	50	x			2	2	2	2	1	1	1	1	1	1	1	1									1	1	1																	
Totals				64	90	88	85	81	96	96	97	97	97	94	97	98	100	98	98	97	85	86	85	85	92	92	77	66	66	66	66	65	48	48	48	44	44	44	44	27	27	27	23	22

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Mass emissions of all criteria pollutants from diesel-fueled construction equipment and vehicles were estimated using equipment-specific OFFROAD emissions factors published by the South Coast Air Quality Management District (SCAQMD). Diesel equipment emissions were calculated by means of an Excel Workbook (presented in Appendix V, Air Quality Data), 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 dispersion 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 San Bernardino County.

Assumptions used in calculating Project construction emissions included a 41-month construction period; 7 construction days per week; and a 12-hour workday (30 construction days per month). The list of fueled equipment usage 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 V, Air Quality Data, 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 40-mile radius.

The short-term maximum combustion and fugitive dust emissions were calculated using the equipment listed in Table 5.2-8 for Month 14 of the construction schedule, which is anticipated to have the heaviest equipment usage and earthmoving activities of any month. Based on the equipment usage and earthmoving schedules, emissions during Months 6 through 17 are expected to be the highest of any consecutive 12-month period during the overall 41-month construction effort.

Tables 5.2-9 and 5.2-10 present the estimated maximum daily and annual emissions of air pollutants due to Project construction, respectively, including the contributions from specific activities

Table 5.2-9
Daily Maximum Construction Emissions of Criteria Pollutants (lbs/day)

Activity	PM_{10}	$PM_{2.5}$	CO	ROC	NO_x	SO_x
Onsite Combustion Emissions						
Diesel Construction Equipment	34.76	31.98	287.70	93.49	700.42	0.82
Worker vehicles	1.09E-04	8.30E-05	6.98E-03	6.53E-04	6.08E-04	9.92E-06

Table 5.2-9
Daily Maximum Construction Emissions of Criteria Pollutants (lbs/day)

Activity	PM_{10}	$PM_{2.5}$	CO	ROC	NO_x	SO_x
Subtotal of Construction Combustion	***34.8***	***32.0***	***287.7***	***93.5***	***700.4***	***0.8***
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	37.19	7.88				
Earth clearing/Bulldozing	12.64	2.63				
Earth Loading/Storage	2.36	0.08				
Subtotal of Onsite Fugitive Emissions	***52.2***	***10.6***				
Offsite Emissions						
Worker Passenger Vehicle and delivery trucks – Combustion Emissions	18.25	16.79	529.29	104.15	297.22	0.58
Worker Passenger Vehicle and delivery truck – Paved Road Dust	568.55	96.08				
Subtotal of Offsite Emissions	***586.80***	***112.87***	***529.29***	***104.15***	***297.22***	***0.58***
Total	**673.8**	**155.4**	**817.0**	**197.6**	**997.6**	**1.4**

Notes:

PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
ROC = reactive organic compounds
CO = carbon monoxide
NO_x = nitrogen oxide(s)
SO_x = sulfur oxide(s)

Table 5.2-10
Maximum Annual Construction Emissions of Criteria Pollutants (ton/year [tpy])

Activity	PM_{10}	$PM_{2.5}$	CO	ROC	NO_x	SO_x
Onsite Combustion Emissions						
Diesel Construction Equipment	5.20	4.79	42.80	14.00	99.81	0.12
Pickup trucks and worker vehicles	0.00	0.00	0.26	0.03	0.10	0.00
Subtotal of Construction Combustion	***5.21***	***4.79***	***43.06***	***14.03***	***99.91***	***0.12***

Table 5.2-10
Maximum Annual Construction Emissions of Criteria Pollutants (ton/year [tpy])

Activity	PM_{10}	$PM_{2.5}$	CO	ROC	NO_x	SO_x
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	6.52	1.38				
Earth clearing/Bulldozing	1.83	0.38				
Earth Loading/Storage	0.90	0.19				
Subtotal of Onsite Fugitive Emissions	***9.3***	***2.0***				
Offsite Emissions						
Worker Passenger Vehicle and delivery trucks – Combustion Emissions	3.28	3.02	95.25	18.74	53.45	0.11
Worker Passenger Vehicle and delivery truck – Paved Road Dust	101.77	17.20				
Subtotal of Offsite Emissions	***105.05***	***20.22***	***95.25***	***18.74***	***53.45***	***0.105***
Total Max. Annual Emissions	**119.5**	**27.0**	**138.3**	**32.8**	**153.4**	**0.2**

Notes:
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
ROC = reactive organic compounds
CO = carbon monoxide
NO_x = nitrogen oxide(s)
SO_x = sulfur oxide(s)

5.2.2.2 Operational Emissions

Air pollutant emission sources associated with thermal solar electric generation are much smaller than for conventional power plants. Operational stationary sources of emissions for the Project will be limited to one backup diesel internal combustion engine driver for an emergency generator. The backup generator engine will be rated at 335 horsepower, will be tested 60 minutes per week (52 hours per year) to ensure its operability in the event of an emergency. Estimated hourly and annual emissions and stack parameters for the backup diesel generator is provided in Table 5.2-11.

Emission rates shown in Table 5.2-11 are based on vendor-supplied or EPA Title 40 CFR 89.112 Tier 3 emission factors, whichever factor is higher. The exclusive fuel for the generator engine will be ultra-low sulfur diesel containing a maximum of 15 ppm sulfur. Detailed emissions calculations for the backup diesel generators are presented in Appendix V, Air Quality Data.

Another category of emission sources on the Project Site during Project operations will be the fleet of vehicles that will be used for a variety of purposes, including:

- tanker trucks for mirror washing,
- other maintenance trucks,
- staff and security trucks,
- fork lifts,
- staff cars,
- visitor vehicles,
- delivery trucks, and
- transport tractor-trailers.

Table 5.2-11
Backup Diesel Generator Engine Emission Rates and Stack Parameters

Pollutant	Emissions (lb/hr)	Emissions (lb/yr)
NOx	4.19	217.92
CO	1.92	99.93
VOC	0.05	2.69
SO_X	0.09	4.61
PM_{10}	0.11	5.77

Source: URS Corporation, 2008.
Source Parameters:
Rated capacity: 335 horsepower
Testing duration: 60 minutes per week
Expected annual non-emergency use: 52 hours per year
Stack height: 6.5 feet above ground level
Stack diameter: 8 inches
Stack exhaust flow rate at full firing: 1,218 ACFM
Stack exhaust temperature at full firing: 869ºF
Notes:
Stack parameters and emissions data provided by project design engineer
ACFM = actual cubic feet per minute
CO = carbon monoxide
lb/hr = pounds per hour
lb/yr = pounds per year
°F = degrees Fahrenheit
NO_x = nitrogen oxide
PM_{10} = particulate matter less than 10 microns in diameter
SO_x = sulfur oxide
VOC = volatile organic compounds

The assumed operational Project vehicle fleet and the equipment and the estimated pollutant emissions from these combined vehicle and equipment operations on the site are summarized in Table 5.2-12 and Table 5.2-13, respectively. Supporting detailed information used as the basis for these emissions estimates is provided in Appendix V, Air Quality Data.

Table 5.2-12
On-Site Vehicle and Equipment Usage During Project Operations

Description	Activity	Vehicle Make/Model, Fuel	Quantity	Frequency
Tanker Truck	Mirror Washing	5 ton Truck, Diesel	22	Continuous
Line replaceable unit maintenance truck with boom[1]	Field Servicing & Maintenance	5 ton Truck, Diesel	24	Continuous
Staff & Security Truck	Site Inspections & Security	¾ ton Truck, Gasoline	6	Continuous
Rubber-wheeled forklift with telescoping boom[1]	SunCatcher power conversion unit & Mirror Maintenance	Caterpillar, Telehandler, Diesel	2	Continuous
Forklif[1]	Warehousing of supplies	5 ton, Propane	2	Continuous
Telescoping Man Lift[1]	Facility Maintenance and SunCatcher power conversion unit & Mirror Maintenance	Propane	8	Continuous
Staff Cars	Community to Work	Cars, Gasoline	120	Daily
Van Pooling		¾ ton Truck, Gasoline	4	Daily
Visitor Cars	Sales, Deliveries, Services	Cars, Gasoline	10	Daily
Delivery Trucks	Hydrogen Delivery	20 ton, Diesel	2	Weekly
	Operations and Maintenance Supplies	5 ton Cargo Truck, Diesel	1	Weekly
	Waste Management	20 ton, Diesel	1	Weekly
	Hazardous Waste	20 ton, Diesel	1	Weekly
Transport Tractor Trailers	Spare Parts, Building Supplies, Temporary Rental Equipment	40-foot, Diesel	1	Weekly

Source: Stirling Energy Systems, 2008.
Note:
[1] :offroad equipment

Table 5.2-13
Pollutant Emissions Due to On-Site Vehicle and Equipment Usage During Operations

	Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	CO	ROG	NO_x	SO_x
Unmitigated (no watering)	3,308	704	393	56	86	0.33
Mitigated (with watering)	1,945	415	393	56	86	0.33

Table 5.2-13
Pollutant Emissions Due to On-Site Vehicle and Equipment Usage During Operations

	Annual Emissions (tons/year)					
	PM_{10}	$PM_{2.5}$	CO	ROG	NO_x	SO_x
Unmitigated (no watering)	590	128	72	9	13	0.06
Mitigated (with watering)	350	76	72	9	13	0.06

Source: See Appendix V, Air Quality Data.
Notes:
CO = carbon monoxide
NO_x = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_x = sulfur oxides
VOC = volatile organic compounds

The only operational stationary emission source for the Project is an emergency backup diesel generator engine. The scheduled operation for the engine will be limited to 60 minutes per week and 52 hours per year for testing purposes. Thus, the worst case Project emissions scenario for purposes of the air dispersion modeling described in Section 5.2.2.3 includes one 60-minute test of the generator engine within any 24 hour period and 52 hours of such engine operation over a one-year period.

5.2.2.3 Greenhouse Gas Emissions

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, iincluding worker vehicles and delivery trucks, were obtained from the EMFAC2007 emissions model. 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 5.2-14, presents the estimated greenhouse gas emissions from the total project construction efforts 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 5.2-14
Total Construction Related Greenhouse Gas Emissions (metric tonne/year)

Activity	CO_2	CH_4	N_2O	CO_2e
Onsite Combustion Emissions				
Diesel Construction Equipment	9,386	1.15	0.000	9,410
Pickup trucks and worker vehicles	25	0.001	0.001	0.06
Subtotal of Construction Combustion	***9,411***	***1.15***	***0.001***	***9,410***
Offsite Combustion Emissions				
Worker Passenger Vehicle and delivery trucks – Combustion Emissions	8,963	0.27	0.26	9,049
Subtotal of Off-site Emissions	***8,963***	***0.27***	***0.26***	***9,049***
Total	**18,374**	**1.4**	**0.3**	**18,460**

5.2.2.3.2 Operational GHG Emissions

Potential greenhouse gas emissions from the Project during operation of the solar power station will be from a single stationary source, small amounts of circuit breaker leakage of sulfur hexafluoride (SF_6), and the operation of Project maintenance and security vehicles and trips to deliver personnel and supplies to the Project Site. The only stationary source emissions for the Project will be from the diesel generator engine. These emissions were calculated using the CCAR power/utility protocol (Version 1.0, April 2005) and are based on 52 hours annual operation. The estimated annual greenhouse gas emissions from the diesel generator engine are presented in Table 5.2-15. Calculation details are provided in Appendix V, Air Quality Data.

Table 5.2-15
Maximum Potential Greenhouse Gas Emissions from the Backup Diesel Generator (metric tons/year, total CO_2 Equivalent)

7.70

Source: See Appendix V, Air Quality Data.
Note:
CO_2 = carbon dioxide

The OFFROAD2007 model was used to calculate GHG emission from the off-road equipment. 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 5.2-16 presents the estimated GHG emission due to vehicle usage during facility operations.

Supporting calculation details for the greenhouse gas emissions estimates in this table are provided in Appendix V, Air Quality Data.

Table 5.2-16
Pollutant Greenhouse Gas Emissions Due to Vehicle Usage During Operations (metric tonne/year)

CO_2	CH_4	N_2O	Total GHG - CO_2e
5,121	0.29	0.25	5,203

Small amounts of SF_6 will be emitted as a result of leakage from the new circuit breakers associated with the project. A conservative leakage rate of 1 percent was assumed for purposes of estimating annual SF_6 emissions from the circuit breakers. The estimated maximum potential SF_6 leakage emissions from circuit breakers and other transmissions system equipment on the Project Site are presented in Table 5.2-17. Calculation details are provided in Appendix V, Air Quality Data.

Table 5.2-17
Estimated Maximum Potential SF_6 Leakage Emissions from Proposed Circuit Breakers and Other Transmissions System Equipment on the Project Site (metric tonne/year)

Breaker	Qty	Typical Make	Typical Model	SF6 Lbs/Brkr	Leakage Rate	Leakage Lbs/Yr (per Brkr)	Leakage Lbs/Yr (All Brkrs)	CO_2e emissions (metric tonnes/Yr)
34.5kV Solar Group Breaker (3000A)	6	GE-Hitachi HVB	HS Series	31	1%	0.31	1.86	20.16
242kV Power Circuit Breaker (2000A)	8	GE-Hitachi HVB	HP Series	240	1%	2.4	19.2	208.14
242kV Coupling Capacitor Voltage Transformer (900A)	6	GE-Hitachi HVB	HP Series	240	1%	2.4	14.4	156.11
CO_2e emissions (metric tonnes/Yr)								384.42

Table 5.2-17
Estimated Maximum Potential SF_6 Leakage Emissions from Proposed Circuit Breakers and Other Transmissions System Equipment on the Project Site (metric tonne/year)

Note:
1. Reference: Greenhouse Gas Global Warming Potentials (GWPs) - Intergovernmental Panel on Climate Change, Second Assessment Report (1996) GWP for SF_6

Source: Stirling Energy Systems, 2008.
Notes:

CO_2e	=	carbon dioxide equivalent
kV	=	kilovolt
A	=	Amps
Bkr	=	breaker
lbs	=	pounds|
yr	=	year

5.2.2.4 Air Quality Impacts Analysis

The purpose of the air quality effects analysis is to evaluate whether criteria pollutant emissions resulting from the Project, would cause or contribute significantly to a violation of a CAAQS or NAAQS. Mathematical models designed to simulate the atmospheric transport and dispersion of airborne pollutants were used to quantify the maximum expected effects of Project emissions for comparison with applicable regulatory criteria. Potential effects of toxic air contaminant emissions from the Project were evaluated in Section 5.16, Public Health and Safety.

Separate criteria pollutant modeling analyses were conducted to address the air quality effects of emissions from Project construction activities and Project operations because these activities would occur at different times. Effects from construction activities include fugitive dust from grading and excavation of disturbed areas and exhaust combustion products from diesel- and gasoline-fueled construction equipment and vehicles. The effects from stationary sources during operations would be associated with diesel combustion in the backup diesel generator.

Construction Modeling

The effects of Project construction emissions on off-site criteria pollutant concentrations were evaluated using the 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, and to use sequential hourly meteorological input data. The regulatory default options were used including building and stack tip downwash, default wind speed profiles, exclusion of deposition and gravitational settling, consideration of buoyant plume rise, and complex terrain.

For the AERMOD simulations to evaluate construction impacts on NO_2 concentrations, the ozone-limiting method (OLM) option of the model was used to take into account the role of ambient O_3 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 O_3 monitoring data for the same years corresponding to the meteorological input record. These simulations used the O_3 data from the MDAQMD Barstow

Monitoring Station for the year 2005, the same year for which the meteorological input data to the model were selected.

To evaluate whether urban or rural dispersion parameters should be used in the model simulations, an analysis of land use adjacent to the Project Site was conducted in accordance with Section 8.2.8 of the *Guideline on Air Quality Models* (EPA 2003) and Auer (1978), and the EPA AERMOD Implementation Guide (2005), and its Addendum (2006). Based on the Auer land use classification procedure, 100 percent of the area within a 1.86-mile (3-kilometer) radius of the Project Site is appropriately classified as rural. Thus, according to the EPA AERMOD implementation guide, the AERMOD rural option was selected. Seasonal values for micrometeorological parameters (albedo, Bowen ratio, surface roughness) appropriate for the land use characteristics of the Project area were selected for processing the meteorological input data set for the AERMOD model.

Section 5.2.2.1 describes the development of Project construction emissions estimates over the planned 41-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 (see Appendix V, Air Quality Data).

Worst case modeling was conducted for short-term averaging times assuming operation of all construction equipment and fugitive dust generation from Month 14 (see Section 5.2.2.1, Project Construction Emissions). Annual emissions were modeled for Months 6-17 of the construction schedule after a determination that this period will have a higher level of construction activity than any other consecutive 12-months over the full 41 months of construction.

For purposes of estimating emissions for modeling, construction activities were assumed to occur during a 12-hour work day. All emissions were modeled as occurring between the hours of 0700 to 1900. 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 (Months 6 through 17 of the construction schedule). Supporting modeling files may be found on the CD/DVD provided with this AFC, at the end of Section 5.16, Public Health and Safety.

Operations Modeling

Section 5.2.2.2 describes Project operational emissions from the backup diesel generator. The impacts of these emissions on off-site criteria pollutant concentrations were evaluated using the same AERMOD (Version 07026) described in the preceding section. 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 using hourly meteorological data. Supporting modeling files may be found on the CD/DVD provided with this AFC, at the end of Section 5.16, Public Health and Safety.

Meteorological Data

The AERMOD modeling analyses to evaluate the potential effects of Project construction used 1 year of hourly meteorological data collected at the nearest long-term meteorological station to the Project Site (i.e., the Barstow Daggett Airport). Barstow Daggett Airport is located approximately 13 miles east of the Project Site. Hourly meteorological data for year 2005 was selected as a period with high data capture currently available for this station (greater than 90 percent).

The topography near the Project Site can be categorized as desert with the Cady Mountains to the north and Newberry, Rodman, and Bullion Mountains to the south. The Twenty-Nine Palms Marine Corp base is located to the southeast of the Project Site. The meteorological station at Barstow Daggett Airport and the Project Site are located along I-40 east to west between these mountain ranges. No significant terrain features in the area between the Barstow Daggett Airport and Project would cause important differences in wind or temperature conditions in these areas. Therefore, the year of meteorological data selected from the Barstow Daggett Airport was determined to be representative of the Project.

The next closest NWS Stations to the Project Site are the Victorville, Needles, and Twenty-nine Palms Airports. These NWS Stations are 60 miles or more away from the Project Site, whereas the Barstow meteorological station is much closer.

There are only two long-term upper air stations for the entire State of California, one station for all of Arizona, and two stations for all of Nevada. The California stations are in Oakland and San Diego, the Arizona station is at Tucson, and the Nevada stations are at Winnemucca and Desert Rock (near Nellis Air Force Base). The closest upper air station to the Project Site is Desert Rock, NV, about 125 miles to the north-northeast and is the most representative of the inland desert conditions at the Project Site. The Tucson and Winnemucca stations are both more than 400 miles from the Project Site and are eliminated because of distance. Therefore, use of the Desert Rock upper air data set is most appropriate for modeling at the Project.

The *USEPA AERMOD Implementation Guide, January 2008*, discusses a newly developed tool called AERSURFACE that may be used to establish realistic and reproducible surface characteristics values. The AERSURFACE program was used to determine surface characteristics for input into the AERMET preprocessor program for this Project. AERSURFACE uses United States Geological Survey (USGS) National Land Cover Data 1992 archives to determine the albedo, Bowen ratio, and surface roughness length representative of the surface meteorological station.

The recommended 1 kilometer (km) radius around the meteorological station was used to calculate surface roughness values from the USGS land use data files (AERSURFACE User's Guide 2008). AERSURFACE subsequently applies an inverse geometric mean to calculate surface roughness. AERSURFACE uses a 10 km x 10 km land use domain with the meteorological tower as the center point to compute the most representative albedo and Bowen ratio values. The albedo is based on an unweighted arithmetic mean while the Bowen ratio uses an unweighted geometric mean.

For the AERSURFACE input, one 360 degree sector was used because the surrounding land use type to the Project Site does not significantly vary by sector for many miles in all directions. The latitude and longitude of the meteorological station are approximately 34.85 Longitude (decimal degrees) and 116.78 Latitude (decimal degrees). The surface meteorological tower at Barstow Daggett is at an airport and is in an arid region. The surface moisture input was set to average for Bowen ratio calculations. Months assigned to each season were as follows: Spring – February and March; Summer – April through July; Autumn – August through October; Winter (not receiving continuous snow cover) – November through January. Finally, monthly output was obtained for all surface characteristics, as presented in Table 5.2-18, AERMET Land Use Characteristics.

Table 5.2-18
AERMET Land Use Characteristics

Month	Sector	Range	Land Use Characteristics		
			Albedo (α)	Bowen Ratio (β) Avg. sfc moisture	Surface Roughness (Zo) (m)
Jan	1	110°-280°	0.22	4.39	0.148
Jan	2	280°-110°	0.22	4.39	0.120
Feb	1	110°-280°	0.22	2.17	0.148
Feb	2	280°-110°	0.22	2.17	0.125
Mar	1	110°-280°	0.22	2.17	0.148
Mar	2	280°-110°	0.22	2.17	0.125
Apr	1	110°-280°	0.22	2.96	0.148
Apr	2	280°-110°	0.22	2.96	0.134
May	1	110°-280°	0.22	2.96	0.148
May	2	280°-110°	0.22	2.96	0.134
Jun	1	110°-280°	0.22	2.96	0.148
Jun	2	280°-110°	0.22	2.96	0.134
Jul	1	110°-280°	0.22	2.96	0.148
Jul	2	280°-110°	0.22	2.96	0.134
Aug	1	110°-280°	0.22	4.39	0.148
Aug	2	280°-110°	0.22	4.39	0.134
Sep	1	110°-280°	0.22	4.39	0.148
Sep	2	280°-110°	0.22	4.39	0.134
Oct	1	110°-280°	0.22	4.39	0.148
Oct	2	280°-110°	0.22	4.39	0.134
Nov	1	110°-280°	0.22	4.39	0.148
Nov	2	280°-110°	0.22	4.39	0.120
Dec	1	110°-280°	0.22	4.39	0.148
Dec	2	280°-110°	0.22	4.39	0.120

An annual wind rose based on the five years of on-site meteorological data was provided in Figure 5.2-3, Annual Wind Rose for Barstow Daggett Airport. Seasonal wind roses can be found in Appendix V, Air Quality Data. Winds blow predominantly from the west.

Receptor Locations

Based on extensive experience modeling power plant construction phase effects, maximum concentrations for all pollutants due to construction activities are expected to occur within the first 100 meters from the Project boundary. Maximum operational pollutant concentrations from the backup diesel generator engine can also be expected to occur at receptor points on ornear to the Project boundary. Accordingly, the receptor grids used in the AERMOD modeling analysis to evaluate construction effects were as follows:

- 50-meter spacing along the fence line, and
- 100-meter spacing from fence line to approximately 1 km beyond the property line.

Figure 5.2-4, shows the placement of receptor points for modeling. Terrain heights at receptor grid points were determined from USGS digital elevation model files. Note that the receptor grid used for construction modeling did not use all receptors located in the northwest portion, compared to the operations modeling (as shown in Figure 5.2-4). Receptors still extended at least 800 meters out from the property line in this area of the project.

5.2.2.5 Modeling Results – Compliance with Ambient Air Quality Standards

Air dispersion modeling was performed according to the methodology described in Section 5.2.2.3 to evaluate the maximum increase in ground-level pollutant concentrations resulting from Project stationary source emissions, and to compare the maximum predicted impacts, including conservative background pollutant levels, with applicable short-term and long-term CAAQS and NAAQS. The effects from construction activities and Project operations were analyzed separately because they would occur during different time periods. The one-year record of hourly meteorological data (2005) was used in the AERMOD modeling to evaluate construction effects.

In evaluating construction impacts, the AERMOD model was used to predict the increases in criteria pollutant concentrations at all receptor concentrations due to Project emissions only. For Project operational emissions, AERMOD was also used to evaluate effects due to Project emissions only. The maximum modeled incremental pollutant concentration increases predicted for both project phases for each pollutant and averaging time were added to the corresponding maximum background concentrations recorded at the most representative monitoring stations during the most recent 3 years (i.e., 2005 through 2007). These background concentrations are presented and discussed in Section 5.2.1.2. The resulting total pollutant concentrations were then compared with the most stringent CAAQS or NAAQS.

Construction Impacts

Section 5.2.2.1, Project Construction Emissions, describes how the construction equipment schedule was used to estimate worst case emission (Month 14) conditions for the purpose of analyzing peak short-term effects to local air quality. Annual effects were modeled with all emissions that would occur during Months 6 through 17. Some notes regarding the modeling results for specific pollutants are provided below.

As reflected in the construction modeling results presented in Table 5.2-19, PM_{10} concentrations above the California (and occasionally the Federal) 24-hour standard have been recorded on multiple occasions at the nearest monitoring stations during recent years. Because of the land use characteristics of this area, it is highly probable that these conditions result primarily from high wind episodes, agricultural burning or tilling activities or other soil disturbances. The predicted contribution of the proposed construction activities would be minor by comparison with these sources, but would have the potential to temporarily contribute to existing violations of the state and federal PM_{10} standards when construction activities coincide with periods of high background concentrations.

AERMOD with OLM predicted maximum one-hour and annual NO_2 concentrations due to Project construction emissions which, when added to conservative background values from the nearest MDAQMD Monitoring Stations, are below the California standards for both averaging times. Predicted maximum effects for CO and SO_2 are also less than the most stringent ambient standards.

Table 5.2-19
Maximum Modeled Criteria Pollutant Effects Due to Project Construction Emissions

Pollutant	Averaging Period	Maximum Modeled Effects ($\mu g/m^3$)	Background[1] ($\mu g/m^3$)	Maximum Total Predicted Concentration ($\mu g/m^3$)	Most Stringent AAQS ($\mu g/m^3$)	UTM Coordinates	
						East (m)	North (m)
Construction Effects							
CO	1 hour	55.34	3,990	4,045	23,000	553890	3849950
	8 hour	10.0	1,824	1,834	10,000	553890	3849950
NO_2	1 hour[2]	134.67	163.6	298.3	339	553890	3849428
	Annual[2]	1.26	41.4	42.7	57	555004	3851589
PM_{10}	24 hour[3]	2.35	86.0	88.4	50	555004	3851539
	Annual[3]	0.07	19.9	20.0	20	555004	3851589
$PM_{2.5}$	24 hour	0.76	28.0	28.8	35	555004	3851539
	Annual[3]	0.06	14.4	14.5	12	555004	3851589
SO_2	1 hour	0.16	86.1	86.3	655	553890	3849950
	3 hour	0.07	44.4	44.5	1,300	553890	3849950
	24 hour	0.02	13.1	13.1	105	554037	3849949
	Annual	0.001	5.2	5.2	80	555004	3851589

Source: EPA, 2004a.
Notes:
[1]Background represents the maximum values measured during 2005-2007 at the most representative air quality monitoring stations, as described in Section 5.2.1.2, Existing Air Quality,
[2] Results for NO_2 during construction used the ozone limiting method with ambient ozone data collected at the Barstow Monitoring Station for the year 2005.
[3] $PM_{2.5}$ annual and all PM_{10} background levels exceed state ambient standards.
$\mu g/m^3$ = micrograms per cubic meter
AAQS = most stringent ambient air quality standard for the averaging period
CO = carbon monoxide
NO_2 = nitrogen dioxide
PM_{10} = particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter less than or equal to 2.5 microns diameter
SO_2 = sulfur dioxide
UTM = Universal Transverse Mercator
NAD27 = North American Datum of 1927

Operational Impacts

As described previously, the estimated emissions used in the AERMOD model for Project operations were based on the assumption of weekly testing of the emergency generator engine, the only stationary source of air pollutants for the operational Solar One facility. The 1-hour and annual emissions used for each pollutant are quantified in Table 5.2-11. The maximum predicted operational effects of the Project are presented in Table 5.2-20. The locations of maximum predicted ground level pollutant concentrations for the operational are shown in Figure 5.2-5. Supporting calculations can be found in Appendix V, Air Quality Data. The table shows that the modeled effects due to the Project emissions, in combination with conservative background concentrations, 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 to the emergency diesel engines, emissions will also result during operations of the Project from intermittent mobile equipment and vehicles to provide routine site maintenance and security and to deliver materials and visitors. Emissions from these sources are quantified in Table 5.2-13, Pollutant Emissions Due to On-Site Vehicle and Equipment Usage During Operations.

Table 5.2-20
Maximum Modeled Criteria Pollutant Effects Due to Project Operational Emissions

Pollutant	Averaging Period	Maximum Predicted Impact (μg/m³)	Background Concentration (μg/m³)	Total Concentration (μg/m³)	NAAQS (μg/m³)	CAAQS (μg/m³)	Maximum UTM NAD27 X Easting (m)	Maximum UTM NAD27 Y Northing (m)
NO_2	1-hour	114.78	163.6	278.4	NA	339	555,007	3,851,888
	Annual	0.01	41.4	41.4	100	57	555,007	3,851,888
SO_2	1-hour	3.0	86.1	89.1	NA	655	555,007	3,851,838
	3-hour	0.5	44.4	44.9	1300	NA	555,010	3,852,236
	24-hour	0.01	13.1	13.1	365	105	555,010	3,852,236
	Annual	0.0001	5.2	5.2	80	NA	555,007	3,851,888
CO	1-hour	64.8	3,990	4,055	40,000	23,000	555,007	3,851,838
	8-hour	2.2	1,824	1,826	10,000	10,000	555,008	3,851,987
PM_{10}	24-hour[3]	0.01	86	86.0	150	50	555,010	3,852,236
	Annual[3]	0.0001	19.9	19.9	NA	20	555,007	3,851,888
$PM_{2.5}$	24-hour	0.01	28	28.0	35	NA	555,010	3,852,236
	Annual[3]	0.0001	14.4	14.4	15	12	555,007	3,851,888

Table 5.2-20
Maximum Modeled Criteria Pollutant Effects Due to Project Operational Emissions

Pollutant	Averaging Period	Maximum Predicted Impact (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)	CAAQS (µg/m³)	Maximum UTM NAD27	Maximum UTM NAD27
							X Easting	Y Northing
							(m)	(m)

Source: EPA, 2004a.
Notes:
[1]Background represents the maximum values measured during 2005-2007 at the most representative air quality monitoring stations, as described in Section 5.2.1.2, Existing Air Quality,
[2] Results for NO_2 during construction used an ozone limiting method with ambient ozone data collected at the Barstow Monitoring Station for the year 2005.
[3] $PM_{2.5}$ annual and all PM_{10} 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
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 diameter
SO_2 = sulfur dioxide
UTM = Universal Transverse Mercator
NAD27 = North American Datum of 1927

5.2.3 Cumulative Impacts

CEC requirements specify that an analysis must be conducted to determine the cumulative effects of the Project and other projects within a 6-mile radius that have received construction permits but are not yet operational, or that are currently in the permitting process or expected to be in the near future. Section 5.18, Cumulative Impacts, provides a map (Figure 5.18-2) which shows the locations of other known development projects in the vicinity of the Solar One site. These include:

- The Solar Three thermal solar power development proposed by the applicant for the land immediately to the west of the Solar One site;
- Solar Six solar power development proposed by the applicant for the land to the east of the Solar One site
- Expansion of the SCE Pisgah Substation;
- Transmission line upgrades (approximately 67 miles from the Pisgah Substation following existing transmission lines to the Lugo Substation)
- Additional solar and wind energy projects in the area.

The combined effects of such sources will be less than significant because operational emissions from stationary sources are expected to be small for the types of cumulative facilities currently under consideration. However, the cumulative increase in vehicular traffic associated with multiple projects in an area that is currently undeveloped would likely have an effect on local air quality. Also, depending on the timing of project implementation relative to the Solar One construction schedule, there is a potential for cumulative construction impacts to air quality.

As of the filing date of this AFC, there is considerable uncertainty as to which of the other projects named in Section 5.18 will actually be developed and on what schedules. It is anticipated; however, that both the transmission line upgrades and the Solar Three Project would be developed close to, if not coinciding with Solar One. Section 5.18 discusses the potential cumulative impacts in detail. The following is a protocol for addressing cumulatitve air quality impacts in cooperation with CEC:

(1) Contact MDAQMD and the San Bernadino County Planning Department to ensure that all new projects within six miles that are currently under construction, in the permitting process or expected to enter the permitting process in the near future are accounted for.
(2) Prepare a list of all identified projects and recommendations as to which sources should reasonably be included in a cumulative modeling analysis.
(3) Submit the list to CEC for review and modify it based on CEC comments.
(4) With the help of MDAQMD and other agencies, develop emissions and stack parameter data for characterizing the selected sources in terms of dispersion model input requirements.
(5) Conduct the cumulative modeling analysis using a model acceptable to CEC with all of the identified cumulative sources in addition to the sources of the Project.
(6) Compare modeling results (plus monitored background pollutant concentrations) with applicable ambient air quality standards to characterize the potential significance of cumulative impacts to air quality.
(7) Provide documentation of study methods, input data, assumptions and results to CEC.

5.2.4 Mitigation Measures

5.2.4.1 Construction Emissions Mitigation

AIR-1

The following mitigation measures are proposed to control exhaust emissions from the diesel heavy equipment used during construction of the Project:

- a requirement to shut down equipment when idling for more than minimum periods,
- 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, including, but not limited to catalytic converter systems and particulate filter systems.

AIR-2

The following mitigation measures are proposed to control fugitive dust emissions during construction of the Project.

- Use either water application, chemical dust suppressant application, or other suppression technique to control dust emissions from on-site unpaved road travel and unpaved parking areas.
- Use vacuum-sweeping and/or water-flushing on paved road surfaces to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets affected by construction activities) and paved parking areas.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.
- Limit traffic speeds on all unpaved site areas to 5 miles per hour.
- 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.
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water, chemical dust suppressant, or other suppression technique.

5.2.4.2 Operational Emissions Mitigation: Best Available Control Technology Analysis

In accordance with the requirements of 40 CFR part 60, 85 et al. and regulations pursuant to California Code of Regulations Title 13 and Title 17, the Project will be required to use best available control technology (BACT) to minimize emissions from the proposed emergency diesel generator. There are no other emission sources for the operational Project for which BACT requirements are applicable. Table 5.2-21 presents the proposed BACT emission levels for the emergency diesel engine, based on the assessment presented below. These emission levels correspond to federal Tier 3 requirements for off-road diesel engines.

Table 5.2-21
Summary of Proposed Best Available Control Technology

Pollutant	Control Technology	Emission Limit
Diesel Generator Set (335 horsepower)		
NO_x + HC	EPA Tier 3	3.0 g/bhp-hr
CO	EPA Tier 3	2.6 g/bhp-hr
SO_2	EPA Tier 3	Diesel fuel with sulfur content no greater than 0.0015 percent by weight
PM_{10}	EPA Tier III	0.15 g/bhp-hr

Source: Title 40 CFR 89.112
Notes:
CO = carbon monoxide.
g/bhp-hr = grams per brake horsepower hour
NO_x = nitrogen oxides
HC = hydrocarbons
PM_{10} = particulate matter less than or equal to 10 microns in diameter
ROC = reactive organic compounds
SO_2 = sulfur dioxide
EPA = Environmental Protection Agency

40 CFR Part 89 and California Code of Regulations Title 13 and Title 17 require certified EPA Tier III emergency internal combustion engines, but engines compliant with Tier III standards are currently commercially unavailable.

All new IC engines of this size, model years 2006 and later, must meet EPA Tier III emissions standards, which is what is proposed for BACT here.

5.2.5 Compliance with LORS

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

5.2.5.1 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 MDAQMD are discussed in Section 5.2.5.2, State, and Section 5.2.5.3, Local – MDAQMD Requirements, respectively, including regulations that apply to both construction and operations.

Air Quality Control Regions

Because air pollution is a regional problem and not limited to political or state boundaries, the federal CAA established Air Quality Control Regions. This is a method of dividing the country into regional air basins. The Project Site is located in the Southeast Desert Sea Intrastate Air Quality Control Region (40 CFR Part 81.167).

NAAQS

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

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

The 1990 Clean Air Act Amendments (CAAA) established attainment deadlines for all designated areas that were not in attainment with the federal NAAQS. The short-term standards for CO, NO_2, SO_2 and Pb are written in 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 5.2-22, National and California Ambient Air Quality Standards.

The EPA, CARB, and the local air pollution control districts (APCDs) 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 AAQSs are classified as "attainment" areas; areas that do not meet the standards are classified as "nonattainment" areas. Areas that have insufficient air quality data may be identified as unclassifiable areas. These attainment designations are determined on a pollutant-by-pollutant basis. The Project vicinity is designated a state nonattainment area for O_3 and PM_{10} based on air quality monitoring data showing exceedances of the state standards. Table 5.2-23, Attainment Status for the West Portion of San Bernardino County with Respect to Federal and California Ambient Air Quality Standards, presents the attainment status of the MDAQMD with respect to both federal and state ambient standards.

Table 5.2-22
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[1] Primary[3,4]	NAAQS[1] Secondary[3,5]	CAAQS[2] 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)[7]		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) [8]	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[9]		20 µg/m^3
Fine particulate matter ($PM_{2.5}$)[10]	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 (10:00 a.m.-6:00 p.m., Pacific Standard Time)			In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.
Vinyl chloride[11]	24-hour			0.01 ppm (26 µg/m^3)

Table 5.2-22
National and California Ambient Air Quality Standards

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

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

Notes:

- = no standard corresponding to indicated pollutant and averaging time
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligram per cubic meter
ppm = parts per million
CAAQS = California Ambient Air Quality Standards
CARB = California Air Resources Board
EAC = early action compact
NAAQS = National Ambient Air Quality Standards
EPA = Environmental Protection Agency

[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. Contact EPA for further clarification and current federal policies.

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

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on 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 EAC Areas. The State of California currently does not have any EAC areas.

[7] EPA strengthened the new 8-hour average ozone standard from 0.08 ppm to 0.075 ppm on 12 March 2008. The new standard became effective on 27 May 2008.

[8] On 19 February 2008, the California Office of Administrative Law approved amendments to the CAAQS for NO_2. The new standards become effective on 20 March 2008.

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

[10] 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 17 December 2006).

[11] CARB 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.

[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.

Table 5.2-23
Attainment Status for the West Portion of San Bernardino County with Respect to Federal and California Ambient Air Quality Standards

Pollutant	Federal Attainment Status	State Attainment Status
O_3	Nonattainment	Nonattainment
CO	Unclassified/Attainment	Attainment
NO_2	Unclassified/Attainment	Attainment
SO_2	Unclassified	Attainment
PM_{10}	Nonattainment	Nonattainment
$PM_{2.5}$	Unclassified/Attainment	Nonattainment
Lead	Unclassified	Attainment

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

Notes:
CO = carbon monoxide
NO_2 = nitrogen dioxide
O_3 = ozone
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
SO_2 = sulfur dioxide

As mentioned above, both EPA and CARB are involved with air quality management in the Mojave Desert Air Basin, along with MDAQMD. The area of responsibility for each of these agencies is described below.

EPA has ultimate responsibility for ensuring, pursuant to the CAAA, that all areas of the U.S. 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) for nonattainment areas that describe how the federal NAAQS will be achieved and maintained. Attainment plans must be approved by CARB before they are submitted to EPA.

Regional or local air quality management districts (or air districts), such as MDAQMD, are responsible for preparation of plans for achieving 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 jurisdictional boundaries. The air district also prepares an air quality management plan 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 air quality management plan is submitted to CARB, which then integrates the plans from all air districts within the state into the SIP. The responsibility of the air districts is to maintain an effective permitting system for existing, new, and modified stationary sources, to monitor local air quality trends, and to adopt and enforce such rules and regulations as may be necessary to achieve the federal and state AAQS.

Prevention of Significant Deterioration Requirements

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

The PSD regulations define a “major stationary source” as any source type belonging to a list of 28 source categories that emits, or has the “potential to emit” 100 tons per year or more of any pollutant regulated under the CAA, or any other source type that has the potential to emit such pollutants in amounts equal to or greater than 250 tons per year. If a source is considered “major” for PSD purposes because of one pollutant, then PSD review is applicable for those other pollutants emitted from the source in amounts greater than the PSD significance levels. The PSD regulations require major stationary sources to undergo a preconstruction review that includes an analysis and implementation of BACT, a PSD increment consumption analysis, an ambient air quality effects analysis, and analysis of air quality-related values (i.e., effects on soils, visibility, and vegetation). The Project operational emissions of all pollutants would be well below the PSD thresholds. Thus, the Project would not trigger PSD requirements.

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 MDAQMD under Regulation XII. Each major source (as defined in MDAQMD rules), Major emission sources 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 not be a major source according to the definition in Regulation XII and thus will not be subject to the Title V Operating Permit requirements.

New Source Review Requirements

The federal CAA, EPA regulations, and the California CAA establish the criteria for siting new and modified emission sources. The federally mandated process for permitting new or modified sources in federal nonattainment areas is referred to as Nonattainment New Source Review (NNSR). MDAQMD is responsible for NNSR rule development and enforcement for sources in the Mojave Desert Air Basin. The MDAQMD NNSR rules are contained in Regulation XIII. These rules require that BACT must be applied to any new or modified emissions unit with a potential to emit equal to or greater than specified levels for different pollutants. Second, all potential emission increases from the sources above specified thresholds must be offset by real, quantifiable, surplus, permanent, and enforceable emission decreases in the form of emission reduction credits. Third, an ambient air quality effects analysis must be conducted to confirm that the Project does not cause or contribute to a violation of a federal or state AAQS. Finally, the Project must certify that all major sources owned or operated in the State of California are either in compliance or on an approved schedule for compliance with applicable air quality regulations. The Project will not produce sufficient pollutant emissions to trigger these requirements.

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. The requirements of 40 CFR 60 Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines are applicable to the diesel engine driver for the Solar One emergency generator. The standards for NO_x plus NMHC, CO, and PM that apply to the applicable standards for the 335 horsepower emergency generator engine match the Tier 3 requirements in 40 CFR 89.112. The applicant will comply with this requirement provided that an acceptable compliant engine model can be identified.

Maximum Achievable Control Technology Standards

The CAAA of 1990, under revisions to Section 112, require a Project to list and promulgate national emission standards for hazardous air pollutants (SHAPs) to control, reduce, or otherwise limit the emissions of HAPs from major categories and area sources. As these standards are promulgated, they are published in 40 CFR 63. The Project will not be a major source of HAPs; thus, this requirement does not apply.

Risk Management Plan

Regulations (40 CFR 68) under the CAA are designed to prevent accidental releases of hazardous materials. The regulations require facilities that store more than a threshold quantity of a listed regulated substance to develop a Risk Management Plan (RMP), including an off-site-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. The Project will not store or handle hazardous materials in quantities sufficient to trigger RMP requirements and thus will not be required to develop a RMP.

5.2.5.2 State

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

California Clean Air Act

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

Toxic Air Contaminant Program

The Toxic Air Contaminant Identification and Control Act of 1983 created a state process to identify toxic air contaminants and to control their emissions. 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 evaluates the corresponding health effects. These agencies prepare a risk assessment report to determine whether the substance poses a significant health risk and should be identified as a toxic air contaminant. This program includes the 189 HAPs named by the CAAA. If necessary, CARB develops air toxics control measures to reduce emissions. No measures in this program are applicable to the Project, since the Project would not exceed the Title V threshold of 10 tons per year of any single HAP, or 25 tons per year of a combination of HAPs.

Air Toxics Hot Spots Program

As required by the California Health and Safety Code Section 44300 (originally Assembly Bill 2588 – Air Toxics "Hot Spots" Information and Assessment Act), this program was created in 1987 to develop a statewide inventory of air toxics emissions from stationary sources. Applicable facilities must prepare: (1) an emissions inventory plan identifying sources of air toxics; (2) an emission inventory report quantifying air toxics emissions; and (3) a health risk assessment, if air toxics emissions are at high levels. Facilities whose air toxics pose a significant health risk must prepare and implement risk reduction plans. This requirement is applicable only after the start of operations. Section 5.16, Public Health and Safety, indicates that air toxics effects from the Project would be insignificant and thus these regulations do not apply to the Project.

ATC and Permit to Operate/DOC Process

Under Regulation II, Rules 201 and 203, MDAQMD administers the air quality regulatory program for the construction, alteration, replacement, and operation of new emission sources within its jurisdiction. Specifically, this rule governs the requirements for issuance of air permits (i.e., Permit to Construct (PTC) and Permit to Operate [PTO]). This permitting process allows the MDAQMD 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. A PTC allows for the construction of the air pollution source and remains in effect until the PTO application is granted, denied, or canceled. Once the Project commences operations and demonstrates compliance with the PTC, MDAQMD will issue a PTO. The PTO specifies conditions that the air pollution source must comply with all air quality rules, regulations, and standards. The Project has only one source subject to permitting requirements, i.e., the diesel emergency generator engine, which will require a permit from MDAQMD before its installation at the Project Site.

Power Plant Siting Requirements

Under the California Environmental Quality Act (CEQA), the CEC has been charged with assessing the environmental effects of each new power plant and considering the implementation of feasible mitigation measures to prevent potential significant effects. CEQA Guidelines [Title 14, California Administrative Code, Section 15002(a)(3)] state that the basic purpose of CEQA is to "prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible."

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

Consistency with State Requirement

State law invests local APCDs and air quality management districts with the responsibility of regulating emissions from stationary sources. As discussed previously in this section, the Project will come under the local jurisdiction of the MDAQMD. Compliance with MDAQMD rules and regulations will ensure compliance with state air quality requirements.

Regulation for the Mandatory Reporting of Greenhouse Gas Emissions

The California Air Resources Board (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. However, the Project might not be required to report its GHG emissions annually after it has been operated because the article does not apply to the electricity generating facilities that are solely powered by solar energy.

5.2.5.3 Local –MDAQMD Requirements

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 sources of air pollution; enforcing air pollution statutes, regulations, and prohibitory rules governing non-vehicular sources; and developing programs to reduce emissions from indirect sources.

Rules and Regulations

The paragraphs below outline the MDAQMD rules and regulations that apply to the Project.

Regulation II - Permits

This regulation establishes the framework of the application for construction and operating permits for new or modified equipment that emits air pollutants.

Rule 201 and 203 – Permits Required: A project shall not construct or modify any nonexempt equipment that emits, eliminates, reduces, or controls pollution without first obtaining the PTC from the Air Pollution Control Officer (APCO). The PTC serves as a temporary PTO for a limited period until MDAQMD verifies that the Project has been constructed in accordance with the permit application. Once this verification is completed a PTO will be issued by the APCO. A PTC and PTO will be required for the Project. The Applicant will need to obtain a PTC permit before installation of the Project.

Rule 219 – Equipment Not Requiring a Permit: This rule, which describes equipment that does not require a District permit, states that internal combustion engines greater than 50 horsepower would require a permit. All particulate matter emissions from diesel engines are subject to CARB air toxic control measures (ATCM) (Title 17 CCR 93115). Note that the provisions of MDAQMD Rule 1160: ICE state that ICE is not applicable toward an emergency diesel engine that operates less than 100 hrs within four continuous calendar quarter periods.

Regulation III - Fees

This rule and the fee schedules in Rule 301 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. The Applicant will submit the required fees with the application for the diesel emergency generator, in compliance with this rule.

Regulation IV - Prohibitions

Rules 401, 402, 403, and 403.2 – Visible Emissions, Nuisance, and Fugitive Dust: These rules would be applicable to the construction period and limit visible emissions, emissions that would cause a nuisance, and fugitive dust emissions. Rule 403.2 lists specific control measures to minimize fugitive dust that is contained in the Mojave Desert Planning Area Federal PM_{10} Attainment Plan.

Operation of the proposed backup emergency generator would not cause visible emissions or nuisance impacts at any public receptor location.

Rule 409 – Combustion Contaminants: This rule limits the amount of emissions from fossil fuel combustion. The generator engine would not exceed these limits.

Rule 475 – Electric Power Generating Equipment: The purpose of this rule is to limit emissions of NO_x and Particulate Matter from non-mobile equipment and applies to equipment having a maximum rated heat input of more than 50 million Btu per hour. This rule would not be applicable to the Project.

Regulation IX – New Source Performance Standards (NSPS)

Rule 900 – NSPS: All new stationary sources of air pollution shall comply with the standards, criteria and requirements. As described previously under the federal requirements, the Project will be subject to the requirements of 40 CFR 60 Subpart IIII for compression igniition internal combustion engines.

Regulation XIII – New Source Review

Rule 1303 – Requirements: This rule outlines the emission standards and offset requirements and conditions for new sources. 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 25 pounds per day or more of any nonattainment pollutant or its precursors. Emissions of any criteria pollutant of the Project will be well below the BACT threshold so it will not trigger BACT requirement. However, as described in Section 5.2.4.2, the proposed emergency diesel engine will meet Tier 3 emission standards, which are equivalent to BACT for this equipment in the MDAQMD.

Offsets: This part of Rule 1303 requires that offsets be provided for a new or modified stationary source with a daily potential to emit equal to or exceeding the thresholds of:

- CO 100 tons per year,
- H_2S 10 tons per year,
- Lead 0.6 tons per year,
- PM_{10} 15. tons per year,
- NO_x 25 tons per year,
- SO_x 25 tons per year,
- ROG 25 tons per year.

Emissions of any criteria pollutant of the Project will be well below the offsets threshold so it will not trigger offsets requirement.

Rule 1306 Electric Energy Generating Facilities: This section applies to all power plants proposed to be constructed in the MDAQMD and for which a Notice of Intention or AFC has been accepted by the CEC. It describes the actions to be taken by MDAQMD to provide information to CEC and CARB to ensure that the Project will conform to the MDAQMD's rules and regulations. After the Application has been submitted to CEC and other responsible agencies, including MDAQMD, the local air district is required to conduct a determination of compliance (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 APCO, within 20 calendar days of receipt of the AFC, must so inform the CEC, and the AFC will be considered incomplete and returned to the Applicant for re-submittal. After determining that the Project can be built without causing any significant adverse effects, the CEC turns permitting of the power plant over to MDAQMD, which proceeds with the PTO processes, as with any new source.

Rule 1320, New Source Review for Toxic Air Contaminants: This rule requires all owners and operators of stationary sources that emit HAPs may have to install BACT for toxic best available control technology (T-BACT) to any constructed or reconstructed major source. All T-BACT determinations shall be controlled to a level that the APCO has determined to be, at a minimum, no less stringent than new source maximum achievable control technology as required by the federal CAA. The proposed emergency diesel engine will meet Tier 3 emission standards, which are equivalent to T-BACT for this equipment. A screening health risk assessment to evaluate the potential health risks resulting from operation of this engne is provided in Section 5.16, Public Health and Safety.

Table 5.2-24 summarizes applicable LORS pertaining to the Project's air pollutant emissions and air quality effects.

Table 5.2-24
Summary of Applicable LORS – Air Quality

LORS	Requirements	AFC Section	Administering Agency
Federal Jurisdiction			
40 CFR Part 50	NAAQS	Section 5.2.2 and Section 5.2.5.1	USEPA
40 CFR Part 51	Federal New Source Review program is delegated to MDAQMD	Section 5.2.5.1	USEPA
40 CFR Part 52.21	The Project does not trigger PSD requirements	Section 5.2.5.1	USEPA
40 CFR Part 60	Subpart IIII NSPS limits are applicable to the diesel engine driver for the emergency generator.	Section 5.2.5.1	USEPA
40 CFR Part 68	Federal Risk Management Plan not tiiggered	Section 5.2.5.1	USEPA
40 CFR Part 70	Federally mandated operating permit is not required	Section 5.2.5.1	USEPA
40 CFR Part 81.165	Air Quality Control Regions	Section 5.2.5.1	USEPA
State Jurisdiction			
H&SC 4430-44384; title 17 of the California Code of Regulations (17 CCR 9330-93347 [Toxic "Hot Spots" Act])	Requires preparation and biennial updating of facility emission inventory of hazardous substances; health risk assessments.	5.2.5.2, 5.16	MDAQMD, with CARB oversight
H&SC 41700 (Nuisance)	Provides that no person shall discharge form any source quantities of air contaminants or material which cause injury, detriment, nuisance, or annoyance to considerable number of persons or to the public which endanger the comfort, repose, health or safety or which can cause injury or damage to business or property.	5.2.5.2, 5.16	MDAQMD, with CARB oversight

Table 5.2-24
Summary of Applicable LORS – Air Quality

LORS	Requirements	AFC Section	Administering Agency
California Public Resources Code 25523(a); 20 CCR 1752, 2300-2309 and Div. 2, Chap. 5, Art. 1, Appendix B, Park (k) (CEC and CARB Memorandum of Understanding)	Requires that CEC's decision on the AFC include requirements to assure protection of environmental quality; AFC is required to address air quality protection.	5.2.5.2	CEC
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. The Project might not be required because it is one of the exempted facilities in the proposed new rule.	5.2.5.2	CEC
Local Jurisdiction			
MDAQMD Rule 201 and 203 Permits Required	Requires a Permit to Construct before construction of an emission source occurs. Prohibits operation of any equipment that emits or controls air pollutants without first obtaining a permit to operate.	5.2.5.3	MDAQMD, with CARB and EPA Region IX oversight
MDAQMD Rule 219 Equipment not Requiring a Permit	States that internal combustion engines greater than 50 horsepower would require a permit, and that all particulate matter emissions are subject to CARB ATCM.	5.2.5.3	MDAQMD
MDAQMD Rule 301 Fees	Establishes the filing and permit review fees.	5.2.5.3	MDAQMD
MDAQMD Rules 401, 402, 403, and 403.2 Nuisance, Visible Emissions, Fugitive Dust	Limits the visible, nuisance, and fugitive dust emissions and would be applicable to the construction period of the project.	5.2.5.3	MDAQMD
MDAQMD Rule 409 Combustion Contaminants	Limits the emissions from fossil fuel combustion.	5.2.5.3	MDAQMD
MDAQMD Rule 1303 New Source Review	Specifies BACT/Offsets technology and requirements for a new emissions unit that has potential to emit any affected pollutants.	5.2.5.3	MDAQMD
MDAQMD Rule 1306 Electric Energy Generating Facilities	Describes actions to be taken for permitting of power plants.	5.2.5.3	MDAQMD
MDAQMD Rule 1320 New Source Review for Toxic Air Contaminants	Requires all owners and operators of stationary sources that emit HAPs to install BACT for toxic best available control technology (T-BACT) to any constructed or reconstructed major source.	5.2.5.3	MDAQMD

Table 5.2-24
Summary of Applicable LORS – Air Quality

LORS	Requirements	AFC Section	Administering Agency

Source: URS Corporation, 2008.

ACT = Authority to Construct
AQMD = Air Quality Management Control District
BACT = Best Available Control Technology
CARB = California Air Resources Board
CCR = California Code of Regulations
CEC = California Energy Commission
EPA =- Environmental Protection Agency
H&SC = Health and Safety Code
HAPS = Hazardous Air Pollutants
MDAQMD = Mojave Desert Air Quality Management District
NAAQS = National Ambient Air Quality Standards
NO_2 = nitrogen dioxide
NO_x = nitrogen oxides
NSPS = New Source Performance Standards
NSR = new source resource
USC = United States Code

5.2.5.4 Agencies and Agency Contacts

Agency contacts regarding this air quality assessment of the Project are shown in Table 5.2-25 Agency Contact List.

Table 5.2-25
Agency Contact List

	Agency	Contact	Address	Telephone
1	Air Quality – California Energy Commission	Mr. Kevin Golden Air Quality Engineer	1519 Ninth Street Sacramento, CA 95814	916-654-4287
2	Mojave Desert Air Quality Management District	Mr. Alan DeSalvio Supervising AQ Engineer	14306 Park Avenue Victorville, CA 92392	760-245-1661

Source: URS Corporation, 2008.

5.2.5.5 Permits Required and Permitting Schedule

Under Regulation II, MDAQMD regulates the construction, alteration, replacement, and operation of new sources of air pollutants by issuance of ATC and PTO (see Table 5.2-26, Applicable Permits). For power plants under the siting jurisdiction of the CEC, the MDAQMD issues a DOC in lieu of an ATC. The DOC is incorporated into the CEC license. When the Project commences operation and demonstrates compliance with the DOC, MDAQMD will issue a PTO. The PTO specifies conditions that the air pollution source must meet to comply with other air quality standards and will incorporate applicable DOC requirements. The final PTO should be issued within 6 months after receipt of a complete application.

Since Solar One is a solar power generating facility, the only stationary sources of emissions for the operational project will be the diesel emergency generator engine, which will normally be operated on a very limited basis for testing and maintenance purposes. Thus, the permit application to MDAQMD will consist only of technical specifications and emissions data for this engine and completed permit application forms. Submittal of the application package to MDAQMD no later than December 10, 2008 and to respond promptly to any subsequent MDAQMD requests for additional information needed to support a finding of completeness.

Table 5.2-26
Applicable Permits

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

Source: URS Corporation, 2008.
Note:
AFC = Application for Certification

5.2.6 References

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

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

______. EMFAC2007 version 2.30. Calculating emission inventories for vehicles in California - User's Guide. 2007.

______. OFFROAD2007. Quick Reference Guide and User's Guide (http://www.arb.ca.gov/msei/offroad/offroad.htm)

______. Risk Management Guidance for the Permitting of New Stationary Source Diesel-Fueled Engines. 2000.

California Climate Action Registry, General Reporting Protocol, Version 3.0, April 2008.

California Climate Action Registry, Power/Utility Reporting Protocol Version 1.0, April 2005.

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

_____. AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, January, 1995.

_____. Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005, February 2000.

_____. User's Guide for the AMS/EPA Regulatory Model-AERMOD. September 2004a.

_____. 2004b. http://www.epa.gov/nonroad-diesel/regulations.htm#tier2

_____. AERMOD Implementation Guide. September 2005.

_____. Guideline on Air Quality Models. 2003.

_____. Addendum to User's Guide for the AMS/EPA Regulatory Model-AERMOD. December 2006.

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

_____. User's Guide for the AERMOD Meteorological Preprocessor (AERMET)," 4-46–4-51. Nov 2004.

_____. AERSURFACE User's Guide. EPA-454/B-08-001, January, 2008.

SES Solar Three, LLC and SES Solar Six, LLC. 2008. *Project Description and Plan of Development.*

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

______. Final - Methodology to Calculate PM10 and PM2.5 Significance Thresholds, Appendix A - Updated CEIDARS Table, October, 2006,

URS Corporation. 2008. Field work, observations, research and modeling.

Western Regional Climate Center Weather Station (WRCC), California Climate Data Archive, http://www.calclim.dri.edu/scaall.html.

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____

Technical Area: **Air Quality** Project: SES Solar One Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	Information	AFC 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 5.2.2.1 Section 5.2.2.2 Section 5.2.2.3 Section 5.2.2.4 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 Table 5.2-11 Appendix V		
Appendix B (g) (8) (C)	A description of the control technologies proposed to limit the emission of criteria pollutants.	Section 5.2.4.2		
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.	N/A		
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 5.2.2.3 Table 5.2-14 Table 5.2-15 Table 5.2-16 Table 5.2-17 Appendix V		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____

Technical Area: **Air Quality** Project: SES Solar One Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	**Information**	**AFC 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 Table 5.2-11 Appendix V		
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.	N/A		
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 V Modeling CD/DVD		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____

Technical Area: **Air Quality** Project: SES Solar One Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

Siting Regulations	**Information**	**AFC 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 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 Section 5.2.2.3 Appendix V Modeling CD/DVD		
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 Section 5.2.3 Modeling 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 ($PM_{2.5}$)] from construction-related equipment;	Section 5.2.2 Modeling CD/DVD		

Adequacy Issue: Adequate ____ Inadequate ____ **DATA ADEQUACY WORKSHEET** Revision No. 0 Date ____

Technical Area: **Air Quality** Project: SES Solar One Technical Staff: ____

Project Manager: ____ Docket: ____ Technical Senior: ____

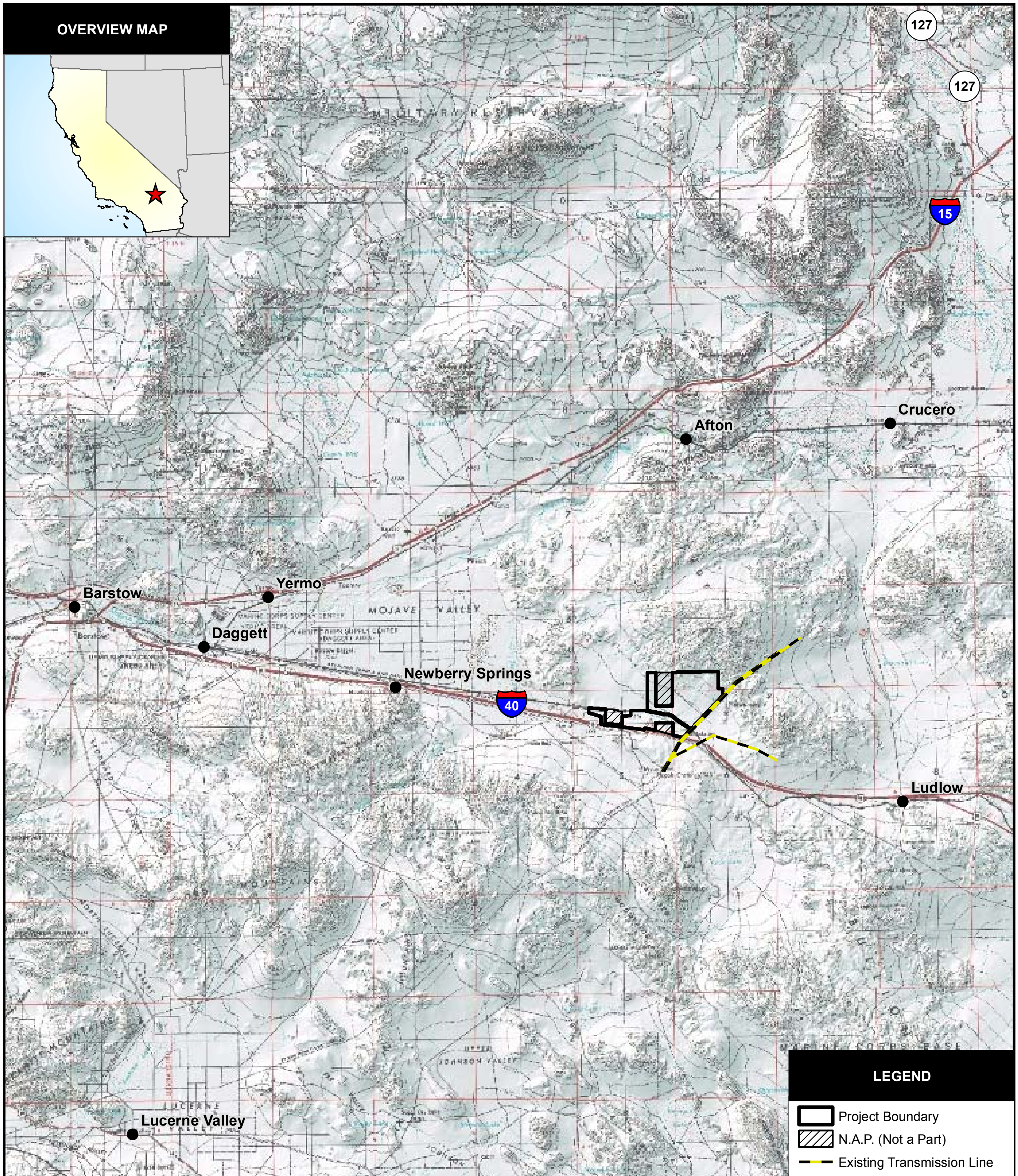
Siting Regulations	Information	AFC Section Number	Adequate Yes Or No	Information Required To Make AFC Conform With Regulations
Appendix B (g) (8) (I) (ii)	A screening level air quality modeling analysis, or a more detailed modeling analysis if so desired by the applicant, of the direct criteria pollutant (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 Modeling CD/DVD (Section 5.16, Public Health and Safety)		
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 5.2.3		
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 NOx, SO_2, CO, PM_{10}, and $PM_{2.5}$.	N/A		
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:	N/A		

Adequacy Issue:	Adequate ____ Inadequate ____	**DATA ADEQUACY WORKSHEET**		Revision No.	0	Date	
Technical Area:	**Air Quality**	Project:	SES Solar One	Technical Staff:			
Project Manager:		Docket:		Technical Senior:			

Siting Regulations	Information	AFC Section Number	Adequate Yes Or No	Information Required To Make AFC Conform With Regulations
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	N/A		
Appendix B (g) (8) (J) (ii)	Potential offset sources, including location, and quantity of emission reductions;	N/A		
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	Section 5.2.5 Table 5.2-24		

Adequacy Issue:	Adequate ____	Inadequate ____	**DATA ADEQUACY WORKSHEET**	Revision No. 0	Date ____
Technical Area:	**Air Quality**	Project:	SES Solar One	Technical Staff:	
Project Manager:		Docket:		Technical Senior:	

Siting Regulations	**Information**	**AFC Section Number**	**Adequate Yes Or No**	**Information Required To Make AFC Conform With Regulations**
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.	Section 5.2.5 Table 5.2-24 Table 5.2-25		
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.	Section 5.2.5 Table 5.2-25		
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 5.2.5.5 Table 5.2-26		



SOURCES: ESRI;
Stantec Engineering (project site Oct. 2008);
USGS (7.5' quads various dates).

REGIONAL VICINITY MAP
SOLAR ONE PROJECT

URS

4 0 4 8 Miles
SCALE: 1" = 8 Miles(1:506,880)
SCALE CORRECT WHEN PRINTED AT 8.5X11

CREATED BY: LG	DATE: 10-30-08	FIG. NO:
PM: WM	PROJ. NO: 27658172.10000	5.2-1

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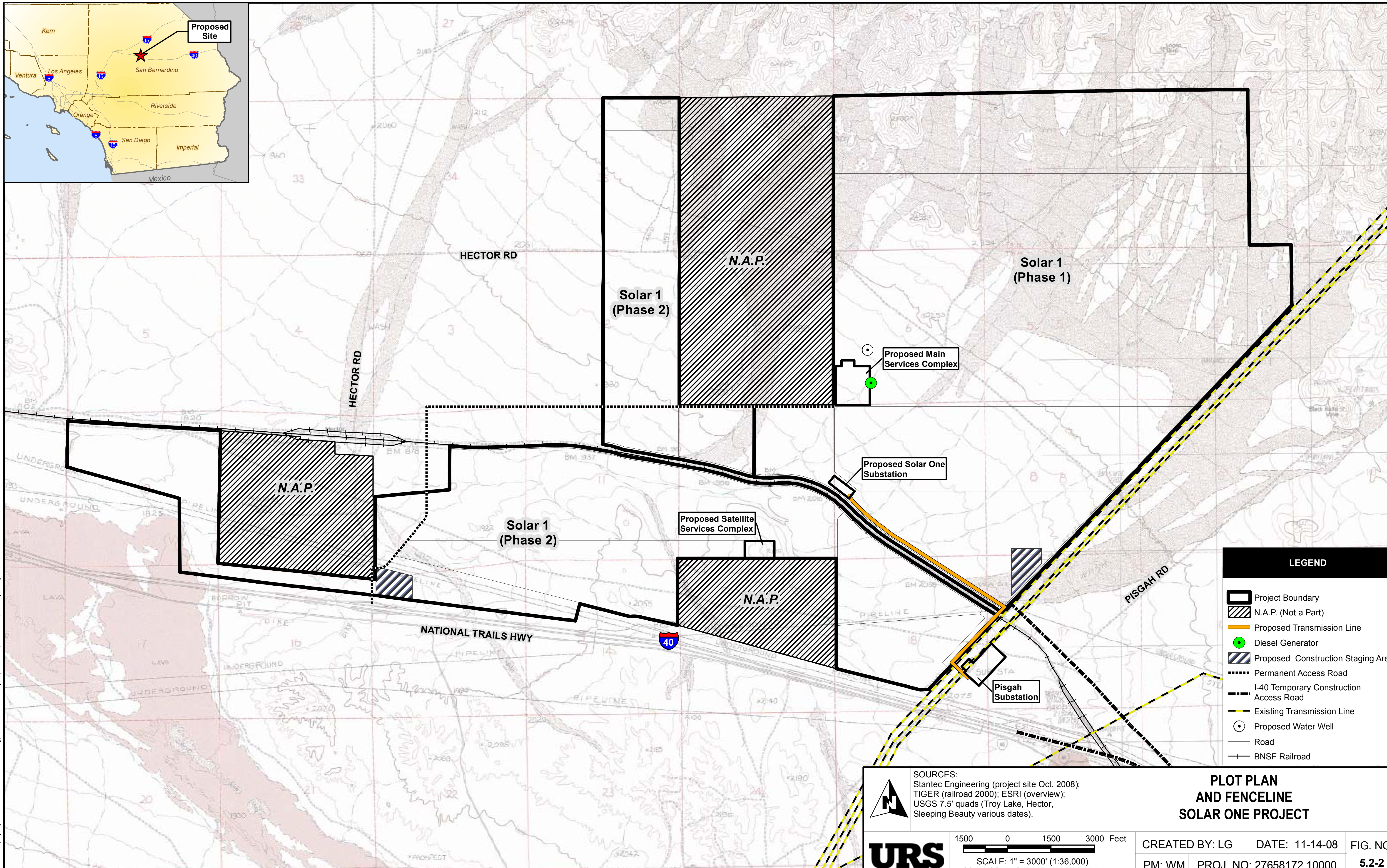

PLOT PLAN
AND FENCELINE
SOLAR ONE PROJECT

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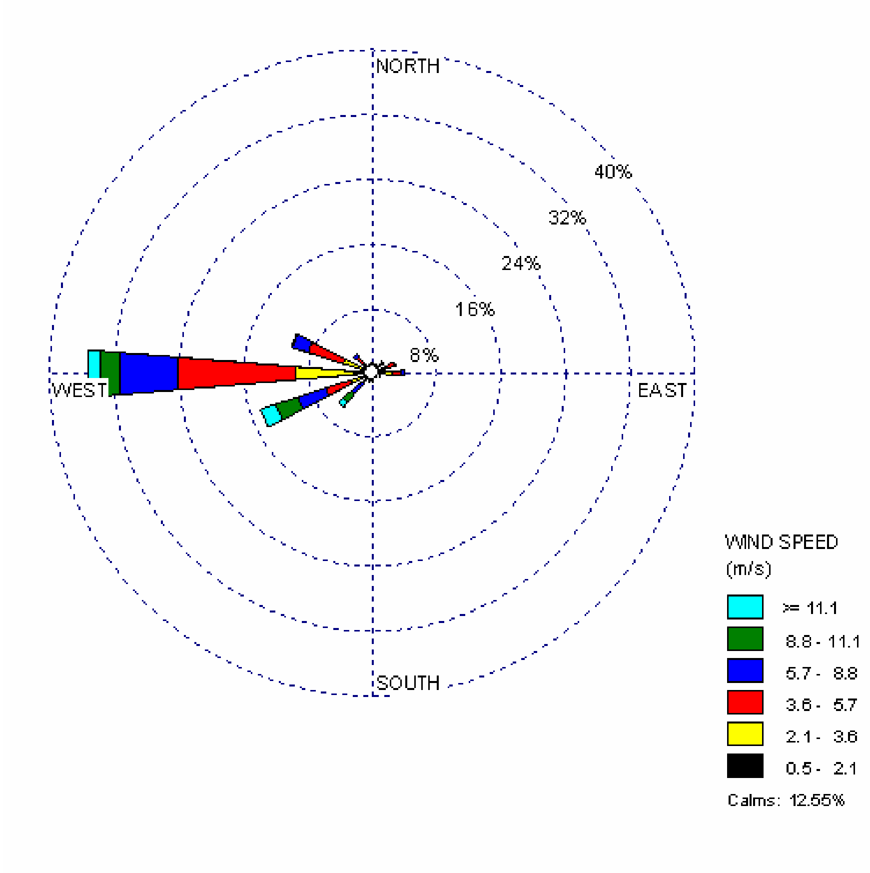

Annual wind rose for Barstow Daggett Airport
Data taken from 2003-2007 for all months

Displays wind speed, direction (blowing from)

	ANNUAL WIND ROSE FOR BARSTOW-DAGGETT AIRPORT SOLAR ONE PROJECT		
URS	CREATED BY: LG	DATE: 10-30-08	FIG. NO:
	PM: WM	PROJ. NO: 27658172.10000	**5.2-3**

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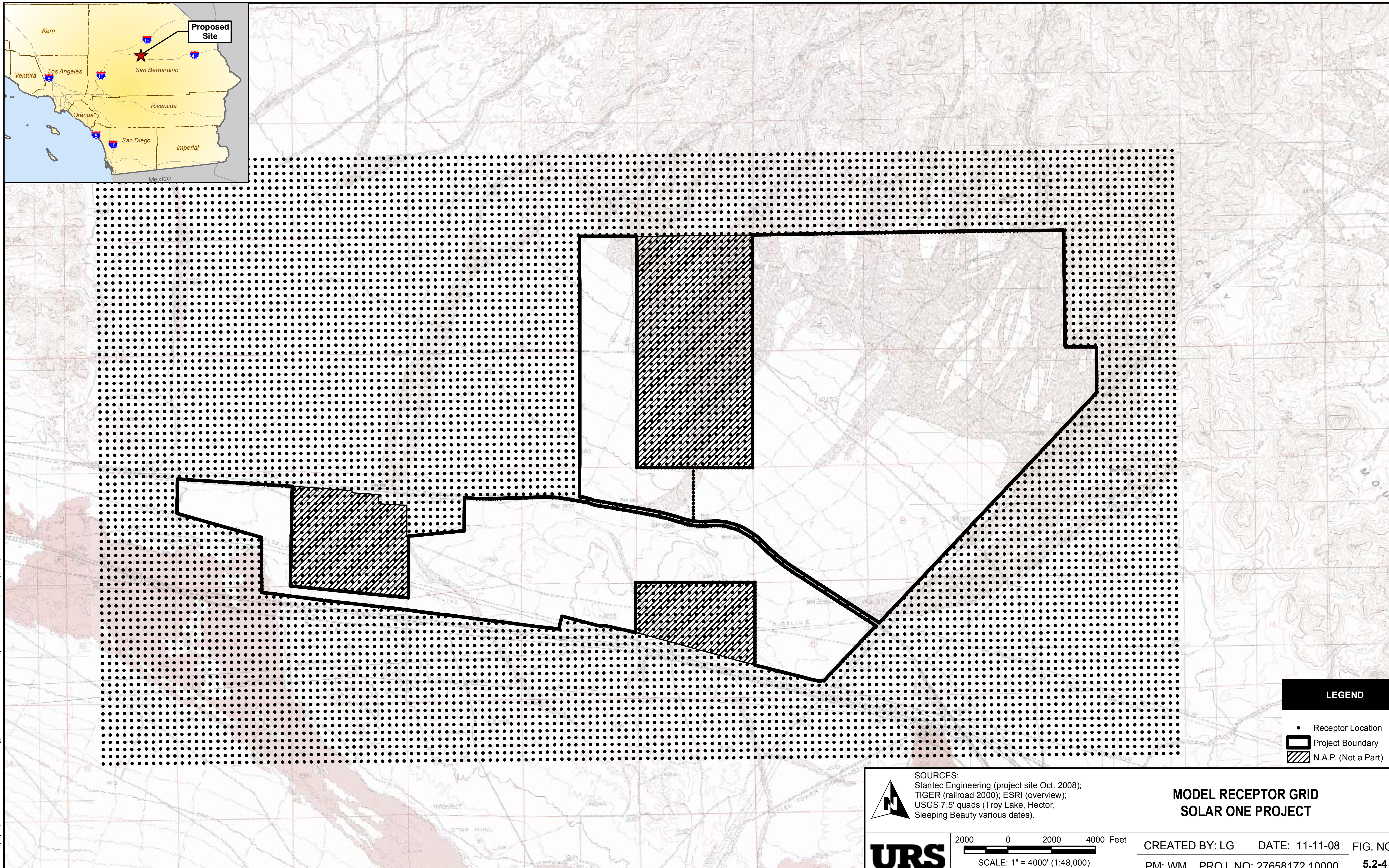

SOURCES:
Stantec Engineering (project site Oct. 2008);
TIGER (railroad 2000); ESRI (overview);
USGS 7.5' quads (Troy Lake, Hector,
Sleeping Beauty various dates).

MODEL RECEPTOR GRID
SOLAR ONE PROJECT

URS

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PM: WM	PROJ. NO: 27658172.10000	5.2-4

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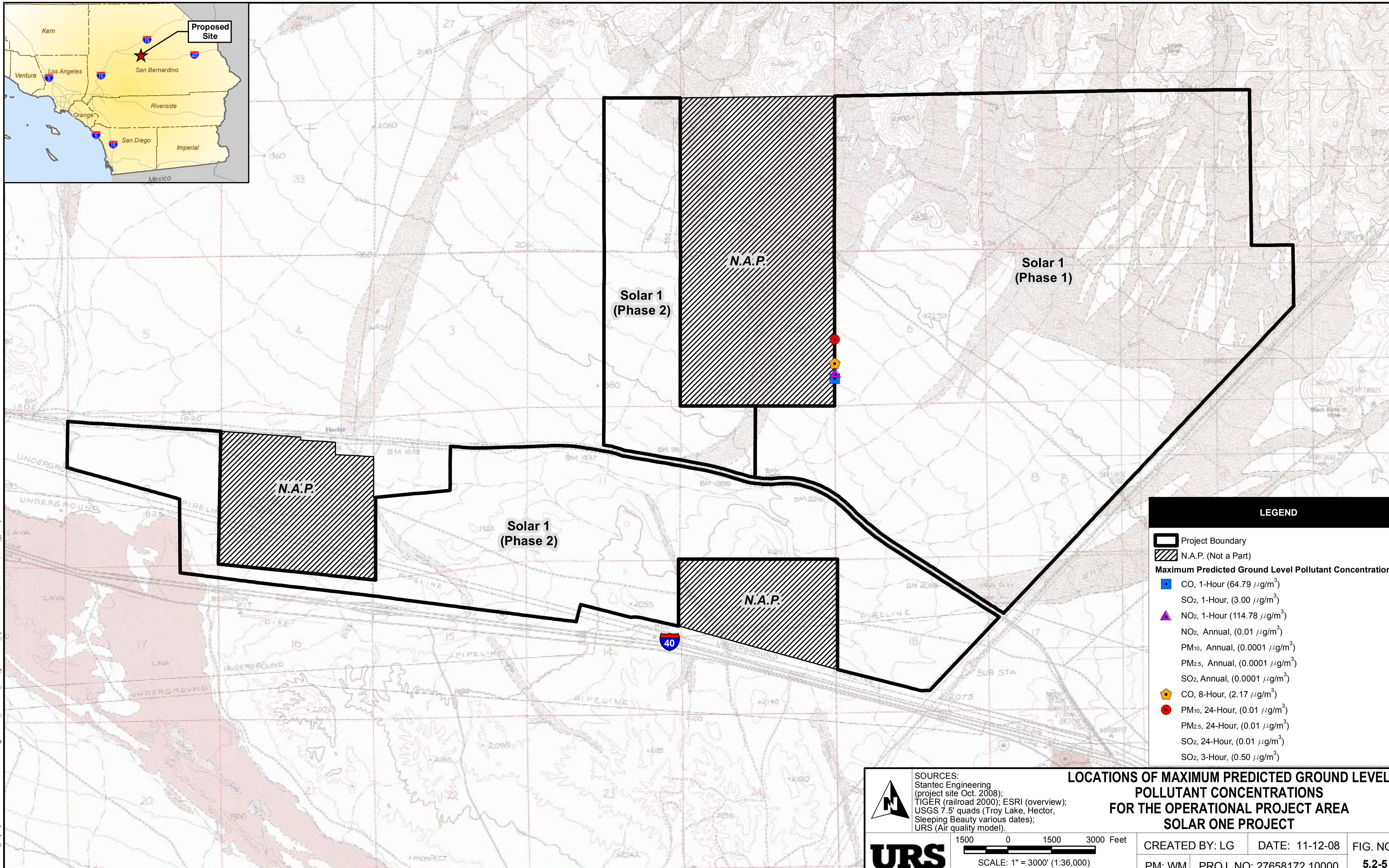

LOCATIONS OF MAXIMUM PREDICTED GROUND LEVEL POLLUTANT CONCENTRATIONS FOR THE OPERATIONAL PROJECT AREA SOLAR ONE PROJECT

URS

CREATED BY: LG | DATE: 11-12-08 | FIG. NO: 5.2-5

PM: WM | PROJ. NO: 27658172.10000

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