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5.2 Air Quality

This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and routine operation of the Mojave Solar Project ("Project or MSP"). Mojave Solar LLC (the "Applicant") is proposing to construct and operate a nominal 250 megawatt (MW) solar power generation facility located in San Bernardino County, California, as follows:

The Project would use well-established parabolic trough solar thermal technology to produce electrical power, which uses a steam turbine generator (STG) fed from a solar steam generator (SSG). SSGs receive heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun. Station processes are as follows:

- Installation of nominal 250 MW solar power generation equipment, consisting of two (2) 125 MW modules and two centralized power blocks.
- Installation of two (2) auxiliary boilers, one per power block, each rated at ~21.5 MMBtu/hr, fired on natural gas.
- Installation of two (2) emergency fire pump systems, one per power block, each consisting of a 346 horsepower (hp) diesel-fired engine coupled to a pump assembly capable of delivering sufficient water for fire suppression purposes.
- Installation of two (2) emergency generator systems, one per power block, each consisting of a 4160 hp (2500 kW) diesel fired engine coupled to an electrical generation assembly for emergency power purposes.
- Installation of two (2) wet-cooling towers, one per power block, each to provide cooling and heat rejection from a single power block process.
- Installation of all required auxiliary support systems.
- The project does not require any off-site transmission line construction.
- The project does not require any off-site pipeline construction for services such as natural gas.

5.2.1 Affected Environment

The affected environment and relevant project details are provided in the following sections.

5.2.1.1 Proposed Site

The proposed Project site is located in western San Bernardino County, east of the Kern County line, approximately 18 miles west-northwest of Barstow, California. The site is a mix of open desert and agricultural land, located in the western desert region of the county. The Four Corners area (intersection of Hwy 58 and Hwy 395) lies approximately 11 miles south-southwest of the project site. The site is flat, gently rising in elevation from the northeast to the west and southwest, with an elevation of approximately 2,070 feet above mean sea level (amsl). Terrain heights in excess of the site elevation are encountered within one mile to the south and west, and within two to three miles to the north and east. The site lies adjacent to and on the southwest side of the Harper Dry Lake depression which has a mean elevation of approximately 2,017 feet amsl.

5.2.1.2 Proposed Project Facilities

The proposed facility will consist of two 125 MW (gross) solar units. The Project would use well-established parabolic trough solar thermal technology to produce electrical power, which uses a steam turbine generator (STG) fed from a solar steam generator (SSG). SSGs receive heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

Each power block will consist of a solar array field, auxiliary boiler, steam turbine, emergency generator set, emergency fire pump system, various feed-water heaters and pumps, a cooling tower, electrical interconnections, and a single main control building, with several small adjacent buildings for support services.

The Applicant is proposing to install two (2) emergency fire pump engines rated at approximately 346 hp, two (2) emergency generator set rated at 4160 hp (2500 kW), two (2) auxiliary natural gas fired boilers each rated at ~21.5 MMBtu/hr, and two (2) wet cooling towers. The engines will meet all applicable U.S. Environmental Protection Agency (USEPA) Tier emissions standards depending upon engine size, year of manufacture, and service category.

Proposed equipment specifications, for emissions sources, are summarized as follows:

<u>Auxiliary Boilers (2)</u>

- Manufacturer: Nebraska Boiler (or equivalent)
- Model: D-Type Watertube
- Fuel: Natural Gas
- Rated Heat Input: 21.5 MMBtu/hr
- Fuel consumption: ~21000 scf/hr (Gas HHV 1025 Btu/scf)
- Exhaust flow: 3589 dscfm, 6184 acfm, at 100% load
- Exhaust temperature: ~301 degrees Fahrenheit (°F)

<u>Fire Pump Engines (2)</u>

- Manufacturer: John Deere or equivalent

- Model: 6090H
- Fuel: Diesel or distillate oil (15 ppmw S)
- Rated horsepower: 346 hp
- Fuel consumption: ~7.6 gallons per hour (gph)
- Exhaust flow: ~2643 actual cubic feet per minute (acfm)
- Exhaust temperature: ~821 degrees Fahrenheit (°F)

Emergency Electrical Generators (2)

- Manufacturer: Caterpillar or equivalent
- Model: 3516C-HD TA
- Fuel: Diesel or distillate oil (15 ppmw S)
- Rated horsepower: ~4160 (2500 kW)
- Fuel consumption: ~173.3 gph
- Exhaust flow: 19049 acfm
- Exhaust temperature: 922 °F

Cooling Towers (2)

- Manufacturer: CTD, Inc. or equivalent
- Number of Cells: 6
- Number of Fans: 6 (1,310,000 acfm each for annual average conditions)
- Water circulation rate: ~90,000 gallons per minute (gpm)
- Drift rate: 0.0005%
- Expected average TDS: ~9968 ppmw

The only fuels to be combusted on-site will be California-certified low-sulfur low-aromatic diesel fuel used by the emergency fire pump and the emergency generator engines, and natural gas for the auxiliary boilers. Table 5.2-1 presents a fuel use summary for the proposed facility. Fuel use values are based on the maximum heat rating of each system, fuel specifications, and maximum operational scenario. Typical fuel analysis data is presented in Appendix C.1 for all proposed fuels.

Table 5.2-1. Estimated Fuel Use Summary for the Project

System	Units	Per Hour	Per Day	Per Year
Auxiliary Boiler (each)	MMscf	0.021	0.504	46.0
Fire Pump Engine (each)	gallons	≤3.8	≤3.8	~198
Emergency Generator (each)	gallons	≤86.7	≤86.7	~4506

Diesel fuel at 139,000 BTU/gal. See Appendix C.1 for specific information.

All engines (diesel emergency generators and fire pump engines) will only be tested for <30 minutes on any given day. Thus, engine fuel uses shown above are actual for ½-hour intervals.

Each boiler may be operated a maximum of 24 hours per day. Annual fuel use is based on 4380 hrs/yr at 50% load.

5.2.1.3 Climate and Meteorology

The proposed site west-northwest of Barstow, California, within the western portion of San Bernardino County, experiences the following climate and meteorology patterns.

The Mojave Desert Air Basin (MDAB) is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains which exist in this vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada mountains to the north. Air masses pushed onshore in southern California by differential heating are channeled through the MDAB. The MDAB is separated from the southern California coastal and central California valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these air masses. The Antelope Valley is bordered in the northwest by the Tehachapi Mountains, separated from the Sierra Nevada mountains in the north by the Tehachapi Pass (3,800 ft elevation). The Antelope Valley is bordered in the south by the San Gabriel Mountains, bisected by Soledad Canyon (3,300 ft). The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriels by the Cajon Pass (4,200 ft). A lesser channel lies between the San Bernardino Mountains and the Little San Bernardino Mountains (the Morongo Valley).

The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 ft) between the San Bernardino and San Jacinto Mountains.

During the summer, the MDAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time the reach the desert. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. The MDAB averages between three and seven inches of precipitation per year (from 16 to 30 days with at least 0.01 inches of precipitation). The MDAB is classified as a dry-hot desert climate (BWh), with portions classified as dry-very hot desert (BWhh), to indicate at least three months have maximum average temperatures over 100.4° F.

The climatic pattern for the Project region is a typical desert climate within the Mediterranean climate classification. The warmest month for the region is typically July, with the coldest month being December. The month with the highest precipitation is usually February. The western Mojave Desert region experiences a large number of days each year with sunshine, generally 345+ days per year. The region also traditionally experiences excellent visibility, i.e., greater than 10 miles or more 95 percent of the time.

Representative climatic data for the Project area was derived from the Barstow Station (#040519), period of record 1/1/1903 to 3/31/1980. A summary of data from this site indicates the following:

- Average maximum daily temperature: 80.3°F
- Average minimum daily temperature: 47.5°F
- Highest mean maximum annual temperature: 78.3°F
- Lowest mean minimum annual temperature: 45.6°F
- Mean annual precipitation: 16.78 inches (in.)
- Highest recorded temperature: 115 °F (1995)
- Lowest recorded temperature: 12 °F (1996)

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the nature of the emitting source, the topography of the air basin, and the local meteorological conditions. In the Project area, inversions and light winds can result in conditions for pollutants to accumulate in the region.

The predominant winds in the Project area are shown in Figures 5.2-1 to 5.2-5. Winds in the Project region are generally westerly (southwest through northwest), with a very much less frequent component of easterly winds. The data displayed in Figures 5.2-2 through 5.2-5 are the quarterly wind roses for the Daggett Airport Automated Surface Observing System (ASOS) site for the 2001-2004 calendar years. Calm conditions occur approximately 7.62% of the time for the Daggett Airport ASOS instruments, with the annual average wind speed being 4.87 m/s. Statistical data for the annual patterns for the Daggett Airport ASOS site is summarized in Appendix C.2.

Based on discussions with the Mojave Desert Air Quality Management District (MDAQMD), meteorological data representative of the site (presented in Appendix C.2) can be derived from the Daggett Airport ASOS station. As discussed in detail later, Daggett Airport ASOS surface data were combined with Desert Rock, Nevada radiosonde data for 2001-2004 using the AERMOD meteorological processing programs and guidance documents.

5.2.1.4 Regulatory Environment

Although a regulatory compliance analysis (LORS) is presented in Section 5.2.5, there are several MDAQMD regulations that directly affect the permitting and review process, such as the Determination of Compliance (DOC) for the proposed Project as follows:

- New Source Review (NSR) Regulation XIII Rule 1303 requires that Best Available Control Technology (BACT) be applied to:

  (1) Any new Permit Unit which emits, or has the Potential to Emit, 25 pounds per day or more of any Nonattainment Air Pollutant shall be equipped with BACT.

  (2) Any Modified Permit Unit which emits, or has the Potential to Emit, 25 pounds per day or more of any Nonattainment Air Pollutant shall be equipped with BACT.

  (3) Any new or Modified Facility which emits, or has the Potential to Emit, 25 tons per year or more of any Nonattainment Air Pollutant shall be equipped with BACT for each new Permit Unit.

- Per Regulation XIII Rule 1303, provide all required emissions mitigations prior to the commencement of construction of the source.

- Provide an impact analysis per Regulation XIII Rule 1302.

- Per Regulation XIII Rule 1302, demonstrate prior to the issuance of the Authority to Construct (ATC) that all major stationary sources owned or operated by the Applicant, which are subject to emissions limitations, are either in compliance or on a schedule for compliance with all applicable emissions limitations under the Clean Air Act (CAA).

In addition the following should be noted:

- The MDAQMD NSR rule (Regulation XIII) defines cargo carriers as trains, trucks and off-road vehicles dedicated to, or an integral part of, a specific facility.

- For purposes of calculating potential to emit, fugitive emissions from operations are not included unless the source is listed in one of the categories of sources per 40 CFR 51.165(a)(1)(iv)(C).

- For purposes of calculating potential to emit, secondary emissions from operations are not included in the sources PTE calculations.

As such, the operational emissions from fugitive sources and on-site dedicated vehicles are not included in the source’s potential to emit calculations.

5.2.2 Environmental Impacts

Potential impacts for the Project are discussed in the following sections.

5.2.2.1 Current Facility Emissions and Permit Limitations

The site is currently vacant with no known emissions sources (other than natural and agricultural sources). There are currently no MDAQMD permitted sources or activities on the proposed site.

5.2.2.2 Proposed Facility Emissions

Installation and operation of the proposed Project will result in a change in the emissions signature for the site. Criteria pollutant emissions from the proposed auxiliary boilers, fire pumps, emergency generator engines, HTF system, and cooling towers are delineated in the following sections, while emissions of hazardous air pollutants (HAPs) are delineated in Section 5.10, Public Health, and Appendix C.1.

5.2.2.3 Normal Operations

Operation of the Project will result in emissions to the atmosphere of both criteria and toxic air pollutants from the proposed auxiliary boilers, fire pumps, emergency generator engines, and cooling towers, and fugitive losses from the HTF system. Criteria pollutant emissions will consist primarily of nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), sulfur oxides (SO_x), sub 10-micron particulate matter (PM_{10}), and sub 2.5-micron particulate matter particulate matter ($PM_{2.5}$). Air toxic pollutants will consist of a combination of toxic gases and toxic particulate matter species. Table 5.2-2 lists the pollutants that may potentially be emitted from the proposed Project.

Table 5.2-2. Criteria and Toxic Pollutants Potentially Emitted from the Project

Criteria Pollutants	Toxic Pollutants (cont'd)
NO_x	Naphthalene
CO	PAHs
VOCs	Propylene
SO_x	Propylene Oxide
$PM_{10}/PM_{2.5}$	Toluene
Lead	Xylene
Toxic Pollutants	Arsenic
Diesel Particulate Matter	Cadmium
Acetaldehyde	Chromium
Acrolein	Copper
Benzene	Nickel
1-3 Butadiene	Manganese
Ethylbenzene	Selenium
Formaldehyde	Mercury
Hexane	Zinc
	Biphenyl

5.2.2.4 Criteria Pollutant Emissions

Tables 5.2-3, 5.2-4, and 5.2-5 present data on the criteria pollutant emissions expected from the plant equipment and systems under normal operating scenarios. Table 5.2-6 presents a summary of total facility operational emissions. Table 5.2-7 delineates the proposed potential to emit for the Project.

Table 5.2-3. Fire Pump Engine Emissions for the Project

Pollutant	Emission Factor (g/hp-hr)	Max Hourly Emissions for Each Engine (lbs)	Max Daily Emissions for Each Engine (lbs)	Max Annual Emissions for Both Engines (tons)
NO_x	2.8	1.07	1.07	0.06
CO	2.6	0.99	0.99	0.05
VOCs	0.2	0.08	0.08	0.004
SOx	0.206 lbs/1000 gal	0.0008	0.0008	0.00004
$PM_{10/2.5}$	0.15	0.06	0.06	0.003

* All particulate matter is classified as diesel particulate matter (DPM)
g/hp-hr – grams per horsepower-hour
lbs – pounds

These engines will only be tested for <30 minutes on any given day, so the maximum hourly emissions above (actually for a ½-hour interval) represent the maximum daily emissions as well. Each engine is tested at most once per week, or run ≤26 hours per year.

Table 5.2-4. Emergency Generator Engine Emissions for the Project

Pollutant	Emission Factor (g/hp-hr)	Max Hourly Emissions for Each Engine (lbs)	Max Daily Emissions for Each Engine (lbs)	Max Annual Emissions for Both Engines (tons)
NO_x	5.05	23.30	23.30	1.21
CO	0.41	1.89	1.89	0.10
VOCs	0.1	0.46	0.46	0.02
SOx	0.206 lbs/1000 gal	0.02	0.02	0.0009
$PM_{10/2.5}$	0.036	0.17	0.17	0.0086

* All particulate matter is classified as diesel particulate matter (DPM)

g/hp-hr – grams per horsepower-hour

lbs – pounds

These engines will only be tested for <30 minutes on any given day, so the maximum hourly emissions above (actually for a ½-hour interval) represent the maximum daily emissions as well. Each engine is tested at most once per week, or run ≤26 hours per year.

Table 5.2-5. Auxiliary Boilers and Cooling Tower Emissions for the Project

Auxiliary Boilers (2)				
Pollutant	Max Hourly Emissions for Each Boiler (lbs)	Max Daily Emissions for Each Boiler (lbs)	Max Annual Emissions for Each Boiler (tons)	Max Annual Emissions for Both Boilers (tons)
NOx	0.24	5.68	0.26	0.52
CO	0.82	19.6	0.90	1.8
VOC	0.231	5.54	0.25	0.51
SOx	0.0126	0.3	0.014	0.028
PM10/PM2.5	0.159	3.83	0.18	0.35
Emissions data at full load, 24 hours per day, 4380 hours per year each. Appendix C.1 presents emissions data for <u>each</u> boiler.				
Cooling Tower (2)				
Pollutant	TDS, mg/L	Max Hourly Emissions for Each Tower (lbs)	Max Daily Emissions for Each Tower (lbs)	Max Annual Emissions for Both Towers (tons)
PM_{10}	~9968	0.69	11.12	4.06
$PM_{2.5}$	~9968	0.42	6.67	2.44

Drift fraction – 0.000005

Emissions are a total from 6 cells, assuming operational time of 16 hr/day and 5840 hrs/year (each tower).

Fugitive VOC losses from the HTF system are expected to be approximately 47.95 lbs/day, of which 27% or 12.95 lbs/day will be emissions of biphenyl. These emissions are due to expansion in the system and are expected to take place over the course of an hour in the morning period. See Appendix C.1 for a description of the system, and emissions estimation.

Table 5.2-6. Summary of Facility Emissions for the Project

Pollutant	lbs/hr	lbs/day	tons/year
NO_x	23.78	34.66	1.80
CO	3.53	41.10	1.95
VOCs	96.82	107.44	18.04
SO_x	0.045	0.62	0.03
PM_{10}	2.08	30.07	4.42
$PM_{2.5}$	1.33	21.20	2.80

The engines will not run in the same hour or on the same day. Lbs/hr and lbs/day are based upon the maximum single engine emissions.

Table 5.2-7. Summary of Potential to Emit for the Project

Pollutant	Proposed Facility, Max lbs/day	Proposed Facility, tons/yr
NO_x	34.66	1.80
CO	41.10	1.95
VOCs	107.44	18.04
SOx	0.62	0.03
PM_{10}	30.07	4.42
$PM_{2.5}$	21.20	2.80

Emissions from the use of on-site mobile equipment are not included in Table 5.2-7, per the following:

- These emissions, per Rule 1303 are classified as “secondary” and are not to be included in the source’s potential to emit.
- Mobile sources, such as the vehicles proposed for on-site use are clearly exempt from the AQMD permitting regulations. Appendix C.1 contains a delineation of the estimated mobile source on-site emissions.
- These vehicles will be properly licensed and registered through the California Department of Motor Vehicles.

- Both the AQMD and the State emissions inventory clearly anticipate and forecast emissions for motor vehicles for future years, therefore it is reasonable to assume that these emissions are already included in the AQMD and State emissions projections and air quality planning analyses. As such, the emissions are not "new" or "un-anticipated". Appendix C.1 presents summary data on the vehicle emissions and use growth rates for the MDAB.

Pursuant to District Rule 1303, the offset thresholds are applied on a facility basis at the following threshold values:

- CO 100 tpy
- PM10 15 tpy
- NOx 25 tpy
- SOx 25 tpy
- ROC 25 tpy

Based on the above noted offset thresholds, and the values in table 5.2-7, the proposed facility would not be required to obtain offsets pursuant to Rule 1303. The proposed criteria pollutant mitigation strategy for Project is discussed in Appendix C.7.

Based on the values in Tables 5.2-6 and 5.2-7, the new facility will not be a major stationary source per MDAQMD NSR Regulation XIII for any criteria pollutant. Detailed emissions data on the proposed facility are presented in Appendix C.1. The proposed facility will not trigger the Prevention of Significant Deterioration (PSD) program requirements therefore a PSD increment analysis protocol is not required (see Appendix C.3).

Greenhouse Gas Emissions

Operational emissions of greenhouse gases (GHGs) will be primarily from the combustion of fuels in the auxiliary boilers, fire pumps and emergency generator engines. Emissions factors derived from the California Climate Action Registry General Reporting Protocol (GRP) (6/2006).

- Total operational emissions of GHG (CO2e) from stationary source equipment are estimated to be 11,211 tons/yr.
- Total operational emissions of GHG (CO2e) from dedicated on-site mobile source equipment are estimated to be 157 tons/yr.

See Appendix C.1 for emissions support data and calculations.

In addition, it is reasonable to assume that the solar power produced from the Project would offset the need to build and operate fossil-fuel generation plants. Assuming that the Project generates power at an annual rate of 600,000 net-megawatt hours (MWh). Using the California Public Utilities (CPUC) and California Energy Commission (CEC) performance value of 1,100 lbs CO_2 per MWh would result in a CO_2 differential between the Project and a comparable fossil-fuel facility of approximately 318,632 tons per year.

5.2.2.5 Hazardous Air Pollutants

See Section 5.10 and Appendix C.1 for a detailed discussion and quantification of hazardous air pollutant emissions from the proposed Project and the results of the health risk assessment (HRA). See Appendix C.4 for the public health analysis support materials. Section 5.10 also discusses the need for Risk Management Plans pursuant to 40 CFR 68 and the California Accidental Release Program (CalARP) regulations.

5.2.2.6 Construction

Construction-related emissions are based on the following:

- The site total acreage is 1778, with a total facility acreage inside the proposed fenceline of 1632. The maximum acreage to be disturbed in any single day or month is 160 acres.
- Moderate site preparation will be required prior to construction of the array fields, power blocks, control building foundations, support structures, and other project features.
- Construction activity is expected to last for a total of 26 months.

Construction-related issues and emissions at the Project site are consistent with issues and emissions encountered at any construction site. Compliance with the provisions of the following permits (as incorporated in the CEC Conditions of Certification) will generally result in minimal site emissions: (1) grading permit, (2) Stormwater Pollution Prevention Plan (SWPPP) requirements (construction site provisions), (3) use permit, (4) building permits, and (5) the MDAQMD ATC permit, which will require compliance with the provisions of all applicable fugitive dust rules that pertain to the site construction phase. An analysis of construction site emissions is presented in Appendix C.5. This analysis incorporates the following mitigation measures or control strategies:

- The Applicant will have an on-site construction mitigation manager who will be responsible for the implementation and compliance of the construction mitigation program. The documentation of the ongoing implementation and compliance with the proposed construction mitigations will be provided on a periodic basis.
- All unpaved roads and disturbed areas in the Project and laydown construction sites will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of every two hours during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.

- On-site vehicle speeds will be limited to five mph on unpaved areas within the Project construction site.
- The construction site entrance(s) will be posted with visible speed limit signs.
- All construction equipment vehicle tires will be inspected and cleaned as necessary to be free of dirt prior to leaving the construction site via paved roadways.
- Gravel ramps will be provided at the tire cleaning area.
- All unpaved exits from the construction site will be graveled or treated to reduce track-out to public roadways.
- All construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been provided.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other similar measures as specified in the construction SWPPP to prevent runoff to roadways.
- All paved roads within the construction site will be cleaned on a periodic basis (or less during periods of precipitation), to prevent the accumulation of dirt and debris.
- The first 500 feet of any public roadway exiting the construction site will be cleaned on a periodic basis (or less during periods of precipitation), using wet sweepers or air-filtered dry vacuum sweepers, when construction activity occurs or on any day when dirt or runoff from the construction site is visible on the public roadways.
- Any soil storage piles and/or disturbed areas that remain inactive for longer than 10 days will be covered, or shall be treated with appropriate dust suppressant compounds.
- All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions will be covered, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to minimize fugitive dust emissions. A minimum freeboard height of two feet will be required on all bulk materials transport.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition will remain in place until the soil is stabilized or permanently covered with vegetation.
- Disturbed areas will be re-vegetated or covered with gravel or other dust suppressant material as soon as practical.

To mitigate exhaust emissions from construction equipment, the Applicant is proposing the following:

- The Applicant will work with the construction contractor to utilize to the extent feasible, USEPA/Air Resources Board (ARB) Tier II/Tier III engine compliant equipment for equipment over 100 hp.
- Ensure periodic maintenance and inspections per the manufacturers specifications.
- Reduce idling time through equipment and construction scheduling.
- Use California low sulfur diesel fuels (<=15 ppmw S).

Based on the temporary nature and the time frame for construction, the Applicant believes that these measures will reduce construction emissions and impacts to levels that are less than significant. Use of these mitigation measures and control strategies will ensure that the site does not cause any violations of existing air quality standards as a result of construction-related activities. Appendix C.5 presents the evaluation of construction related emissions. Appendices C.2 and C.5 present data on the construction related ambient air quality impacts.

Table 5.2-8 presents data on the regional air quality significance thresholds currently being implemented by the MDAQMD.

Table 5.2-8. MDAQMD CEQA Significance Thresholds

Pollutant	Annual Threshold, tons	Daily Threshold, lbs
Carbon Monoxide	100	548
Oxides of Nitrogen	25	137
Volatile Organic Compounds	25	137
Oxides of Sulfur	25	137
Particulate Matter (PM10)	15	82
Odor	10 D/T	5 D/T
Source: San Bernardino County Planning Division, 5/09. MDAQMD CEQA Guidelines, 2/09.		

The on-site emissions from the construction phase of the project will exceed the significance threshold for PM10 only. The on and off-site construction emissions will exceed the daily significance thresholds for NOx and PM10, and the annual threshold for PM10. The operational phase of the Project will not result in emissions above the annual or daily significance thresholds noted in Table 5.2-8. The project is not expected to generate any odors which would cause a public nuisance or impact a substantial population at any offsite location.

In addition to the local significance criteria, the following general conformity analysis thresholds are as follows in accordance with Code of Federal Regulations (40 CFR Parts 6 and 51), and MDAQMD Rule 2002:

- NO_x, VOCs – 50 tons per year
- CO, PM_{10}, SO_x—100 tons per year

If the total direct and indirect emissions from the proposed Project are below the conformity analysis thresholds, then the proposed Project would be considered to be exempt from performing a comprehensive air quality conformity analysis and determination, and would also be considered to be conforming to the State Implementation Plan (SIP). The proposed Project will not result in emissions in excess of the conformity thresholds therefore a conformity analysis is not required.

5.2.3 Best Available Control Technology Evaluation

5.2.3.1 Current Facility Control Technologies

Table 5.2-9 summarizes the control technologies currently proposed for use on the auxiliary boilers, emergency generator and fire pump engines.

Table 5.2-9. BACT Values for Auxiliary Boilers, Fire Pump and Emergency Generator Engines

IC Engines		
Pollutant	BACT Emissions Range[1]	Tier III Standards[2]
NO_x	2.8 – 6.19 g/hp-hr	2.8-4.5 g/hp-hr
CO	3.7 g/hp-hr	2.6-3.7 g/hp-hr
VOCs	0.07 – 1.5 g/hp-hr	0.2-0.3 g/hp-hr
SO_x	Fuel S <= 15 ppmw S	None
PM_{10}	0.07 – 0.4 g/hp-hr	0.15-0.22 g/hp-hr
Auxiliary Boilers		
Pollutant	SCAQMD BACT[3]	
NO_x	9-15 ppmv @3% O2	
CO	50-100 ppmv @ 3% O2	
VOCs	Clean fuel (natural gas, propane)	
SO_x	Clean fuel (natural gas, propane)	
PM_{10}	Clean fuel (natural gas, propane)	

[1] Data summary from SCAQMD, San Diego Air Pollution Control District (APCD), San Joaquin Valley Unified APCD, and Bay Area AQMD.

[2] Tier III standards for NO_x and VOCs are actually NO_x +VOCs.

[3] BACT for gas boilers in the range of 6.3-25 MMBtu/hr.

5.2.3.2 Proposed Facility Best Available Control Technology

Table 5.2-10 presents the BACT for the proposed new auxiliary boilers, fire pump and emergency generator engines.

Table 5.2-10. Proposed BACT for the Project Auxiliary Boilers, Fire Pump and Emergency Generator Engines

IC Engines

Pollutant	Proposed BACT Emissions Level	Proposed BACT System(s)	Meets Current BACT Requirements
NO_x	2.8-5.1 g/hp-hr	Engine Design	Yes
CO	2.6-3.7 g/hp-hr	Engine Design	Yes
VOCs	0.2-0.3 g/hp-hr	Engine Design and Low Aromatic Fuel	Yes
SO_x	Fuel S <= 15 ppmw S	Fuel S <= 15 ppmw S	Yes
PM_{10}/ $PM_{2.5}$	0.15-0.22 g/hp-hr	Engine design and ultra-low sulfur diesel (ULSD)	Yes
Auxiliary Boilers			
Pollutant	**Proposed BACT Emissions Level**	**Proposed BACT System(s)**	**Meets Current BACT Requirements**
NO_x	9 ppmv @ 3% O2	LNB and good combustion practices (GCP)	Yes
CO	50 ppmv @ 3% O2	LNB and good combustion practices (GCP)	Yes
VOCs	Clean fuel	Clean fuel (propane) and GCP	Yes
SO_x	Clean fuel	Clean fuel (propane) and GCP	Yes
PM_{10}/ $PM_{2.5}$	Clean fuel	Clean fuel (propane) and GCP	Yes
LNB = low NOx burner technology, see Appendix K-1 for boiler specifications, etc.			

BACT for the cooling tower will be high efficiency drift eliminators rated at 0.0005% drift fraction.

BACT for the HTF expansion system and fugitives is described in Appendix C.1. The system will incorporate a nitrogen blanketing system on the HTF tanks. In addition, the HTF piping, storage and distribution system (valves, flanges, pumps, etc.) will be properly and regularly inspected and maintained to either eliminate or decrease to the maximum extent possible fugitive losses.

Based on the above data, the proposed emissions levels for the new auxiliary boilers, fire pump, emergency generator engine, HTF system, and cooling tower meet the BACT requirements of the MDAQMD.

5.2.4 Air Quality Impact Analysis

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from the Project. The maximum modeled concentrations were added to the maximum background concentrations to calculate a total impact.

Potential air quality impacts were evaluated based on air quality dispersion modeling, as described in herein. All input and output modeling files are contained on a CD-ROM disk provided to CEC and MDAQMD staffs under separate cover. All modeling analyses were performed using the techniques and methods as discussed with the MDAQMD.

5.2.4.1 Dispersion Modeling – Primary Model Selection

For modeling the potential impact of the Project in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top) the USEPA guideline model AERMOD (version 07026) was used as well as the latest versions of the AERMOD preprocessors to determine surface characteristics (AERSURFACE version 08009), to process meteorological data (AERMET version 06341), and to determine receptor slope factors (AERMAP version 09040). The purpose of the AERMOD modeling analysis was to evaluate compliance with the California and Federal air quality standards.

The surface meteorological data processed for AERMOD was four recent years (2001-2004) of ASOS data from Daggett Airport (located approximately 50 kilometers east-southeast from the Project site). The ASOS data were downloaded from the National Climatic Data Center (NCDC) website in CD-3505 format, converted to SAMSON format using the Russ Lee freeware program NCDC-CNV (which also interpolates missing data in accordance with USEPA procedures), and then combined with upper-air data from Desert Rock (downloaded from the NOAA website) for the same time period. As part of the AERMET input requirements, Albedo, Bowen Ratio, and Surface Roughness must be classified by season. These values were determined with the AERSURFACE using the latest USEPA guidance (i.e., *AERMOD Implementation Guide*, revised March 19, 2009, and the *AERSURFACE User's Guide,* USEPA-454/B-08-001) as described later.

AERMOD input data options are listed below. Use of these options follows the USEPA's modeling guidance. Following the methods outlined by the Auer land use classification method, the land use within a three-kilometer radius around the Project can be classified as rural. Default model option[1] for temperature gradients, wind profile exponents, and

[1]To reduce run times for the area source modeled for fugitive dust and the large number of point sources modeled for mobile combustion source equipment, the TOXICS keyword was used for modeling construction impacts.

calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor terrain heights option, and all sources were modeled as rural sources.

5.2.4.2 Additional Model Selections

The Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274) was used to determine building dimensions input into AERMOD, the HARP On-Ramp preprocessor was used to evaluate the public health impacts of non-criteria pollutants as described in Section 5.10, and the SCREEN3 dispersion model (version 96043) was used to evaluate fumigation impacts.

5.2.4.3 Good Engineering Practice Stack Height Analysis

Good engineering practice (GEP) stack heights were calculated based on the proposed Project site plans as 92.5 feet (28.19 meters) for the fire pump and one of the cooling tower cells at each power block (due to the 37' high cooling tower deck), 99.23' (30.24 meters) for another one of the cooling tower cells at each power block (due to the 39.69' high cooling tower blow down water tank), and 181.25 feet (55.24 meters) for the emergency generator, auxiliary boiler, and the four remaining cooling tower cells at each power block (due to the 72.5' high steam turbine generator building). The design stack heights of all sources (20' fire pump stacks, 51' cooling tower cells, 60' emergency generator stacks, and 60' auxiliary boiler stacks) are less than calculated GEP stack heights, so downwash effects were included in the modeling analysis. Thus, BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD.

5.2.4.4 Receptor Grid Selection and Coverage

Receptor and source base elevations were determined from the U.S. Geological Survey (USGS) Digital Elevation Model (DEM) data using the 7.5-minute format data (10-meter spacing between grid nodes). All coordinates were referenced to UTM North American Datum 1927 (NAD27), Zone 11. The receptor locations and elevations from the DEM files were placed exactly on the DEM nodes for regular receptor grids and AERMAP was used to interpolate fenceline receptor elevations. Every effort was made to maintain receptor spacing across DEM file boundaries.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the Project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The receptor grids used in this analysis are as follows:

- 50-meter resolution receptor grid extending outwards 500 meters from the Project fenceline in all directions. This is called the downwash grid. In addition, receptors were placed at approximate 50-meter intervals along the property fenceline.
- 100-meter resolution receptor grid extending outwards from the edge of the downwash grid to 1200 to 1500 meters or more from the Project fenceline in all directions. This is referred to as the intermediate grid.

- 200-meter resolution receptor grid extending outwards from the edge of the intermediate grid to 10 kilometers from the center of the Project in all directions. This is referred to as the coarse grid.
- 50-meter resolution around any location on the coarse or intermediate grids where a maximum impact is modeled above the concentrations on the downwash grid. This is referred to as a refined grid. All overall maximum impacts occurred on the fenceline or in the downwash receptor grid, so no refined receptor grids were required.

Concentrations within the facility fenceline will not be calculated. Two public roadways traverse the overall facility property, which are considered in the analysis by modeling receptors along the property fenceline on each side of the public roadways (i.e., the Project actually consists of three separate fenced areas). Receptor locations and DEM receptor data were input into AERMAP (version 09040) to calculate receptor heights and hill height scales as per USEPA guidance. Since maximum impacts due to fugitive emissions from construction activities are expected to occur at or near the property boundary, only the 50-meter spaced downwash and fenceline receptor grids were used for modeling construction impacts.

5.2.4.5 Meteorological Data Selection

The meteorological input data for AERMOD was the ASOS data measured at Daggett Airport. Due to its proximity, this data is considered to be representative of the dispersion conditions for the Project site. Four recent years (2001-2004) of hourly surface data were combined with concurrent upper-air data from Desert Rock, Nevada using the AERMET program. These four years were selected because these are the only recent years of ASOS surface data from Lancaster Fox Field that meet the minimum 90% data recovery rates (for each calendar year) after combining with concurrent upper-air data from Desert Rock. Because of the relatively homogeneous land use surrounding the meteorological data and project sites, one 360-degree sector (to a distance of one km) was selected for Surface Roughness (USEPA guidance for Albedo and Bowen Ratio assumes one large ten km area for these parameters).

As part of the input requirements for AERMET/AERMOD, Albedo, Bowen Ratio, and Surface Roughness must be classified by month/season. These values were calculated with AERSURFACE for the meteorological data location (34.85372ºN and 116.78701ºW) based on recent USEPA guidance for the sizes of area selected and averaging used for each parameter. AERSURFACE was executed for arid conditions and no snow cover during the winter season and the AERSURFACE inputs/outputs are shown in the following table.

Table 5.2-11. Monthly Parameters for AERMET

Month	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Surface Roughness (meters) and Albedo based on the following Seasonal Assumptions:												
Season	Fall	FALL	Fall	Fall	Summer	Summer	Summer	Summer	Summer	Summer	Fall	Fall
Arid	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Airport	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Surface Roughness (meters) and Albedo												
Sfc.Rgh.	0.118	0.118	0.118	0.118	0.118	0.118	0.118	0.118	0.118	0.118	0.118	0.118
Albedo	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Bowen Ratio for each Month/Year based on above inputs and following surface moisture contents:[1]												
2001	Avg	Avg	Avg	Wet	Avg	Avg	Avg	Avg	Avg	Avg	Wet	Avg
2002	Dry	Dry	Dry	Avg	Avg	Avg	Wet	Dry	Avg	Avg	Wet	Avg
2003	Dry	Wet	Wet	Wet	Avg	Avg	Dry	Avg	Avg	Avg	Wet	Dry
2004	Dry	Wet	Wet	Avg	Avg	Avg	Avg	Avg	Avg	Wet	Wet	Wet
Bowen Ratio												
2001	4.34	4.34	4.34	1.57	2.93	2.93	2.93	2.93	2.93	2.93	1.57	4.34
2002	7.78	7.78	7.78	4.34	2.93	2.93	1.19	4.87	2.93	2.93	1.57	4.34
2003	7.78	1.57	1.57	1.57	2.93	2.93	4.87	2.93	2.93	2.93	1.57	7.78
2004	7.78	1.57	1.57	4.34	2.93	2.93	2.93	2.93	2.93	1.19	1.57	1.57

[1]Dry/Average/Wet designate total monthly rainfall amounts for the month/year based on Daggett Airport cooperative data that fall into the lower 30th percentiles / middle 40th percentiles / upper 30th percentiles for the most recent standardized 30-year period (in this case, 1971-2000).

5.2.4.6 Background Air Quality

In 1970, the United States Congress instructed the USEPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the effects of air pollutants on the health and welfare of the public. The resulting CAA set forth air quality standards to protect the health and welfare of the public. Two levels of standards were promulgated—primary standards and secondary standards. Primary national ambient air quality standards (NAAQS) are “those which, in the judgment of the administrator [of the USEPA], based on air quality criteria and allowing an adequate margin of safety, are requisite to protect the public health (state of general health of community or population).” The secondary NAAQS are “those which in the judgment of the administrator [of the USEPA], based on air quality criteria, are requisite to protect the public welfare and ecosystems associated with the presence of air pollutants in the ambient air.” To date, NAAQS have been established for seven criteria pollutants as follows: sulfur dioxide (SO_2), CO, ozone, nitrogen dioxide (NO_2), PM_{10}, $PM_{2.5}$, and lead.

The criteria pollutants are those that have been demonstrated historically to be widespread and have a potential to cause adverse health impacts. USEPA developed comprehensive documents detailing the basis of, or criteria for, the standards that limit the ambient concentrations of these pollutants. The state of California has also established AAQS that further limit the allowable concentrations of certain criteria pollutants. Review of the established air quality standards is undertaken by both USEPA and the state of California on a periodic basis. As a result of the periodic reviews, the standards have been updated and amended over the years following adoption.

Each federal or state AAQS is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the period over which the concentration value is to be measured. Table 5.2-12 presents the current federal and state AAQS.

Table 5.2-12. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hr	0.09 ppm (180 μg/m^3)	-
	8-hr	0.070 ppm (137 μg/m^3)	0.075 ppm (147 μg/m^3) (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8-hr	9.0 ppm (10,000 μg/m^3)	9 ppm (10,000 μg/m^3)
	1-hr	20 ppm (23,000 μg/m^3)	35 ppm (40,000 μg/m^3)
Nitrogen dioxide	Annual Average	0.030 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)
	1-hr	0.18 ppm (339 μg/m^3)	-
Sulfur dioxide	Annual Average	-	0.030 ppm (80 μg/m^3)
	24-hr	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)
	3-hr	-	0.5 ppm (1,300 μg/m^3)
	1-hr	0.25 ppm (655 μg/m^3)	-
Respirable particulate matter (10 micron)	24-hr	50 μg/m^3	150 μg/m^3
	Annual Arithmetic Mean	20 μg/m^3	-
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 μg/m^3	15.0 μg/m^3 (3-yr average)
	24-hr	-	35 μg/m^3 (3-yr average of 98th percentiles)
Sulfates	24-hr	25 μg/m^3	-
Lead	30-day	1.5 μg/m^3	-
	Calendar Quarter	-	1.5 μg/m^3
	Rolling 3 Month Avg.	-	0.15 μg/m^3

μg/m3 -- micrograms per cubic meter
ppm—parts per million

Source: CARB website, table updated 11/17/08

Brief descriptions of health effects for the main criteria pollutants are as follows.

Ozone—Ozone is a reactive pollutant that is not emitted directly into the atmosphere, but rather is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving precursor organic compounds (POC) and NO_x. POC and NO_x are therefore known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of POC and NO_x under the influence of wind and sunlight. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. In addition to causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Carbon Monoxide—Carbon monoxide is a non-reactive pollutant that is a product of incomplete combustion. Ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses.

Particulate Matter (PM_{10} and $_{PM2.5}$)—PM_{10} consists of particulate matter that is 10 microns or less in diameter (a micron is one millionth of a meter), and fine particulate matter, $PM_{2.5}$, consists of particulate matter 2.5 microns or less in diameter. Both PM_{10} and $PM_{2.5}$ represent fractions of particulate matter, which can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local PM_{10} concentrations, while others, such as vehicular traffic, affect regional PM_{10} concentrations.

Several studies that the USEPA relied on for its staff report have shown an association between exposure to particulate matter, both PM_{10} and $PM_{2.5}$, and respiratory ailments or cardiovascular disease. Other studies have related particulate matter to increases in asthma attacks. In general, these studies have shown that short-term and long-term exposure to particulate matter can cause acute and chronic health effects. $PM_{2.5}$, which can penetrate deep into the lungs, causes more serious respiratory ailments.

Nitrogen Dioxide and Sulfur Dioxide—NO_2 and SO_2 are two gaseous compounds within a larger group of compounds, NO_x and SO_x, respectively, which are products of the combustion of fuel. NO_x and SO_x emission sources can elevate local NO_2 and SO_2 concentrations, and both are regional precursor compounds to particulate matter. As described above, NO_x is also an ozone precursor compound and can affect regional visibility. NO_2 is the "whiskey brown-colored" gas readily visible during periods of heavy air pollution. Elevated concentrations of these compounds are associated with increased risk of acute and chronic respiratory disease.

SO_2 and NO_2 emissions can be oxidized in the atmosphere to eventually form sulfates and nitrates, which contribute to acid rain. Large power plants with high emissions of these substances from the use of coal or oil are subject to emissions reductions under the Phase I Acid Rain Program of Title IV of the 1990 CAA Amendments. Power plants, with individual equipment capacity of 25 MW or greater that use natural gas or other fuels with low sulfur content, are subject to the Phase II Program of Title IV. The Phase II program requires plants to install Continuous Emission Monitoring Systems (CEMS) in accordance with 40 CFR Part 75 and report annual emissions of SO_x and NO_x. The acid rain program provisions do not apply to the Project.

Lead—Gasoline-powered automobile engines used to be the major source of airborne lead in urban areas. Excessive exposure to lead concentrations can result in gastrointestinal disturbances, anemia, and kidney disease, and, in severe cases, neuromuscular and neurological dysfunction. The use of lead additives in motor vehicle fuel has been eliminated in California and lead concentrations have declined substantially as a result.

The nearest criteria pollutant air quality monitoring sites to the proposed Project site would be the stations located at Lancaster, Mojave, Victorville, and Barstow. Table 5.2-13 presents the MDAQMD attainment status and ambient monitoring data for these sites for the most recent three-year period are summarized in Table 5.2-14. Data from these sites are estimated to present a reasonable representation of background air quality for the Project site and impact area. Sulfur dioxide data was derived from the Victorville and Trona sites (the only sites in the regional area).

Table 5.2-13. MDAQMD Attainment Status Table

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hr	-	NA
Ozone	8-hr	NA	NA
CO	All	UNC/ATT	ATT
SO_2	All	UNC/ATT	ATT
NO_2	All	UNC/ATT	ATT
PM_{10}	All	NA	NA
$PM_{2.5}$	All	UNC/ATT	NA

ATT -- attainment
NA—non-attainment
UNC/ATT-unclassifed-attainment
Source: CARB AQ Status Maps, website, 5/09.

Table 5.2-14. Monitoring Data Summary (Highest Monitored Values)

Pollutant	Site	Avg. Time	2006	2007	2008
Ozone, ppm	Lancaster	1-hr	0.132	0.118	0.116
		8-hr	0.098	0.091	0.095
	Mojave	1-hr	0.109	0.092	0.112
		8-hr	0.089	0.078	0.093
	Victorville	1-hr	0.136	0.107	0.109
		8-hr	0.091	0.087	0.089
	Barstow	1-hr	0.112	0.099	0.104
		8-hr	0.094	0.088	0.097
PM_{10}, µg/m^3	Lancaster	24-hr	63	75	73
		Annual	26.9	30.2	24.7
	Mojave	24-hr	65	73	154
		Annual	21.4	22.1	24.4
	Victorville	24-hr	62	130	77
		Annual	33	38.4	27
	Barstow	24-hr	80	103	93
		Annual	21.9	29.8	26.1
$PM_{2.5}$, µg/m^3	Lancaster	24-hr	18	25	24
		Annual	7.4	8.0	-
	Mojave	24-hr	21.3	21.1	19.1
		Annual	-	6.2	6.8
	Victorville	24-hr	22	28	17
		Annual	10.4	9.7	-
	Barstow	24-hr	-	-	-
		Annual	-	-	-

Pollutant	Site	Avg. Time	2006	2007	2008
CO, ppm	Lancaster	1-hr	2.5	2.5	2.2
		8-hr	1.60	1.35	1.0
	Mojave	1-hr	-	-	-
		8-hr	-	-	-
	Victorville	1-hr	2.2	2.1	1.4
		8-hr	1.56	1.61	1.0
	Barstow	1-hr	3.5	1.4	1.4
		8-hr	1.19	0.7	1.2
NO_2, ppm	Lancaster	1-hr	0.066	0.064	0.062
		Annual	0.015	0.015	0.013
	Trona	1-hr	0.05	0.055	0.062
		Annual	0.005	0.004	0.004
	Victorville	1-hr	0.079	0.071	0.074
		Annual	0.02	0.018	0.016
	Barstow	1-hr	0.082	0.073	0.081
		Annual	0.022	0.02	0.019
SO_2, ppm	Victorville	1-hr	0.009	0.009	0.006
		3-hr	0.006	0.006	0.005
		24-hr	0.005	0.005	0.002
		Annual	0.001	0.001	0.001
	Trona	1-hr	0.014	0.014	0.036
		3-hr	0.009	0.009	0.006
		24-hr	0.005	0.005	0.004
		Annual	0.001	0.001	0.001
	Lancaster	1-hr	-	-	-
		3-hr	-	-	-

Pollutant	Site	Avg. Time	2006	2007	2008
		24-hr	-	-	-
		Annual	-	-	-
	Barstow	1-hr	-	-	-
		3-hr	-	-	-
		24-hr	-	-	-
		Annual	-	-	-

Sources: MDAQMD 2008 AQ Report, CARB ADAM database, EPA AIRS database.

Table 5.2-15 shows the background air quality values based upon the data presented in Table 5.2-14. The background values represent the highest values reported for any site during any single year of the most recent three-year period.

Table 5.2-15 Background Air Quality Values

Pollutant and Averaging Time	Background Value, μg/m³
Ozone – 1-hr	272
Ozone – 8-hr	192
PM_{10} – 24-hr	154
PM_{10} – Annual	38.4
$PM_{2.5}$ – 24-hr	28
$PM_{2.5}$ – Annual	10.4
CO – 1-hr	4025
CO – 8-hr	1789
NO_2 – 1-hr	154
NO_2 – Annual	42
SO_2 – 1-hr	94
SO_2 – 3-hr	23
SO_2 – 24-hr	13
SO_2 – Annual	3

High values for all years, all applicable stations.
ND—no data

5.2.4.7 Impacts on Class II Areas

Pollutant impacts due to normal operations for the facility sources can occur due to cooling tower drift (PM_{10} and $PM_{2.5}$ only), testing of the emergency generator or fire pump, and boiler operations (all criteria pollutants). While testing of the emergency generators and fire pumps will generally not be concurrent, they were conservatively modeled this way to determine absolute potential worst-case impacts. All stationary emissions sources at both alpha and beta blocks were included in the modeling analyses.

5.2.4.8 Refined Analysis

Facility sources at both power blocks, consisting of the two (2) diesel emergency generators, two (2) fire pump diesel engines, two (2) auxiliary boiler(s), as well as the two

(2) six-cell cooling towers, were modeled in the analysis for comparisons with Significant Impact Levels (SILs) and CAAQS/NAAQS.

Testing times for the diesel firepump and emergency generator engines were limited to 30 minutes per day, one day per week. As noted above, while testing of the fire pumps and emergency generators would generally not occur at the same time, short-term impacts for these four sources were conservatively modeled assuming all four engines were operating at the same time. The modeling input information for each pollutant and averaging period are shown in Table 5.2-16.

Table 5.2-16. Stack Parameters and Emission Rates for Refined AERMOD Modeling

Each Emissions Source or Device*	Stack Height (m)	Stack Temp. (Kelvins)	Exhaust Velocity (m/s)	Stack Diameter (m)	Emission Rates (g/s/stack)			
					NO_X	SO_2	CO	$PM_{10/2.5}$
Averaging Period: 1-hour for Normal Operating Conditions								
Aux. Boiler	18.288	422.6	13.84	0.5182	2.981E-2	1.586E-3	1.029E-1	–
Emergency Generator	18.288	767.6	123.21	0.3048	2.936E+0	2.250E-3	2.384E-1	–
Fire Pump	6.096	711.5	38.46	0.2032	1.344E-1	9.868E-5	1.248E-1	–
Averaging Period: 3-hours for Normal Operating Conditions								
Aux Boiler	18.288	422.6	13.84	0.5182	–	1.586E-3	–	–
Emergency Generator	18.288	767.6	123.21	0.3048	–	7.501E-4	–	–
Fire Pump	6.096	711.5	38.46	0.2032	–	3.289E-5	–	–
Averaging Period: 8-hours for Normal Operating Conditions								
Aux Boiler	18.288	422.6	13.84	0.5182	–	–	1.029E-1	–
Emergency Generator	18.288	767.6	123.21	0.3048	–	–	2.980E-2	–
Fire Pump	6.096	711.5	38.46	0.2032	–	–	1.560E-2	–
Averaging Period: 24-hours for Normal Operating Conditions								
Aux Boiler	18.288	422.6	13.84	0.5182	–	1.586E-3	–	2.009E-2
Emergency Generator	18.288	767.6	123.21	0.3048	–	9.376E-5	–	8.721E-4
Fire Pump	6.096	711.5	38.46	0.2032	–	4.112E-6	–	3.001E-4
Cooling Tower	15.545	296.0	6.66	9.1440	–	–	–	9.730E-3
Averaging Period: Annual for Normal Operating Conditions								

Each Emissions Source or Device*	Stack Height (m)	Stack Temp. (Kelvins)	Exhaust Velocity (m/s)	Stack Diameter (m)	Emission Rates (g/s/stack)			
					NO_X	SO_2	CO	$PM_{10/2.5}$
Aux Boiler	18.288	422.6	13.84	0.5182	7.453E-3	3.964E-4	–	5.022E-3
Emergency Generator	18.288	767.6	123.21	0.3048	1.743E-2	1.336E-5	–	1.243E-4
Fire Pump	6.096	711.5	38.46	0.2032	7.980E-4	5.858E-7	–	4.275E-5
Cooling Tower	15.545	300.3	9.41	9.1440	–	–	–	9.730E-3

*Each boiler, each IC engine, and each cooling tower cell. Cooling tower flowrates and temperatures represent winter conditions for 24-hour impacts (worst-case conditions) and average ambient conditions for annual impacts.

5.2.4.9 Normal Operations Impact Analysis

In order to determine the magnitude and location of the maximum impacts for each pollutant and averaging period, the AERMOD model was used. Table 5.2-17 summarizes maximum modeled concentrations for each criteria pollutant and associated averaging periods. In order to assess the significance of the modeled concentrations, the maximum concentrations were modeled and compared to the Class II PSD SILs. All modeled facility pollutant concentrations with the exception of 1-hour NO_2 concentrations are less than the SILs for those pollutants. Maximum combined impacts (modeled plus background) exceed the AAQS only when background concentrations already exceed the applicable standards (in this case, only the PM_{10} 24-hour California and National AAQS and the annual California AAQS).

The maximum impacts for NO_2 (1-hour and annual averages), CO (1-hour and 8-hour averages), SO_2 (1-hour, 3-hour, 24-hour, and annual averages), and PM_{10}/$PM_{2.5}$ (24-hour and annual averages) occurred in the immediate vicinity of the facility either on the fenceline or within the downwash grid in the 50-meter-spaced receptor areas. Therefore, no additional 50-meter-spaced receptor grids in the coarse or intermediate receptor grid areas were required.

Table 5.2-17 Air Quality Impact Summary for Normal Operating Conditions

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Class II Significance Level (µg/m³)	SIL (µg/m³)	Ambient Air Quality CAAQS/NAAQS	
							(µg/m³)	(µg/m³)
NO_2	1-hr	129.6	154	283.6	-	19	339	-
	Annual	0.051	42	42.1	1	1	57	100
PM_{10}	24-hr	1.31	154	155.3	5	5	50	150
	Annual	0.102	38.4	38.5	1	1	20	

$PM_{2.5}$	24- hr	1.31	28	29.3	5	5	-	35
	Annual	0.102	10.4	10.5	1	1	12	15.0
CO	1- hr	75.5	4025	4101	2000	2000	23,000	40,000
	8- hr	7.8	1789	1797	500	500	10,000	10,000
SO_2	1- hr	0.25	94	94.3	-	-	655	-
	3- hr	0.17	23	23.2	25	25		1,300
	24- hr	0.07	13	13/1	5	5	105	365
	Annual	0.002	3	3	1	1	-	80

Shoreline and inversion breakup fumigation analyses with the USEPA Model SCREEN3 (version 96043) were conducted based on USEPA guidance given in *"Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised"* (EPA-454/R-92-019). One-hour averaging times were initially evaluated with the 1-hour stack parameters and emissions shown in Table 5.2-16 (fumigation impacts are generally expected to occur for 90-minutes or less). Since fumigation impacts and analyses are distance-dependant, only a single power block was evaluated. The site is classified as a rural source location based on the Auer land use classification methodology. Therefore, only rural dispersion conditions were considered and there is no need to adjust fumigation impacts for urban dispersion conditions.

According to SCREEN3, the potential for fumigation impacts exists only for the emergency generator stacks under inversion breakup conditions. No inversion breakup fumigation impacts are predicted by SCREEN3 for the firepump or auxiliary boiler or for shoreline fumigation impacts for any stack (due to the Harper Lake shoreline at a distance of 1000 meters from the beta power block, when water is present). For total facility inversion breakup fumigation impacts, maximum SCREEN3 impacts under rural conditions for all SCREEN3 meteorological combinations were then determined for the auxiliary boiler or fire pump stacks at the inversion breakup fumigation distance of 2861 meters for the emergency generator. The maximum 1-hour total impacts (for the combined fumigation impact of the emergency generator stack and the coincident auxiliary boiler and fire pump impacts for normal SCREEN3 conditions) are less than the SCREEN3 maxima predicted to occur under normal dispersion conditions anywhere off-site for all the sources combined. Therefore, no further analysis of fumigation impacts for additional short-term averaging times (3-hours, 8-hours, or 24-hours) is required as described in Section 4.5.3 of *"Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised"* (EPA-454/R-92-019). The maximum fumigation impact is also compared to the maximum 1-hour impacts from the refined AERMOD analyses in the following table. As shown below, the maximum 1-hour inversion breakup fumigation impacts are less than maximum 1-hour facility impacts predicted by AERMOD to occur under normal dispersion conditions.

Table 5.2-18 Inversion Breakup Fumigation Impacts

Pollutant /Avg.Time	Impacts ($\mu g/m^3$) at Inversion Breakup Location				Max. 1-hour Refined Impacts from AERMOD
	Fumigation Impact for Emer.Gen	Max. Impact for Aux.Boiler	Max. Impact for Firepump	TOTAL	
NO_X 1-hour	38.7	1.7	10.7	51.1	129.6
SO_2 1-hour	0.03	0.09	0.01	0.13	0.25
CO 1-hour	3.1	5.8	10.0	18.9	75.5

Based on the above modeling results, emissions from the proposed Project will not significantly affect the ambient air quality of the area.

5.2.4.10 Impacts on Soils, Vegetation, and Sensitive Species

Impacts on soils, vegetation, and sensitive species were determined to be "insignificant" for the following reasons:

- No soils, vegetation, or sensitive species were identified in the Project area, which are recognized to have any known sensitivity to the types or amounts of air pollutants expected to be emitted by the proposed facility.
- The facility emissions are expected to be in compliance with all applicable air quality rules and regulations.
- The facility impacts are not predicted to result in violations of existing air quality standards, nor will the emissions cause an exacerbation of an existing violation of any quality standard.

5.2.5 Compliance With Laws, Ordinances, Regulations, and Statutes (LORS)

Section 5.2.5, Table 5.2-19, presents a listing of local, state, and federal air quality LORS deemed applicable to the proposed Project. Conformance and/or compliance for each identified LORS is noted in the table.

Table 5.2-19. Laws, Ordinances, Regulations, and Standards

Applicable LORS	LORS Requirement Summary	LORS Compliance/Conformance
Federal LORS[1]		
Title 40 CFR, Parts 51 and 52	Prevention of Significant Deterioration for new and modified major stationary sources.	The MS1 facility will not be a major stationary source per the PSD regulations. PSD will not apply.
Title 40 CFR, Parts 51 and 52	New Source Review for new and modified major stationary sources.	The MS1 facility will be subject to the local air district NSR rules and review process, including but not limited to, BACT determination, offset analysis, air quality impact assessment, etc. See AQMD Rule XIII.
Title 40 CFR, Parts 71-75	Acid Rain program provisions applicable to NOx and SOx emissions compliance, reporting, monitoring, and record keeping.	The AQMD DOC will discuss the final applicability of the Title IV provisions. The facility is not expected to be subject to the title IV provisions. See AQMD Rule 1210.
Title 40 CFR, Part 70	Federal operating permits requirements.	The MS1 facility will assess applicability under the MDAQMD Title V rule and submit the required applications, if applicable, pursuant to the District Rule XII timeframes.

Applicable LORS	LORS Requirement Summary	LORS Compliance/Conformance
Title 40 CFR, Part 60	New Source Performance Standards (NSPS) Subparts Dc, K, Kb,	The MS1 facility will work with MDAQMD staff to assess final NSPS Subpart applicability during the DOC review. MS1 will comply with all compliance and operational limits, reporting, and record keeping requirements in the final applicable NSPS. See AQMD Rule IX.
State LORS[2]		
Air Toxics Hot Spots Program HSC 44300-44384	Requires preparation and submittal of air toxics plans and reports to the AQMD on the District delineated schedule per the HSC provisions.	The MS1 facility will comply with all submittals, plans and reports, as required by the MDAQMD upon a determination of program applicability by the AQMD.
CCR 1752, 2300-2309	Requires the CEC decision on the AFC to consider air quality compliance and protection of the environment.	The MDAQMD will issue a DOC prior to the CEC approval of the AFC. The DOC will contain the AQMD's compliance requirements and conditions. The CEC certification and approval will also contain numerous conditions relating to compliance limits, procedures, reporting, monitoring, and record keeping.
17 CCR 93115	ATCM for Stationary CI Engines, established emissions and operational requirements for diesel fueled stationary CI engines.	The emissions and impact sections of the air quality and public health analyses of the AFC establish compliance with the provisions of the ATCM. Also see the BACT determination in Appendix C.6.
Local MDAQMD LORS[3]		

Applicable LORS	LORS Requirement Summary	LORS Compliance/Conformance
Regulation XIII-NSR	Requires pre-construction review for all proposed new or modified stationary sources. Review includes a BACT determination, mitigation analysis, air quality impact analysis, etc.	The air quality analysis presented in the AFC air section and Appendices C.1 through C.9 fulfill the filing and analysis requirements of NSR. The MDAQMD will issue a DOC with conditions insuring compliance with all provisions of the NSR rule.
Rule 1320-Toxics NSR	Requires pre-construction review for all proposed new or modified stationary sources emitting toxic pollutants. Establishes risk significance levels and review procedures.	The public health analysis presented in the AFC public health section and Appendices C.1 through C.9 fulfill the filing and analysis requirements of toxics NSR. The MDAQMD will issue a DOC with conditions insuring compliance with all provisions of the toxics NSR rule.
Regulation XII-Title V	Implements the provisions of the federal operating permits program and the requirements of CAA Title V.	The MS1 facility will file the required applications for a Title V permit within 12 months of the start of the facility, if the Title V program is determined to apply to the facility per the MDAQMD DOC.
Acid Rain Program	No locally adopted rule. See Federal LORS section.	If Title IV is deemed applicable per the AQMD DOC, the DOC will contain conditions insuring compliance with all applicable provisions of 40 CFR 71-75, including but not limited to permit application filing, monitoring, reporting, record keeping, etc.

Applicable LORS	LORS Requirement Summary	LORS Compliance/Conformance
Rule 401-Visible Emissions	Limits visible emissions from applicable processes to values no darker than Ringelmann #1 for periods greater than 3 minutes in any hour.	MDAQMD DOC will insure compliance with Rule 401. Use of solar trough technology and clean fuels will also insure compliance.
Rule 402-Nuisance	Prohibits emissions in quantities that would adversely affect public health, other businesses, or property.	The MS1facility is not expected to use or operate any equipment or process that would have the capability to cause a public nuisance.
Rule 403-Fugitive Dust	Limits fugitive PM emissions from construction and construction related activities.	The MDAQMD DOC conditions coupled with the MS1 facility proposed mitigation measures should insure compliance with the provisions of Rule 403. See also Appendix C.5.
Rule 404-Combustion Contaminants	Limits PM emissions from combustion sources.	Use of clean fuels in the boilers and IC engines will insure compliance with this rule. See Appendix C.1.
Rule 406-Specific Contaminants	Limits SO2 emissions from stationary sources.	Use of clean fuels (natural gas and low sulfur fuel oil) in the boilers and IC engines will insure compliance with this rule. See Appendix C.1.
Rule 407-Liquid and Gaseous Contaminants	Limits CO emissions from combustion sources.	Use of clean fuels (natural gas and low sulfur fuel oil) in the boilers and IC engines, and good combustion practices, will insure compliance with this rule. See Appendix C.1.

Applicable LORS	LORS Requirement Summary	LORS Compliance/Conformance
Rule 431-Sulfur Content of Fuels	Limits the sulfur content of fuels combusted in stationary sources.	Use of clean fuels (natural gas and low sulfur fuel oil) in the boilers and IC engines will insure compliance with this rule. See Appendix C.1.
Rule 475-Electric Power Generating Equipment	Limits NOX and PM emissions from power generating equipment, i.e., emergency engines.	Use of low sulfur fuel oils, good combustion practices, and periodic maintenance coupled with engine design reflecting the applicable level of emissions compliance with the EPA and CARB tiered emissions standards will insure compliance with this rule. See Appendices C.1 and C.6.
Rule 476-Steam Generating Equipment	Limits NOx emissions from boilers.	Use of natural gas and BACT for NOx at 9 ppmv will insure compliance with this rule. See Appendix C.1 and C.6.
Regulation IX-NSPS	New Source Performance Standards (NSPS) Potentially applicable Subparts: Dc, K, Kb,	The MS1 facility will work with MDAQMD staff to assess final NSPS Subpart applicability during the DOC review. MS1 will comply with all compliance and operational limits, reporting, and record keeping requirements in the final applicable NSPS.
Rule 2002	Implements the General Conformity requirements of 40 CFR Parts 6 and 51.	Direct and indirect emissions from the proposed facility are not expected to exceed the general conformity levels noted in Rule 2002, as such a conformity analysis is not required at this time.

Applicable LORS	LORS Requirement Summary	LORS Compliance/Conformance
Regulating agencies with respect to Federal LORS are EPA, and the MDAQMD with EPA oversight. In some instances, the MDAQMD has been granted program authority (via rule adoption or MOU) to act in the place of EPA. These instances are noted in the Local LORS. Regulating agencies with respect to State LORS are the MDAQMD with CARB oversight, and the CEC. Regulating agency with respect to Local LORS is the MDAQMD with either CARB and/or EPA oversight. The Determination of Compliance (DOC) issued by the MDAQMD will contain conditions insuring compliance with all adopted air quality related LORS (local rules, federal rules for which the AQMD has authority to implement and enforce, and state rules for which the AQMD has authority to implement and enforce.		

5.2.6 Involved Agencies and Agency Contacts

Table 5.2-20 presents data on the following: (1) air quality agencies that may or will exercise jurisdiction over air quality issues resulting from the proposed power plant, (2) the most appropriate agency contact for the proposed Project, (3) contact address and phone information, and (4) the agency involvement in required permits or approvals.

Table 5.2-20 Agencies, Contacts, Jurisdictional Involvement, Required Permits for Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
California Energy Commission (CEC)	Assigned Project Manager 1516 Ninth St. Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the proposed facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
MDAQMD	Eldon Easton, APCO 43301 Division St. Suite 206 Lancaster, CA 93535 (661) 723-8070	Prepares Determination of Compliance (DOC) for CEC, Issues MDAQMD Authority to Construct (ATC) and Permit to Operate (PTO), Primary air regulatory and enforcement agency.	DOC will be prepared subsequent to AFC submittal. The AFC contains the AQMD permitting application forms. The AFC plus these forms will constitute the required AQMD permitting application.
California Air Resources Board (CARB)	Mike Tollstrup Chief, Project Assessment Branch 1001 I St., 6th Floor Sacramento, CA 95814 (916) 322-6026	Oversight of AQMD stationary source permitting and enforcement program	CARB staff will provide comments on applicable AFC sections affecting air quality and public health. CARB staff will also have opportunity to comment on draft ATC.
Environmental Protection Agency, Region IX	Gerardo Rios Chief, Permits Section USEPA-Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974	Oversight of all AQMD programs, including permitting and enforcement programs	USEPA Region 9 staff will receive a copy of the DOC. USEPA Region 9 staff will have opportunity to comment on draft ATC.

5.2.7 Permit Requirements and Permit Schedules

An Authority to Construct (ATC) application is required in accordance with the MDAQMD rules. Appendix C.9 contains the required MDAQMD permitting application forms. These forms in conjunction with the following AFC sections constitute the required air district permitting application (per MDAQMD Rule 1306); Section 2.0-Project Description, Section 5.2-Air Quality, Section 5.10-Public Health, and Appendices C.1 through C.9.

5.2.8 References

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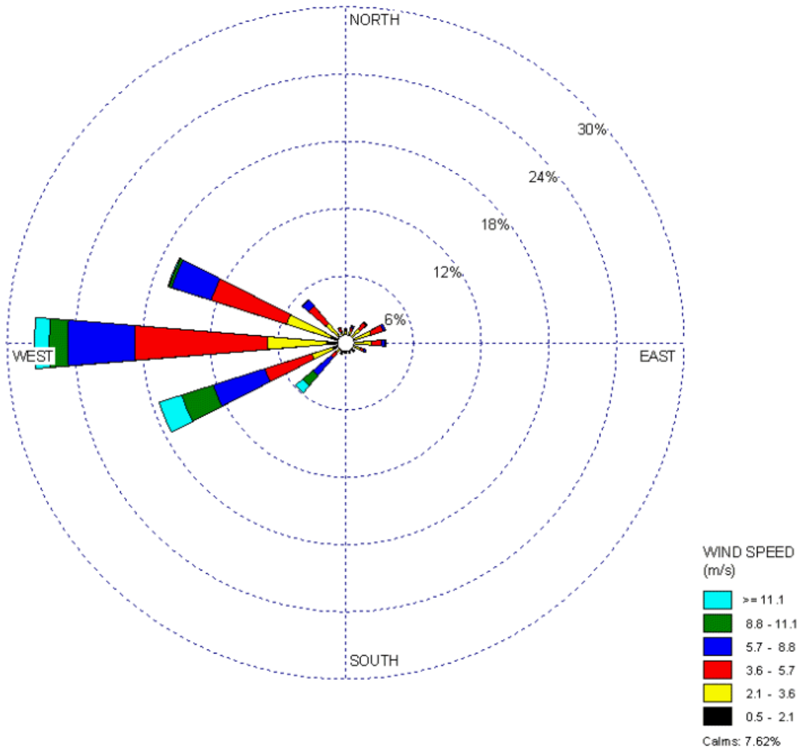

Figure 5.2-1. Daggett Airport Wind Rose – Annual

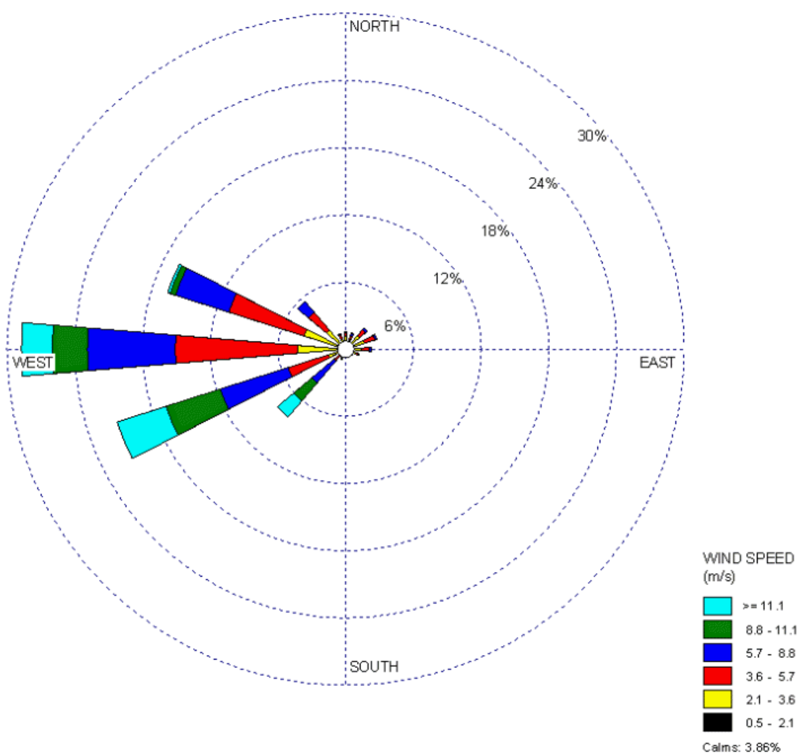

Figure 5.2-2. Daggett Airport Wind Rose – Spring

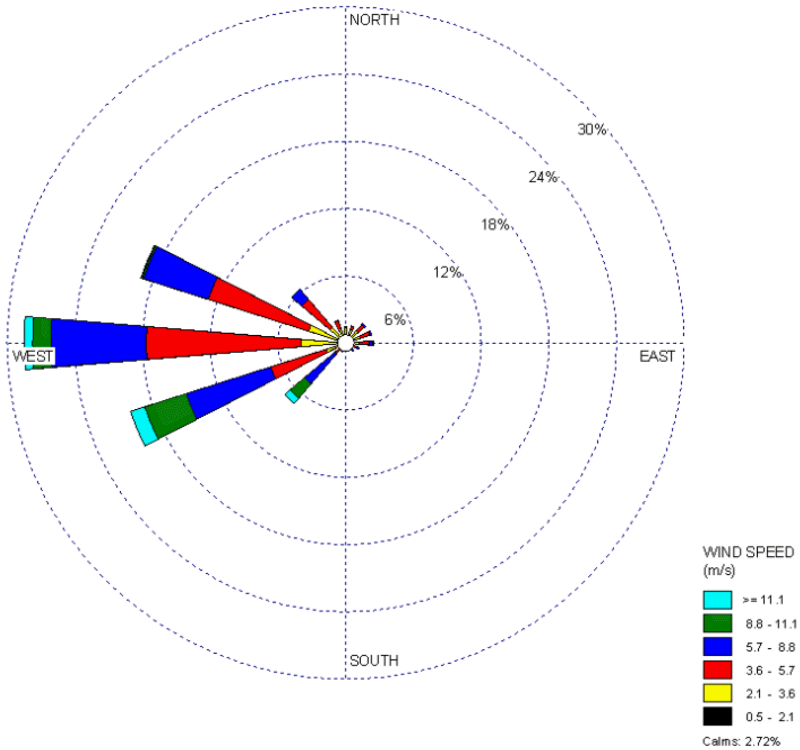

Figure 5.2-3. Daggett Airport Wind Rose – Summer

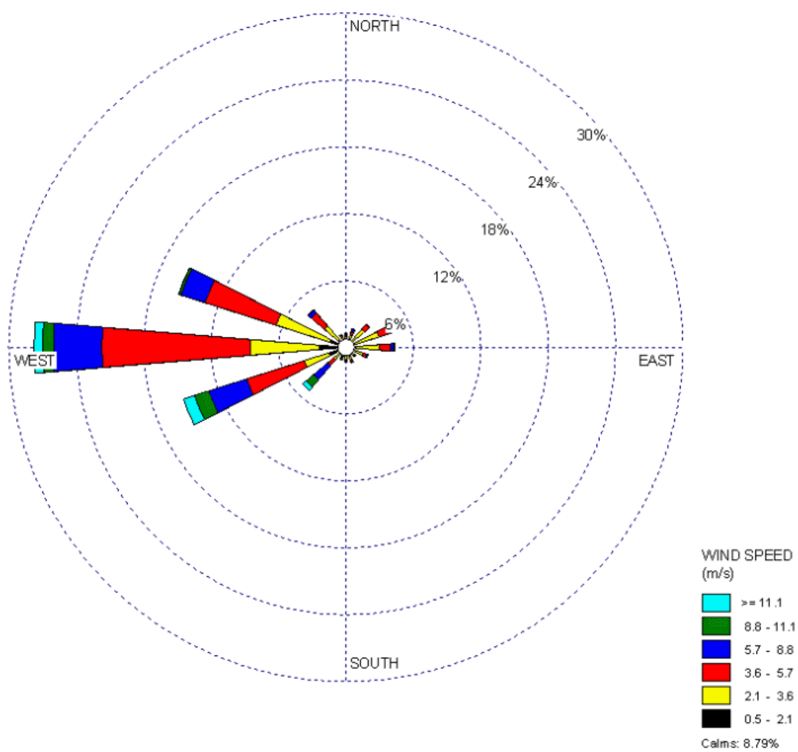

Figure 5.2-4. Daggett Airport Wind Rose – Fall

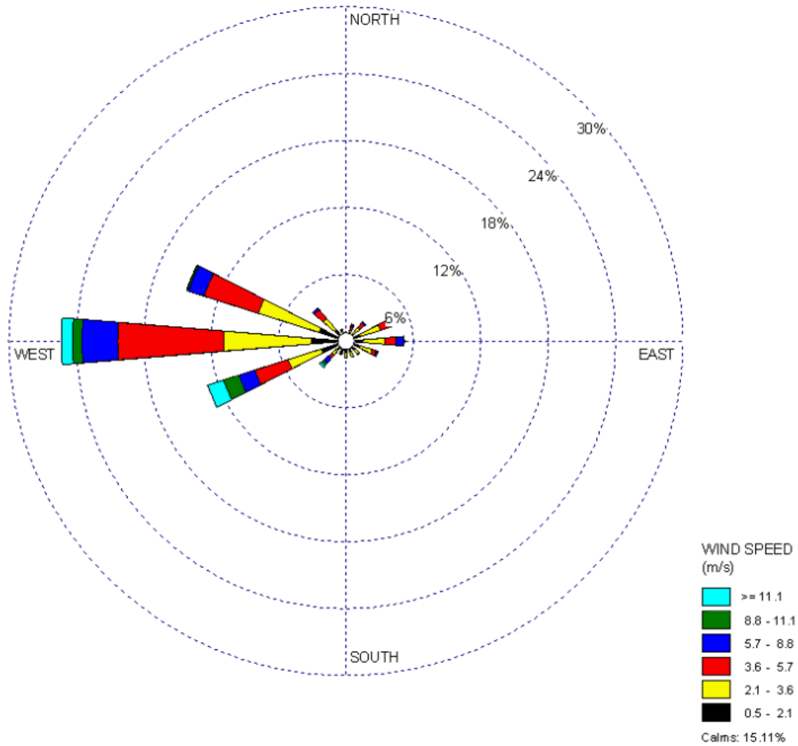

Figure 5.2-5. Daggett Airport Wind Rose – Winter