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January 23, 2017

Mike Monasmith
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Subject: Mission Rock Energy Center (15-AFC-02)
Updated Air Quality and Public Health Sections

Dear Mr. Monasmith:

Mission Rock Energy Center, LLC (the "Applicant") submits the attached updates to the following Application for Certification ("AFC") materials for the Mission Rock Energy Center ("MREC"):

- Section 5.1, Air Quality;
- Section 5.9, Public Health;
- Appendix 5.1B, Modeling Support;
- Appendix 5.1D, Health Risk Assessment Support; and
- Appendix 5.1E, Construction Emissions Support.

The Air Quality and Public Health sections have been updated to incorporate the following changes:

- Updated meteorological data set, provided by the San Joaquin Valley Air Pollution Control District;
- Revised SO_2 emission rates, based on the recommended use of 0.75 grains/standard cubic foot by the Ventura County Air Pollution Control District;
- Use of the EPA approved CTSCREEN dispersion model for complex terrain impacts;
- Revised Health Risk Assessment based on the updated meteorological data set; and
- Revised construction impact modeling assessment using the updated meteorological data set.

No other revisions were made to the air quality and public health sections. The analyses in the attached materials demonstrate that the MREC complies with applicable laws, ordinances, regulations and standards and that there will be no significant air quality or public health impacts from the MREC.

The updated sections filed today replace those filed on February 26, 2016 (TN# 210540-2). For ease of reference, redlined versions of these materials are also being provided.

A compact disc containing the air quality and public health modeling input and output files will be hand-delivered.

If you have any questions, please contact me at 916-447-2166.

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APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Section 5.1, Air Quality (CLEAN)

5.1 Air Quality

5.1.1 Introduction

This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and operation of the MREC and the Project's compliance with applicable air quality requirements. Section 5.1.1 presents the introduction, applicant information, and the basic VCAPCD rules applicable to the MREC. Section 5.1.2 presents the MREC description, both current and proposed. Section 5.1.3 presents data on the emissions of criteria and air toxic pollutants from the MREC. Section 5.1.4 discusses the BACT evaluations for the MREC. Section 5.1.5 presents the air quality impact analysis for the MREC. Section 5.1.6 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.1.6 presents agency contacts, and Section 5.1.6 presents permit requirements and schedules. Section 5.1.7 contains references cited or consulted in preparing this section. Appendix 5.1A contains the support data for the emissions calculations. Appendix 5.1B presents the air quality impact analysis support data. Appendix 5.1C presents the dispersion modeling protocol. Appendix 5.1D presents the risk assessment support data. Appendix 5.1E delineates the estimated construction period emissions. Appendix 5.1F presents the BACT determination support data. Appendix 5.1G presents regional emissions inventory data. Appendix 5.1H presents the mitigation strategy support data.

The MREC is proposing to construct and operate a 275 MW (nominal) natural gas-fired simple-cycle power plant. The MREC is planning to operate as a peaking power plant and is proposed to operate up to approximately 2,500 hours per year, with an expected facility capacity factor of up to 29 percent.

The MREC will consist of the following:

- Installation of five LM6000 PG Sprint gas turbines which will be operated in simple-cycle mode
- A California Air Resources Board (CARB)-certified Tier 3 diesel-fueled fire pump
- A six (6) cell wet surface air condenser
- Necessary support systems and processes

The MREC design will incorporate the air pollution emission controls designed to meet VCAPCD BACT/LAER determinations. These controls will include water injection in the turbine combustors to limit NO_x production, SCR with aqueous ammonia for additional NO_x control along with an oxidation catalyst to control carbon monoxide (CO) and reactive organic compounds (ROC) emissions. The fuels to be used will include pipeline quality natural gas in the turbines and California ultra low-sulfur diesel fuel in the fire pump engine**.** The ammonia slip from the SCR system will be limited to 5 parts per million (ppm).

5.1.1.1 Regulatory Items Affecting New Source Review

The applicant is submitting the air quality impact analyses to the California Energy Commission (CEC). Pursuant to VCAPCD Rule 26.9 (Equivalency of AFC to Authority to Construct), "the APCO shall consider the AFC to be equivalent to an application for an Authority to Construct during the Determination of Compliance review, and shall apply all provisions of Rule 26 and all other District rules and regulations which apply to applications for an Authority to Construct".

The application includes discussions of emissions calculations, control technology assessments, regulatory review and modeling analysis which include impact evaluations for criteria and hazardous air pollutants.

The MREC is expected to result in emissions that will exceed the VCAPCD Rule 26.2 Major Facility significance thresholds for NO_x, and ROCs. No major source thresholds for particulate matter less than 10 or 2.5 micrometers in aerodynamic diameter (PM10/PM2.5), sulfur oxide (SO_x), or CO are stated in the VCAPCD NSR rules. BACT will be required for NOx, ROC, SOx, and PM10/PM2.5. Although not required by VCAPCD rules, BACT for CO will also be determined and implemented.

The emissions impacts associated with the Project are analyzed pursuant to VCAPCD and CEC modeling requirements. The air quality analysis will be conducted to demonstrate that impacts from NO_x, CO, SO_x, PM10 and PM2.5 will comply with the California and National Ambient Air Quality Standards (CAAQS/NAAQS) for the applicable averaging periods. Impacts from nearby sources (cumulative impacts) are also assessed for criteria pollutants.

The MREC will not trigger the Prevention of Significant Deterioration (PSD) permitting requirements, which would be required for simple cycle design with facility wide emissions equaling or exceeding 250 tons per year (tpy) for any criteria pollutant. Worst-case annual emissions are summarized in Table 5.1-1 below.

Table 5.1-1 Facility PTE Summary

Pollutant	MREC, tpy	VCAPCD Rule 26.1 Major Source Thresholds, tpy	VCAPCD Rule 26.2 Offsets, tpy	EPA Major PSD Source Thresholds (tpy)*
NO_x	28.17	25	5	250
CO	32.32	-	-	250
ROC (VOC)	4.98	25	5	250
SO_x	3.69	-	15	250
PM10	13.09	-	15	250
PM2.5	13.09	-	15	250
CO_2e	410,360	-	-	75,000*

*PSD major source review would be triggered for simple cycle turbines at 250 tpy, from which the major modification thresholds are then used for the remaining pollutants. PSD review is not triggered solely based on GHG emissions. If the MREC triggered PSD for any non-GHG pollutant, then PSD would be triggered if the CO_2e emissions were equal or greater than 75,000 tpy.

PTE = potential to emit

PSD = Prevention of Significant Deterioration

Although a regulatory compliance analysis (LORS) is presented in Section 5.1.6, there are several VCAPCD regulations that directly affect the application and review process. These regulations include:

- VCAPCD New Source Review (NSR) Rule 26.2 requires that BACT be applied to all proposed new or modified sources which will result in any emissions increase of NO_x, ROC, PM10, or SO_x.
- VCAPCD Rule 26.11, indicates that all emission reduction credits proposed for use by the new source must be evaluated prior to the issuance of the district Authority to Construct (ATC).
- VCAPCD Rule 26.2 requires that an air impact analysis be prepared to insure the protection of state and federal ambient air quality standards.
- VCAPCD Rule 26.2, also requires that prior to the issuance of the ATC that all major stationary sources owned or operated by the Mission Rock, 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).
- The MREC will not require a PSD permit, per Rule 26.13 or the federal PSD regulations.

5.1.2 Project Description

5.1.2.1 MREC Site Location

The MREC will be located in Ventura County within the South Central Coast Air Basin. The MREC site is situated approximately 4 miles southwest of downtown Santa Paula, California, between Mission Rock Road and Shell Road. The MREC lies south of Highway 126 (Santa Paula Highway), and approximately 2.5 miles northeast of the junction of Highway 126 and Highway 118. SPZ lies approximately 3 miles to the northeast, and the Ventura County Jail lies approximately 900 feet due west of the MREC site. See Section 1.2 for detailed location maps.

5.1.2.2 Project Equipment Specifications

The MREC will consist of the following major equipment.

- Five LM6000 PG Sprint Gas Turbines with inlet chilling
- SCR to control emissions of NO_x
- Oxidation Catalyst to control emissions of CO and VOCs
- One diesel engine powered fire pump
- A six (6) cell wet surface air condenser with drift eliminators (for inlet chilling)

All power from the facility will be delivered to the California power grid under the control of the CAISO.

The turbine equipment output specifications are summarized in Table 5.1-2 as follows:

Table 5.1-2 Combustion Turbine Equipment Output Specifications

Parameter	Minimum Cold Day (30°F)	ISO Day (59°F)	Maximum Hot Day (96°F)
Case Number	1	9	29
Net Power, kW (5 turbines)	281,125	276,676	272,083
Net Heat Rate, btu/kW-hour (HHV)	10,069	10,138	10,300
Gross Gas Turbine Power, kW (5 turbines)	290,445	286,680	286,510

Ref: GE Performance Data supplied by the Mission Rock, see Appendix 5.1A.

HHV (1021 btu/scf) as specified by GE in the fuel analysis.

Equipment specifications are summarized as follows:

Combustion Turbines (5)

- Manufacturer: GE
- Model: LM6000 PG Sprint
- Fuel: Natural gas
- Heat Input: 561.0 MMBtu/hr HHV (Case 9-ISO day)
- 566.1 MMBtu/hr HHV (Case 1-Cold day)
- Maximum Fuel consumption: <=2.773 mmscf per hour (Case 1, cold day)
- Exhaust flow: <=1,197,006 lbs/hr (Case 1, cold day)
- Exhaust temperature: 850-870 degrees Fahrenheit (°F) at the stack exit (Dependent upon ambient temperature of atmosphere and turbine load)

Fire Pump (1)

- Manufacturer: Clarke or equivalent (Tier 3)
- Fuel: Ultra low sulfur diesel
- Horsepower: 220 brake horsepower

Wet Surface Air Condenser (1)

- 6 cell Wet SAC
- Circulation rate: ~10675 GPM (all cells)
- Max TDS: ~1700 mg/l
- Max Concentration Cycles: 5
- Drift Eliminator Efficiency: 0.001%

Fuels

Natural gas will be the only fuel used by the Project to generate electricity, with the exception of the emergency diesel fire pump, which will fire ultra-low sulfur diesel fuel. The typical natural gas composition is shown in Appendix 5.1A. Natural gas combustion results in the formation of NO_x, CO, ROCs, SO_2, PM10, and PM2.5. Because natural gas is a clean-burning fuel, there will be minimal formation of combustion PM10, PM2.5, and SO_2.

The fuel used for the MREC is similar to the fuels used on similar simple-cycle power generation facilities. Table 5.1-3 presents a fuel use summary for the facility. Fuel use values are based on the maximum heat rating of each system, fuel specifications, and maximum operational scenario. Fuel analysis data for both natural gas and diesel fuel is presented in Appendix 5.1A.

- The natural gas will meet the CPUC grade specifications. The diesel fuel sulfur will be limited to 15 ppm, and will meet all California low sulfur diesel specifications.

Table 5.1-3 Estimated Fuel Use Summary for the MREC

Source	Fuel	Per Hour (mmscf)	Per Day (mmscf)	Per Year (mmscf)
CT-1	Natural gas	0.5545	13.307	1373.65
CT-2	Natural gas	0.5545	13.307	1373.65
CT-3	Natural gas	0.5545	13.307	1373.65
CT-4	Natural gas	0.5545	13.307	1373.65
CT-5	Natural gas	0.5545	13.307	1373.65
Source	**Fuel**	**Per Hour, gallons**	**Per Day, gallons**	**Per Year, gallons**
Diesel Fire Pump	Diesel Fuel	11.2	11.2	582.4

Notes: Hourly and daily fuel use based on Case 1 (cold day), annual fuel use based on Case 9 (ISO day).

The fire pump will be tested up to 1 hour per day and 1 day per week, or 52 hours per year, per NFPA testing requirements. Max total annual operating hours will be <=200.

HHV of fuel is 1021 BTU/SCF (average)

Max turbine hours per day = 24 (including SU/SD hours). Max turbine hours per year (see Appendix 5.1A)

The MREC will only use pipeline quality natural gas in the turbines and ultra-low sulfur diesel fuel for the fire pump.

CT – Combustion Turbine

mmscf = million standard cubic feet

5.1.2.3 Climate and Meteorology

Ventura County covers an area of 1,873 square miles, including 43 miles of shoreline. The County is located northwest of Los Angeles County, with Kern County to the north, Santa Barbara County to the west, and the Pacific Ocean on the southwest. There are 411 acres of state beach parks. The Los Padres National Forest accounts for 860 square miles of the northern portion of the county (46 percent of the county's land mass). Elevation changes within the county from sea level to the highest point on Mount Pinos at 8,831 feet. Ventura County ranks 26th in land size among California's 58 counties.

There are ten incorporated cities: Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, Santa Paula, Simi Valley, Thousand Oaks and San Buenaventura (Ventura), the County seat.

Ventura County offers very diverse climates. Coastal areas offer a Mediterranean climate, while the northern half of the county is mountainous with a sub-alpine climate. Interior valleys offer a mild climate moderated by the daily sea breeze that progresses through and across the county beginning in the early morning at the coast and reaching the inland valleys by early afternoon. Ventura County's mountains, valleys, and seashore give the area six different microclimates. Ventura County does experience four different seasons. The difference between the seasons, although subtle, is the distinct weather patterns.

Ventura County's air quality is influenced by both local topography and meteorological conditions. Surface and upper-level wind flow varies both seasonally and geographically in the county and inversion conditions common to the area can affect the vertical mixing and dispersion of pollutants. The prevailing wind flow patterns in the county are not necessarily those that cause high ozone values. In fact, high ozone values are often associated with atypical wind flow patterns.

Meteorological and topographical influences that are important to air quality in Ventura County are as follows:

The semi-permanent high pressure that lies off the Pacific Coast leads to a limited average rainfall of 17.5 inches per year, with warm, dry summers and relatively damp winters. Maximum summer temperatures average about 70-75°F near the coast and in the high 80s to low 90s inland. During winter, average minimum temperatures range from the high 40s along the coast to the low 40s inland. Additionally, cool, humid, marine air causes frequent fog and low clouds along the coast, generally during the night and morning hours in the late spring and early summer. The fog and low clouds can persist for several days until broken up by a change in the weather pattern.

In the coastal and coastal valley portions of the county, the sea breeze (from sea to land) is typically west-southwesterly throughout the year except for the winter period which shows predominantly east-northeasterly winds (off shore). At night, the sea breeze weakens and is replaced by light land breezes (from land to sea). The alternation of the land-sea breeze cycle can sometimes produce a "sloshing" effect, where pollutants are swept offshore at night and subsequently carried back onshore during the day. This effect is exacerbated during periods when wind speeds are low.

The terrain around Point Conception (north of Ventura County), combined with the change in orientation of the coastline from north-south to east-west can cause counterclockwise circulation (eddies) to form east of the Point. These eddies fluctuate temporally and spatially, often leading to highly variable winds along the southern coastal strip as far south as the Ventura coastal area. Point Conception also marks the change in the prevailing surface winds from northwesterly to southwesterly as noted above.

Santa Ana winds are northeasterly winds that occur primarily during fall and winter, but occasionally in spring. These are warm, dry winds blown from the high inland desert that descend down the slopes of a mountain range. Wind speeds associated with Santa Ana's are generally 15-20 mph, though they can sometimes reach speeds in excess of 60 mph. During Santa Ana conditions, air emissions in Ventura County, and the South Coast Air Basin (the Los Angeles region) are moved out to sea. These pollutants can then be moved back onshore into Ventura County in what is called a "post-Santa Ana condition." The effects of the post-Santa Ana condition can be experienced throughout the county. Not all post-Santa Ana conditions, however, lead to high pollutant concentrations in Ventura County.

Upper-level winds (measured at Vandenberg Air Force Base once each morning and afternoon) are generally from the north or northwest throughout the year, but occurrences of southerly and easterly winds do occur in winter, especially during the morning. Upper-level winds from the south and east are infrequent during the summer. When they do occur during summer, they are usually associated with periods of high ozone levels. Surface and upper-level winds can move pollutants that originate in other areas into the county.

Surface temperature inversions (0-500 ft) are most frequent during the winter, and subsidence inversions (1000-2000 ft) are most frequent during the summer. Inversions are an increase in temperature with height and are directly related to the stability of the atmosphere. Inversions act as a cap to the pollutants that are emitted below or within them and ozone concentrations are often higher directly below the base of elevated inversions than they are at the earth's surface. For this reason, elevated monitoring sites will occasionally record higher ozone concentrations than sites at lower elevations. Generally, the lower the inversion base height and the greater the rate of temperature increase from the base to the top, the more pronounced effect the inversion will have on inhibiting vertical dispersion. The subsidence inversion is very common during summer along the California coast, and is one of the principal causes of air stagnation.

Poor air quality is usually associated with "air stagnation" (high stability/restricted air movement). Therefore, it is reasonable to expect a higher frequency of pollution events in those portions of the county where light winds are frequently observed, as opposed to those portions of the county where the prevailing winds are usually strong and persistent. The annual average wind speed derived from the approved meteorological data used in the impact analysis was 5.6 mph, with calm winds persisting for approximately 5.04 percent of the time on an annual basis.

As on the rest of the Pacific Coast, a dominant characteristic of spring and summer is the nighttime and early morning cloudiness. Low clouds form regularly and frequently extend inland over the coastal valleys and foothills, but they usually dissipate during the morning and the afternoons are generally clear.

Considerable fog occurs along the coast, but the amount decreases with distance inland. The fall and winter months are usually the foggiest. Thunderstorms are rare, averaging about three a year in the regional area. The sunshine is plentiful for a marine location, with a marked increase toward the interior. Ventura County on average experiences 273 sunny days per year.

Additional climate and historical meteorological data are presented in Appendix 5.1B for the Ventura County regional area and for the following stations: Ojai (046399), and Santa Paula (047957) (WRCC 2014. The meteorological data supplied by the VCAPCD as representative of the site are presented in electronic form on the CD-ROM provided.

5.1.3 Emissions Evaluation

5.1.3.1 Facility Emissions and Permit Limitations

The approximately 9.8-acre MREC site is currently used as a vehicle salvage/dismantling yard. There are no current air pollution sources on the proposed site (except for motor vehicles), and there are no facilities on the current site that are permitted by the VCAPCD.

5.1.3.2 Facility Emissions

Installation and operation of the MREC will not result in emissions greater than 250 tpy for any criteria pollutants, and as such the MREC will be considered a minor NSR source for NO_x, CO, ROC, and PM10/PM2.5 under federal rules. The MREC will not trigger the requirements of the Federal PSD program since the emissions of one or more criteria pollutants will not exceed the 250 tpy major source applicability thresholds. The applicability determination for PSD is based on the post commissioning year emissions. The facility is expected to be a major source under the VCAPCD NSR rules for NO_x only. Criteria pollutant emissions from the new combustion turbines and auxiliary equipment are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 5.9. Backup data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The hourly, daily and annual emissions for all criteria pollutants are based upon a series of worst-case assumptions for each pollutant. The maximum hourly emissions are based on cold day conditions assuming a startup event with the remainder of the startup hour at steady state compliant conditions. The daily operation assumes 24 hours of operation with a maximum of two starts and two shutdowns. The worst-case annual emissions are based upon annual conditions (Case 14), the maximum projected hours of operation, including startups and shutdowns.

The applicant would propose that the facility limits be based on total short-term and annual emissions rather than operational hours or operational events. The turbines will be required to install CEMS for NO_x and CO. Hourly fuel use monitoring along with source test requirements will establish a compliance method to allow for continuous tracking of all emissions at the MREC. For example, the maximum annual emissions of NO_x at 28.13 tons per year would establish the turbines' PTE. Mission Rock would propose and accept hourly, daily and annual emission limits for this pollutant, but would propose that the permit would not contain any limit on the number of start events or hours of operation as the established emission limits would be continuously monitored. This way, the facility operational profiles would be solely based on PTE rather than hours which would allow for a flexible response to changing power market conditions. Thus, the short-term and annual emissions limits would establish the facility PTE rather than any individual operational profiles. This type of emissions and compliance strategy is not new, and has been implemented on numerous CEC approvals as well as district permits.

During the first year of operation, plant commissioning activities, which are planned to occur over an estimated 213 operating hours (per turbine) during the first year of operation, will have higher hourly and daily emission profiles than during normal operations in the subsequent years of operation. The emissions during the first year of operation are presented below and were included in the air quality modeling analysis along with subsequent post commissioning yearly emissions.

The MREC will be a major NSR source as defined by the VCAPCD Rule 26.2 and will be subject to VCAPCD requirements for emission offsets and air quality modeling analyses for criteria pollutants and toxics. Mission Rock has prepared an air quality emissions and impact analysis to comply with the VCAPCD and the CEC regulations. The modeling analysis includes impact evaluations for those pollutants shown in Table 5.1-4 and the CEC requirements for evaluation of MREC air quality impacts. The emissions presented in Table 5.1-4 are the worst-case potential emissions on an annual basis.

Table 5.1-4 Significant Emissions Threshold Summary

Pollutant	MREC Cumulative Increase, tpy	Federal/ State Attainment		Federal and VCAPCD Rule 26.1 Major Source Thresholds PSD/NNSR, tpy		VCAPCD Rule 26.2 Offsets, tpy	Major Source (Federal NSR/PSD)	Major Source VCAPCD Rule 26.1
NO_x	28.17	Y	Y	250	25	5	No/No	Y
SO_2	3.69	Y	Y	250	-	15	No/No	N
CO	32.32	Y	Y	250	-	-	No/No	N
PM10	13.09	Y	N	250	-	15	No/No	N
PM2.5	13.09	Y	N	250	-	15	No/No	N
ROC (Ozone)	4.98	N	N	250	25	5	No/No	N

Table 5.1-4 Significant Emissions Threshold Summary

Pollutant	MREC Cumulative Increase, tpy	Federal/ State Attainment		Federal and VCAPCD Rule 26.1 Major Source Thresholds PSD/NNSR, tpy		VCAPCD Rule 26.2 Offsets, tpy	Major Source (Federal NSR/PSD)	Major Source VCAPCD Rule 26.1
CO_2e	410,360	-	-	100,000	-	75,000	No/No	N

Installation and operation of the MREC will be considered a major source under the VCAPCD 26.1 rule for NO_x and will trigger the offset requirements under VCAPCD Rule 26.2 for NO_x and ROC. The MREC will not trigger the major new source thresholds for PSD. Criteria pollutant emissions from the new combustion turbines, and emergency equipment, are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 4.5. Support data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The emissions calculations presented in the application represent the highest potential emissions based on the proposed operational scenarios.

The proposed mitigation, through the surrender of emission reduction credits as presented in Appendix 5.1H is based on the maximum operational profile for the MREC. There may be a lack of available ERCs for purchase from the existing and surrounding air basins to satisfy the maximum operational scenario for affected pollutants. If this case arises, then MREC is proposing to lower the operational emissions to a level based on the available emission offsets until such time that the offsets are available. Lowering the emissions would also lower the corresponding air quality impacts. The air quality impact analysis presented herein is based on the maximum proposed operational scenario.

5.1.3.3 Normal Operations

Operation of the proposed process and equipment systems will result in emissions to the atmosphere of both criteria and toxic air pollutants. Criteria pollutant emissions will consist primarily of NO_x, CO, ROCs, SO_x, total suspended particulates (TSP), PM10, and PM2.5. Air toxic pollutants will consist of a combination of toxic gases and toxic PM species. Table 5.1-5, lists the pollutants that may potentially be emitted from the MREC.

Table 5.1-5 Potentially Emitted Criteria and Toxic Pollutants

Criteria Pollutants	**Toxic Pollutants (cont'd)**
NO_x	
CO	1-3 Butadiene
ROCs	Ethylbenzene
SO_x	Formaldehyde
PM10/2.5	Hexane (n-Hexane)
GHGs	Lead
CO_2e	Manganese
Toxic Pollutants	Mercury
Ammonia	Naphthalene
PAHs	Nickel
Acetaldehyde	Propylene
Acrolein	Propylene Oxide
Arsenic	Selenium
Benzene	Silica
Beryllium	Toluene
Cadmium	Vanadium
Chromium	Xylene
Copper	Diesel Particulate Matter

PAHs = polynuclear (or polycyclic) aromatic hydrocarbons

5.1.3.4 Criteria Pollutant Emissions

Tables 5.1-6 through 5.1-11 present data on the criteria pollutant emissions expected from the facility equipment and systems under normal operating scenarios. The maximum hourly emissions are based on Case 1 (30°F day) incorporating a startup event. A startup event is defined as a one-half hour event with the turbine stack emissions in BACT compliance at the end of the 30-minute startup, with the reminder of the startup hour at steady-state compliance conditions. The worst case day for emissions is defined as two startup events, two shutdown events, and 22.7 hours of full load operation (Case 1, cold day) for a total of 24 hours of operation.

Table 5.1-6 Combustion Turbine Emissions
(Startup and Steady State Operation Per Turbine)

Pollutant	Emission Factor and Units	Max Hour Emissions at Startup lb/hr	Max Hour Emissions Steady State (Cold Day) lb/hr[a]	Max Hour Emissions Steady State (ISO Day) lbs/hr[b]	Max Daily Emissions lbs
NO_x	See Appendix 5.1A	11.65	5.10	4.04	136.37
CO	See Appendix 5.1A	7.99	4.97	4.92	127.42
ROC	See Appendix 5.1A	1.36	0.71	0.71	20.12
SO_x	See Appendix 5.1A	0.59	0.59	0.59	14.16
PM10/PM2.5	See Appendix 5.1A	2.0	2.0	2.0	48.0
Ammonia	5.0 ppmvd	3.78	3.77	3.74	90.50
CO_2e	116.89 lb/mmbtu	NA			

Table 5.1-6 Combustion Turbine Emissions
(Startup and Steady State Operation Per Turbine)

Pollutant	Emission Factor and Units	Max Hour Emissions at Startup lb/hr	Max Hour Emissions Steady State (Cold Day) lb/hr[a]	Max Hour Emissions Steady State (ISO Day) lbs/hr[b]	Max Daily Emissions lbs

[a] Cold day – Case 1

[b] ISO Day-Case 9

lb/hr = pound per hour

Table 5.1-7 Startup and Shutdown Emissions (per event per turbine)

Parameter	Startup	Shutdown
NOx, lbs/event	9.1	1.2
CO, lbs/event	5.5	1.8
ROC, lbs/event	1.0	1.0
PM10/PM2.5 lbs/event	1.0	.30
SO_x, lbs/event	.30	.10
Event duration, mins	30	9
Estimated Number per year	150	150

Table 5.1-8 Five Combustion Turbine Emissions (Full Load, Startup and Shutdown, whichever is Greater) for the Non-Commissioning Year

Pollutant	Emission Factor	Max Hour Emissions lbs (5 Turbines)	Max Daily Emissions lbs (5 Turbines)	Max Annual Emissions tons (5 Turbines)
NO_x	N/A	58.25	681.85	28.13
CO	N/A	39.93	637.10	32.29
ROCs	N/A	6.76	100.59	4.98
SO_x	N/A	2.95	70.82	3.69
PM10/PM2.5	N/A	10.0	240.00	12.5
NH_3	N/A	18.85	452.50	22.46
CO_2e	N/A	NA	NA	410,296 (372,972 MT/yr)

See Appendix 5.1A, for detailed emissions and operational data.

Maximum hour based on five turbines in cold startup, except for PM10/PM2.5 and SO_x which is based on Case 1 operation.

Emergency equipment readiness testing will not occur during a turbine startup or run hour.

Maximum day is based on 2 startups and shutdowns, with remaining hours at Case 1 (cold day) operation.

Maximum annual NO_x, SO_x, CO, ROC, NH3, CO_2e and PM10/PM2.5 based on Case 9 (ISO Conditions).

Table 5.1-9 Diesel Fire Pump Engine and Wet SAC Emissions

Pollutant	g/hp-hr	Max Hour Emissions lbs	Max Daily Emissions lbs	Max Annual Emissions tons
220 BHP Fire Pump (Tier 3)				
PM10/PM2.5	.15	0.07	0.07	0.002
NO_x	2.8	1.36	1.36	0.035
SO_x	0.0015percent by weight	0.0023	0.0023	0.00006
CO	2.6	1.26	1.26	0.033
ROC	0.2	0.10	0.10	0.003
CO_2e	-	-	-	6.622 (6.02 MT)
Wet SAC				
PM10/PM2.5	-	0.45	10.88	0.57

Notes:

SO_x emissions based on fuel S content of 15 ppm.

The fire pump testing is based on 60 minutes per day, 52 hours per year. Max annual runtime is 200 hours.

Wet SAC emissions based on 1700 mg/l TDS at 5 cycles of concentration, 24 hrs/day, 2500 hrs/yr.

Table 5.1-10 presents a summary of the annual emissions for each operational scenario.

Table 5.1-10 MREC Maximum Potential to Emit

Pollutant	TPY
NO_x	28.17
CO	32.32
ROCs	4.983
SO_x	3.69
PM10/PM2.5	13.09
NH_3	22.46
CO_2e	410,360

Table 5.1-11 presents the maximum proposed emissions for the MREC on a pollutant specific basis.

Table 5.1-11 Summary of Maximum Facility Emissions for the MREC

Pollutant	lbs/hour	lbs/day	TPY
NO_x	58.25	683.21	28.17
CO	39.93	638.36	32.32
ROCs	6.76	100.69	4.983
SO_x	2.95	70.822	3.69

Table 5.1-11 Summary of Maximum Facility Emissions for the MREC

Pollutant	lbs/hour	lbs/day	TPY
PM10/PM2.5	10.45	250.98	13.09
NH_3	18.85	452.50	22.46
CO_2e	-	-	410,360 (373,030 MT)

Total facility estimated maximum emissions (including turbine SU/SD emissions). The FP will not be tested when the turbines are running, but it may be tested on a day that the turbines run.

In addition to the normal operational profiles presented above, during the first year of operation, plant commissioning activities will occur. These are planned to occur over an estimated 213 hours per turbine, and will have higher hourly and daily emission profiles than during normal operations in the subsequent years of operation. The commissioning activities schedule and emissions are summarized in Appendix 5.1-A.

GHG Emissions

MREC GHG Estimates

GHG emissions have been estimated for both the construction and operation phases of the MREC.

Construction emissions are presented in Appendix 5.1-E and include emission evaluations for the following source types:

- On and offsite construction equipment exhaust,
- Construction site delivery vehicle exhaust emissions,
- Construction site support vehicle exhaust emissions, and,
- Construction worker travel exhaust emissions.

Operational emissions of CO_2e will be primarily from the combustion of fuels in the turbine, and the emergency equipment along with SF_6 emissions from the circuit breakers. SF_6 emissions are estimated to be 57 tons/yr (51.7 MT/yr). Appendix 5.1A, contains the support data for the GHG emissions evaluation. Estimated CO_2e emissions for the MREC operational phase, based on annual average conditions, are as follows:

- CO_2e <= 410,360 tons/year (=373,030 metric tons/year)

The emission factors, GWPs, and calculation methods are based on 40 CFR 98, Subpart A, Table A-1 and Subpart C, Tables C-1 and C-2.

NSR/PSD Review

- The MREC will require a VCAPCD New Source Review (NSR) permit, as specified under Rule 26. Currently, the VCAPCD air basin is federal and State attainment or attainment/unclassified for NO_2, SO_2, and CO. The county is nonattainment (serious) for the federal 8-hr ozone standard, as well as nonattainment for the state 1-hr and 8-hr ozone standards. It is also state nonattainment for PM10 and PM2.5, but attainment for the federal standards. Based on the values in Table 5.1-11, the MREC will be a major new stationary source per VCAPCD NSR Regulation 26.
- Based upon the annual emissions presented in Table 5.1-11, the facility will not trigger the PSD program requirements for the following pollutants: NO_x, VOC, TSP, PM10, PM2.5, CO, SO_x, and GHGs.

- The MREC, pursuant to the VCAPCD NSR Rule 26, is required to generate or acquire sufficient emission reduction credits to offset the MREC emissions due to its status as a major NSR source. The table below summarizes these requirements.

Table 5.1-12 VCAPCD Emission Bank Credits Required By MREC

	PM10/PM2.5	ROC	NO_x	SO_2	CO
VCAPCD Offset Trigger Thresholds, tpy	15	5	5	15	NA
Facility PTE[a], tpy	13.09	4.98	28.17	3.69	32.32
VCAPCD Offset Ratio	1:1	1.3:1	1.3:1	1:1	1:1
Total Offsets Required, tpy	0	0	36.62	0	0

[a] Values derived from Section 5.1.

The sources of emission offsets could be from any of the following strategies or combination of strategies. Any required offsets or additional mitigations pursuant to California Environmental Quality Act (CEQA) and/or the District NSR regulations, will be negotiated, acquired, and implemented per the VCAPCD regulations and CEC guidance.

Mission Rock will demonstrate to the satisfaction of the VCAPCD and the CEC and that adequate emission reduction credits have been purchased prior to issuance of the ATC. The MREC emissions of 28.17 tons per year of NO_x shall be offset at a ratio of 1.3 to 1. Appendix 5.1H (Mitigation) provides the details of the proposed use of offsets to mitigate MREC emissions.

5.1.3.5 Hazardous Air Pollutants

See Section 5.9, Public Health, for a detailed discussion and quantification of HAP emissions from the MREC and the results of the health risk assessment (HRA). See Appendix 5.1D, for the public health analysis health risk assessment support materials. Section 5.9, Public Health, also discusses the need for RMPs pursuant to 40 CFR 68 and the CalARP regulations.

5.1.3.6 Construction

Construction-related emissions are based on the following:

- Mission Rock owns the current MREC site, which is 9.79 acres in size. The construction laydown area will be contained within the 50-acre site.
- Minimal site preparation will be required prior to construction of the turbines, building foundations, support structures, etc.
- Construction activity is expected to last for a total of 23 months (not including startup and commissioning).

Construction-related issues and emissions at the MREC site are consistent with issues and emissions encountered at any construction site. Compliance with the provisions of the following permits will generally result in minimal site emissions:

- Grading permit
- Storm water Pollution Prevention Plan (SWPPP) requirements (construction site provisions),
- The VCAPCD Permit to Construct (PTC), which will require compliance with the provisions of all applicable fugitive dust rules that pertain to the site construction phase

Construction emissions are summarized in Appendix 5.1E. These emissions were used to establish construction related impacts.

This applicant commits to the incorporation of the following mitigation measures or control strategies:

- Mission Rock will have an onsite 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 MREC and construction laydown and parking areas will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of two times per day during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.
- On-site vehicle speeds will be limited to 5 mph on unpaved areas within the MREC construction site.
- The construction site entrance 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 2 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, which are presently vegetated, will be re-vegetated as soon as practical.

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

- The Applicant will work with the general contractor to utilize to the extent feasible, EPA Air Resources Board 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 ppm weight sulfur).

Based on the temporary nature and the time frame for construction, Mission Rock 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 5.1E, presents the evaluation of construction related emissions as well as data on the construction related ambient air quality impacts.

Table 5.1-13 presents data on the regional air quality significance thresholds currently being implemented by the VCAPCD. The specific construction and operational thresholds were derived from the VCAPCD CEQA guidance.

Table 5.1-13 VCAPCD CEQA Significance Thresholds

Pollutant	Significance Level (for the MREC area)
NO_x	25 lbs/day
ROCs	25 lbs/day
Other Criteria Pollutants	Emissions that would cause a violation of an established air quality standard, or worsening of an existing violation
Hazardous or toxic pollutants	Cancer risk increase > 10 $x10^{-6}$ Hazard index > 1

Source: VCAPCD CEQA Guidance, October 2003.

Construction emissions, from onsite and offsite activities are expected to exceed the VCAPCD CEQA thresholds for NO_x and ROC on a daily basis. Mitigations imposed by the CEC as well as the construction modeling analysis indicates these emissions, as well as emissions from other criteria pollutants will result in less than significant impacts to air quality.

Operational emissions from all onsite activities are expected to exceed the daily threshold values for NO_x and ROC. These emissions will be mitigated to a level of “less than significant” pursuant to the VCAPCD rules and the CEC conditions of certification. Emissions of the remaining criteria pollutants, based on the impact analysis presented herein are not expected to cause a violation or, or worsen an existing violation of any established air quality standard.

In addition to the local significance criteria, the following general conformity analysis thresholds (applicable to nonattainment areas) are as follows in accordance with CFR (40 CFR Parts 6 and 51), and VCAPCD Rule 220 (General Conformity-applicable to federal actions only). The VCAPCD is “serious” nonattainment for the federal 8-hr ozone only, and as such the applicable conformity thresholds are those presented below:

- NO_x – 50 tons per year
- VOCs – 50 tons per year (assumed the same for ROCs)

Emissions from the construction phase are not estimated to exceed the conformity levels noted above. Emissions from the operational phase are subject to the VCAPCD NSR permitting provisions, and as such, are exempt from a conformity determination or analysis.

5.1.4 Best Available Control Technology Evaluation

5.1.4.1 Current Control Technologies

To evaluate BACT for the proposed turbines, the guidelines for simple-cycle gas turbines (< 50 MW) as delineated in the District, state, and federal BACT listings were reviewed. Table 5.1-14 summarizes the proposed BACT limits on the simple cycle combustion turbines.

Table 5.1-14 BACT Values for Combustion Turbines

Pollutant	BACT Emissions Range[1]	Proposed BACT
NO_x	2.5 – 5 ppmvd	2.5 ppmvd
CO	4 - 6 ppmvd	4.0 ppmvd
ROCs	2 - 3 ppmvd	1.0 ppmvd
SO_x	Natural Gas 0.25 to 0.75 gr S/100 scf	Natural Gas 0.75 gr S/100 scf
PM10/PM2.5	Natural gas and GCPs	Natural gas and GCPs <= 2 lbs/hr

Sources: CARB, VCAPCD, SDAPCD, SJVUAPCD, and Bay Area Air Quality Management District (BAAQMD) BACT Guidelines.

GCPs = good combustion practices

gr S/100 scf = grains of sulfur per 100 standard cubic feet

5.1.4.2 Proposed Best Available Control Technology

Table 5.1-15 presents the proposed BACT for the new combustion turbines. The new combustion turbines will utilize aqueous ammonia as the primary reactant in the SCR system.

Table 5.1-15 Proposed BACT for the Combustion Turbines

Pollutant	Proposed BACT Emissions Level	Proposed BACT System(s)	Meets Current BACT Requirements
NO_x	2.5 ppmvd short term 2.0 ppmvd long term	DLN combustors with SCR	Yes
CO	4.0 ppmvd	Oxidation Catalyst	Yes
ROCs	1.0 ppmvd	Oxidation Catalyst	Yes
SO_x	0.75 gr S/100 scf	Natural Gas	Yes
PM10/ PM2.5	<= 2 lbs/hr	Natural Gas	Yes
Ammonia	5.0 ppmvd	NH_3 Reagent/SCR System	Yes

Source: MREC Team.

Fire Pump Engine BACT

The fire pump engine will be fired exclusively on California certified ultra-low sulfur diesel fuel, and will meet all the emissions standards as specified in; CARB ATCM, EPA ARB Tier III, and NSPS Subpart IIII. Due to the low use rate of the engine for testing and maintenance, as well as its intended use for emergency fire protection, the engine meets the current BACT requirements of the VCAPCD.

Wet SAC BACT

The wet surface air condenser will be a packaged unit designed to handle the cooling needs of the turbines (inlet air chilling). The unit will have six (6) cells, with a total circulation rate of approximately 10,675 gpm. The drift eliminator efficiency for small package units of this type ranges from 0.001 to 0.005%. The proposed unit will be designed at an efficiency level of 0.001% .

Summary

Based on the above data, the proposed emissions levels for the new combustion turbines and fire pump engine satisfy the BACT requirements of the VCAPCD under Rule 26. Specifics associated with the BACT determinations can be found in Appendix 5.1F.

5.1.5 Air Quality Impact Analysis

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from the MREC. 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 herein and presented in the Air Quality Modeling Protocol. A copy of the Air Quality Modeling Protocol is included in Appendix 5.1C. All I/O modeling files have been provided to the VCAPCD and CEC Staff under separate cover. All modeling analyses were performed using the techniques and methods as discussed with the VCAPCD and CEC.

5.1.5.1 Dispersion Modeling

AERMOD Modeling Procedures: For modeling the potential impact of the MREC 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 EPA guideline model AERMOD (version 15181) was used as well as the latest versions of the AERMOD preprocessor to determine receptor elevations and slope factors (AERMAP version 11103). The purpose of the AERMOD modeling analysis was to evaluate compliance with the California state and Federal ambient air quality standards.

Hourly observations of certain meteorological parameters are used to define the area's dispersion characteristics. These data are used in approved air dispersion models for defining a project's impact on air quality. These data must meet certain criteria established by the EPA and the later discussion details the proposed data and its applicability to the MREC.

AERMOD is a steady-state plume dispersion model that simulates transport and dispersion from multiple point, area, or volume sources based on updated characterizations of the atmospheric boundary layer. AERMOD uses Gaussian distributions in the vertical and horizontal for stable conditions, and in the horizontal for convective conditions; the vertical distribution for convective conditions is based on a bi-Gaussian probability density function of the vertical velocity. For elevated terrain AERMOD incorporates the concept of the critical dividing streamline height, in which flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. AERMOD also uses the advanced PRIME algorithm to account for building wake effects.

Flagpole receptors are not proposed to be used (ground level concentrations will be calculated). AERMAP will be used to calculate receptor elevations and hill height scales for all receptors from the National Elevation Dataset (NED) in accordance with EPA guidance. Selection of the receptor grids is discussed below.

AERMOD input data options will be set to default. The URBAN option will not be selected for use as the predominant land use around the MREC site is predominantly agriculture/undeveloped land. In accordance with the Auer land use classification methodology (EPA's "*Guideline on Air Quality Models*"), since the land use within the area circumscribed by a 3-kilometer (km) radius around the facility is greater than 50 percent rural, the urban dispersion options in AERMOD will not be used in the modeling analyses supporting the permitting of the facility.

Default model option for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option.

NO_2 Modeling Procedures: Most MREC-only NO_2 impacts were assessed using a conservative Tier 2 modeling analysis based on the ARM, adopted in the *Guideline on Air Quality Models*. The Guideline allows a nationwide default conversion rate of 75 percent for annual NO_2/NO_x ratios and 80 percent for 1-hour NO_2/NO_x ratios (not to be confused with the proposed ARM2 methodology). ARM may be performed either by using the ARM model option or by multiplying the modeled NO_x concentrations by the appropriate ratios. Based on EPA and CARB Guidance, the Tier 2 analyses can be performed without justification to, or prior approval of, the permitting authority.

A Tier 3 analysis was used to assess 1-hour NO_2 impacts during start-up/shutdown periods and commissioning activities to assess compliance with the NAAQS and CAAQS. Due to the limited number of hours of commissioning activities, modeling analyses were not required for the 1-hour NAAQS according to USEPA guidelines. The Tier 3 analysis was based on the ozone limiting method (OLM) as described in the Air Quality Modeling Protocol. The OLM analysis used ambient hourly background ozone measured at the El Rio monitoring station for the modeled years of 2011-2015. The El Rio monitoring data has been shown above to be a conservative representation of the MREC site.

The ozone data was first processed to remove missing data similar to procedures outlined in the California Air Pollution Control Officers Association (CAPCOA) guidance document *"Modeling Compliance of The Federal 1-Hour NO_2 NAAQS"* (2011). The procedures for missing data are described in detail in the Air Quality Modeling Protocol. In support of the Tier 3 OLM NAAQS analysis, the modeling methods also included:

- In-stack NO_2/NO_x ratios (ISR) for all MREC modeled sources (turbines during commissioning activities) were based on the conservative national default of 0.5
- AERMOD-default ambient equilibrium NO_2/NO_x ratio of 0.9 was used
- The option OLMGROUP ALL was used

For the 1-hour NO_2 cumulative assessment, OLM will be used with representative 1-hour NO_2 background concentrations added to the modeled 1-hour concentrations.

CTSCREEN PM10 Modeling Procedures: In addition to AERMOD, the CTSCREEN model was used to assess the PM10 SILs in the complex terrain south of the project site. The CTSCREEN model, which is a screening mode of CTDMPLUS, is a refined point source Gaussian air quality model for use in all stability conditions for complex terrain applications. The use of refined modeling techniques to assess air quality impacts is summarized in USEPA's Modeling Guideline, 40 CFR Part 51, Appendix W. In particular, upon revising Appendix W to adopt AERMOD as the replacement for ISC3, EPA specifically retained CTDMPLUS and CTSCREEN as appropriate models for detailed complex terrain analysis (see "Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule" in the November 9, 2005 Federal Register, Vol. 70, No. 216 at 70 Fed. Reg. 68218 and 68225-68226). The refined modeling analyses consists of those analytical techniques that provide more detailed treatment of terrain, physical and chemical atmospheric processes, and can provide a more refined concentration estimates. As a result, they provide a more accurate estimate of source impact and the effectiveness of control strategies. These are referred to as refined techniques and models.

Complex terrain is defined as terrain with elevations above plume height, while intermediate terrain is defined as terrain with elevations between stack top and final plume rise height. Simple terrain is defined as terrain below stack height. Historically, a distinction has been made between simple, intermediate, and complex terrain because of the capability of different air quality dispersion models to effectively handle the simulation of the dispersion of pollutants in the different terrain regimes. Most of the models approved by the USEPA were originally developed either for use with simple or complex terrain. The most widely used model for simple terrain has been the ISCST3 model, which was replaced as the preferred model by AERMOD. Intermediate terrain is no longer a consideration in dispersion modeling.

In addition to the AERMOD model, the USEPA has approved the CTDMPLUS model for use in complex terrain modeling applications. *See id*., 70 Fed. Reg. 68233. CTDMPLUS is a preferred/recommended USEPA dispersion model for terrain impacts and "provides greater resolution of concentrations about the contour of the hill feature than does AERMOD through a different plume-terrain interaction algorithm." *Id*. The challenge to using the CTDMPLUS model in many situations is the additional meteorological and terrain data that is required by the model. However, the USEPA developed a screening version of the CTDMPLUS model, called CTSCREEN. The CTSCREEN model is a refined point source Gaussian air quality model for use in all stability conditions for complex terrain applications.

CTDMPLUS in screening mode (CTSCREEN) serves several purposes in regulatory applications. When meteorological data are unavailable, "CTSCREEN can be used to obtain conservative [safely above those of refined models], yet realistic, worst-case estimates" of impacts from particular sources in complex terrain. *Id*. These estimates can be used to determine the necessity and value of obtaining on-site data for refined modeling or can simply provide conservative emission-limit estimates. In addition, CTSCREEN can be a valuable tool for designing meteorological and pollutant monitoring programs. It is important to note that CTSCREEN and the refined model, CTDMPLUS, are the same basic model. The primary difference in their make-up is in the way in which CTSCREEN obtains the meteorological conditions. For example, wind direction in CTSCREEN is calculated based on the source-terrain-dividing streamline geometry to ensure computation of the highest impacts that are likely to occur. The daytime mixed-layer heights are based on fractions of the terrain height. Other meteorological variables or parameters are chosen through a variety of possible combinations from a predetermined matrix of values.

As a result of the CTSCREEN model accounting for the dimensional nature of the plume and terrain interaction, the model requires digitized terrain of the nearby topographical features. The mathematical representation of terrain is accomplished by the terrain preprocessors, FITCON and HCRIT. CTSCREEN and CTDMPLUS are virtually the same air quality model, with the main difference between the two being the meteorological data used. The wind direction used in CTSCREEN is based on the source-terrain geometry, resulting in computation of the highest impacts likely to occur. Other meteorological variables are chosen from possible combinations from a set of predetermined values. CTSCREEN provides maximum concentration estimates that are similar to, but on the conservative side of, those that would be calculated from the CTDMPLUS model with a full year of on-site meteorological data.

CTSCREEN is appropriate for the following applications:

- Elevated point sources
- Terrain elevations above stack top
- Rural areas
- One hour to annual averaging time periods

Meteorological data used by the CTSCREEN model is internally derived by the model itself, but is similar to those 1-hour values used in the screening model SCREEN3. As well as calculating maximum 1-hour concentrations at all receptors, the CTSCREEN model is designed to provide conservative estimates of worst case 3-hour, 24-hour, and annual impacts. Default scaling factors, as presented below, were used to convert calculated 1-hour concentrations to 3-hour, 24-hour, and annual estimates.

CTSCREEN Model Persistence Factors

Averaging Period	CTSCREEN Scaling Factor
1-hour	1.0
3-hour	0.7
8-hour	-
24-hour	0.15
Annual	0.03

5.1.5.2 Additional Model Selection

In addition to AERMOD and CTSCREEN, several other EPA models and programs were used to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations. The models used were Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274), HARP, and the AERSCREEN (version 15181) dispersion model for fumigation impacts. These models, along with options for their use and how they are used, are discussed below.

The AERSCREEN model was used to evaluate inversion breakup fumigation impacts for all short-term averaging periods (24 hours or less). The methodology outlined in EPA-454/R-92-019 (EPA, 1992a) will be followed for this analysis. The combined fumigation concentrations are compared to the maximum AERSCREEN concentrations under normal dispersion for all meteorological conditions. If fumigation impacts are less than AERSCREEN maxima under normal dispersion (and AERMOD maxima for the actual meteorological and terrain data used in the refined analyses), no further analysis of fumigation is required based on Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019).

If fumigation impacts exceed AERSCREEN maxima, then fumigation impacts longer than 1-hour averages will be evaluated based on Section 4.5.3 of Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019) guidance on converting to 3-, 8- and 24-hour average concentrations. Combined impacts for all sources under fumigation conditions will be evaluated. For sources with plume heights not subject to inversion breakup fumigation, their contributions to fumigation impacts will be determined using AERSCREEN with all meteorological conditions and ignoring terrain at the distance of the maximum fumigation concentration. The fumigation concentration is then combined with the maximum AERSCREEN concentration from the other sources.

5.1.5.3 Good Engineering Practice Stack Height Analysis

Formula Good Engineering Practice (GEP) stack height is the greater of 65 meters or the height based on EPA formulas for the various onsite and offsite structures and their locations and orientations to the MREC stacks. Formula GEP stack height was calculated at 28.32 meters (about 93 feet) for the turbine stacks and 38.58 meters (about 126.5 feet) for the firepump stack and the six wet-SAC cells. The GEP stack heights are due to the air intake superstructure for the turbine stacks and the demineralized water storage tank for the firepump stack and wet-SAC cells. The design stack heights of 60 feet for the turbine stacks, 25 feet for the firepump stack, and 42.5 feet for the wet-SAC cells are all less than their formula GEP stack heights, so downwash effects were included in the modeling analysis.

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. Appendix 5.1B, Figure 5.1B-1 shows the structures included in the BPIP-PRIME downwash analysis.

5.1.5.4 Receptor Grid Selection and Coverage

<u>AERSCREEN Modeling Procedures:</u> AERMOD receptor elevations and hill slope factors were determined from the U.S. Geological Survey (USGS) NED using either 1/3-arcsecond (~10-meter) spacing for receptor grids with spacing between adjacent receptors of 100 meters or less and 1-arcsecond (~30-meter) spacing for receptor grids with receptor spacing greater than 100 meters. All coordinates were referenced to universal transverse Mercator (UTM) North American Datum 1983 (NAD83), Zone 11. The National Elevation Dataset (NED) files used will extend beyond the receptor grid boundaries as appropriate for the hill slope factors.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the MREC 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 listed below.

- Receptors were placed along the proposed MREC fence line with a 10-meter spacing.
- Receptors extending outwards from the proposed MREC fence line in all directions at least 500 meters from the MREC with a 20-meter receptor spacing were modeled, called the downwash receptor grid.
- An intermediate receptor grid with a 100-meter resolution was modeled that extended outwards from the edge of the downwash grid to 1) km from the MREC.
- The first coarse receptor grid with 200-meter spacing extended outwards from the edge of the intermediate grid to 5 km from the MREC. The second coarse receptor grid with a 250-meter spacing then extended from the first coarse receptor grid out to 15 km from the MREC (the extent and spacing of the second coarse grid was adjusted from the original analyses based on agency comments).
- A refined receptor grid with 20-meter resolution was modeled around any location on the coarse and intermediate grids where a maximum impact was modeled that was above the concentrations on the downwash grid. Based on the locations of the maximum modeled concentrations, a single refined receptor grid was required as a number of maximum impacts occurred on the 100-meter spaced intermediate and 200-meter spaced coarse receptor grids in a common elevated terrain area south to southeast of the MREC site. This refined receptor grid was modeled in both the turbine screening and refined modeling analyses.

Concentrations within the facility fenceline will not be calculated. Receptor grid figures 5.1B-2a and 5.1B-2b in Appendix 5.1B display the receptors grids used in the modeling assessment with respect to the MREC fence line.

CTSCREEN Modeling Procedures: The use of CTSCREEN requires the CTDMPLUS Terrain Feature Processing System. CTDMPLUS requires construction of a mathematical representation of the complex terrain being analyzed. For each of the complex terrain regions to be modeled, the contours of the specific terrain feature of interest were digitized and used as input to the FITCON and HCRIT processing programs. The FITCON and HCRIT programs use the digitized data to develop continuous contours, complete the contours and extend the contours down to the stack base, fit a series of ellipses to these contour data, create polynomial equations that represent the fitted ellipses, and format the results so CTDMPLUS can use them. Contour data were based on 7.5-minute USGS topographic maps, and contour intervals of 100 feet or less as needed to accurately digitize the terrain features, shown in Figure 5.1B-3. Two sets of receptors grids were used. The first "coarse" receptor grid was used to represent overall complex terrain in South Mountain south and southeast of the MREC project site, up to a peak elevation of 1860 feet above mean sea level (1860'amls). The RECGEN receptor utility program was used to generate coarse grid receptor locations for this terrain feature. Receptors were placed along the digitized contours at approximate 310 meter intervals. AERMOD regular grid receptors were then modeled for this complex terrain area of South Mountain. Finally, 20-meter spaced receptors (similar to the AERMOD refined grid) were modeled in the areas of maximum AERMOD and CTSCREEN maxima (generally based on receptor elevations). RECGEN was not needed to generate these additional receptors based on the AERMOD receptor grids. The CTSCREEN receptor grids are shown in Figure 5.1B-4.

5.1.6 Meteorological Data Selection

The MREC, as discussed above, is located in the southwestern portion of the Santa Clara River Valley, near the mouth of the Valley. The Santa Clara River Valley has a predominant northeast and southwest orientation, with terrain rising up to over 2000 feet on each side of the valley. Based on the MREC location near the entrance to the valley, the selection of surface meteorology is an important consideration for use in assessing the MREC's impacts on regional air quality. Because the MREC location is influenced in large part by the valley orientation, surface meteorological data were reviewed to determine which data set would be considered representative of the MREC area.

The nearest representative surface meteorological data set in the general area of the MREC was determined to the Camarillo Airport Automated Surface Observation Station (ASOS) by the agency about 11 kilometers (km) south of the MREC site. (The original application used the El Rio Air Quality Monitoring Station, operated by the VCAPCD, located approximately 7km south-southwest of the MREC site.) The Camarillo surface meteorological data set was provided by the agency already processed for AERMOD with Vandenberg Air Force Base upper air data for the most recent five-year period, 2011-2015. These data were determined to be representative of dispersion conditions for the MREC project.

5.1.6.1 Background Air Quality

In 1970, the U.S. Congress instructed EPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the impacts 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 NAAQS are "those which, in the judgment of the administrator [of EPA], 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 EPA], 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: SO_2, CO, ozone, NO_2, PM10, PM2.5, and lead.

The criteria pollutants are those that have been demonstrated historically to be widespread and have a potential to cause adverse health effects. EPA 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 EPA 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: a numerical limit expressed as an allowable concentration, and an averaging time that specifies the period over which the concentration value is to be measured. Table 5.1-16 presents the current federal and California state AAQS.

Table 5.1-16 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hour	0.09 ppm (180 µg/m^3)	-
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3) (3-year average of annual 4th-highest daily maximum)

Table 5.1-16 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Carbon Monoxide	8-hour	9.0 ppm (10,000 µg/m³)	9 ppm (10,000 µg/m³)
	1-hour	20 ppm (23,000 µg/m³)	35 ppm (40,000 µg/m³)
Nitrogen dioxide	Annual Average	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)
	1-hour	0.18 ppm (339 µg/m³)	0.100 ppm (188 µg/m³) (3-year average of annual 98th percentile daily max's)
Sulfur dioxide	Annual Average	-	0.030 ppm (80 µg/m³)
	24-hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)
	3-hour	-	0.5 ppm (1,300 µg/m³)
	1-hour	0.25 ppm (655 µg/m³)	0.075 ppm (196 µg/m³) (3-year average of annual 99th percentile daily max's)
Respirable particulate matter (10 micron)	24-hour	50 µg/m³	150 µg/m³
	Annual Arithmetic Mean	20 µg/m³	-
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 µg/m³	12.0 µg/m³ (3-year average)
	24-hour	-	35 µg/m³ (3-year average of annual 98th percentiles)
Sulfates	24-hour	25 µg/m³	-
Lead	30-day	1.5 µg/m³	-
	3 Month Rolling Average	-	0.15 µg/m³

Source: CARB website 10/2015

Notes:

µg/m3 = micrograms per cubic meter

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—CO is a non-reactive pollutant that is a product of incomplete combustion. Ambient CO 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, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, CO 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 (PM10 and PM2.5) — Both PM10 and PM2.5 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 PM10 concentrations, while others, such as vehicular traffic, affect regional PM10 concentrations.

Several studies that EPA relied on for its staff report have shown an association between exposure to particulate matter, both PM10 and PM2.5, 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. PM2.5, 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 facilities 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 facilities, 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 facilities to install CEMS in accordance with 40 CFR Part 75 and report annual emissions of SO_x and NO_x. The acid rain program provisions will apply to the MREC. The MREC will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on the MREC.

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.

Table 5.1-17 presents the VCAPCD attainment/nonattainment status. Figure 5.1B-5 (Appendix 5.1B) show the locations of monitoring stations in Ventura County (and the South Central Coast Air Basin). A summary of background air quality values for the representative monitoring sites for the period 2013-2015 are shown in Table 5.1-18. These ambient monitoring data for the most recent 3-year period (2013-2015) are then summarized in Table 5.1-18, Air Quality Monitoring Data. Data from these sites are a reasonable representation of background air quality for the MREC site and impact areas.

Table 5.1-17 VCAPCD Attainment Status

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hour	No NAAQS	Nonattainment
Ozone	8-hour	Nonattainment (serious)	Nonattainment

Table 5.1-17 VCAPCD Attainment Status

Pollutant	Averaging Time	Federal Status	State Status
CO	All	Unclassified/Attainment	Attainment
NO_2	All	Unclassified/Attainment	Attainment
SO_2	All	Attainment	Attainment
PM10	All	Unclassified/Attainment	Nonattainment
PM2.5	All	Unclassified/Attainment	Nonattainment
Sulfates	24-hour	No NAAQS	Attainment
Lead	All	Unclassified/Attainment	Attainment
H_2S	1-hour	No NAAQS	Unclassified/Attainment
Visibility Reducing Particles	8-hour	No NAAQS	Unclassified/Attainment

Source: CARB and VCAPCD website data, 10/2015.

Table 5.1-18 Background Air Quality Data

Pollutant	Site	Avg. Time	2013	2014	2015
Ozone, ppm	El Rio	1-Hr Max	0.067	0.112	0.070
	El Rio	8-Hr Max	0.063	0.077	0.066
PM10, µg/m^3	El Rio	24-Hr Max* (6-day samples)	47	51	N/A
	El Rio	24-Hr H2H (6-day samples)	40	50	N/A
	El Rio	24-Hr Max (continuous)	106	118	93
	El Rio	24-Hr H2H (continuous)	60	69	61
	El Rio	Ann. Mean	24.3	27.4	25.6
PM2.5, µg/m^3	El Rio	24-Hr 98th%	18	18	22
	El Rio	Ann. Mean	9.4	9.3	9.6
NO_2, ppm	El Rio	1-Hr Max	0.040	0.039	0.036
	El Rio	1-Hr 98th%	0.033	0.030	0.028
	El Rio	Ann. Mean	0.007	0.006	0.006
CO, ppm	Santa Barbara	1-Hr Max*	2.5	4.0	2.1
	Santa Barbara	8-Hr Max*	1.1	1.1	0.8
SO_2, ppm	Santa Barbara	1-Hr Max	0.002	0.004	0.002
	Santa Barbara	1-Hr 99th%	0.002	0.001	0.001
	Santa Barbara	24-Hr Max	0.0020	0.0003	0.0010
	Santa Barbara	Ann. Mean	0.0008	0.0000	0.0001

Table 5.1-19 shows the background air quality values based upon the data presented above. The background values represent the highest values reported for the most representative air quality monitoring site during any single year of the most recent three-year period for the CAAQS assessments

and the appropriate values for the NAAQS according to the format of the standard as noted below. Appendix 5.1B presents more detailed background air quality data summaries.

Table 5.1-19 Background Air Quality Data

Pollutant and Averaging Time	Background Value
Ozone – 1-hour Maximum CAAQS	0.112 ppm (219.9 µg/m^3)
Ozone – 8-hour Maximum CAAQS/NAAQS	0.077 ppm (151.2 µg/m^3)
PM10 – 24-hour Maximum CAAQS	118 µg/m^3
PM10 – 24-hour High, Second-High NAAQS	69 µg/m^3
PM10 – Annual Maximum CAAQS	25.6 µg/m^3
PM2.5 – 3-Year Average of Annual 24-hour 98th Percentiles NAAQS	19 µg/m^3
PM2.5 – Annual Maximum CAAQS	9.6 µg/m^3
PM2.5 – 3-Year Average of Annual Values NAAQS	9.4 µg/m^3
CO – 1-hour Maximum CAAQS/NAAQS	4.0 ppm (4,581 µg/m^3)
CO – 8-hour Maximum CAAQS/NAAQS	1.1 ppm (1,260 µg/m^3)
NO_2 – 1-hour Maximum CAAQS	0.040 ppm (75.3 µg/m^3)
NO_2 – 3-Year Average of Annual 1-hour 98th Percentile Daily Maxima NAAQS	0.030 ppm (56.4 µg/m^3)
NO_2 – Annual Maximum CAAQS/NAAQS	0.007 ppm (13.2 µg/m^3)
SO_2 – 1-hour Maximum CAAQS	0.004 ppm (10.5 µg/m^3)
SO_2 – 3-Year Average of Annual 1-hour 99th Percentile Daily Maxima NAAQS	0.001 ppm (2.6µg/m^3)
SO_2 – 24-hour	0.002 ppm (5.2 µg/m^3)
SO_2 – Annual Maximum NAAQS	0.0008 ppm (2.1 µg/m^3)

For conversion from the ppm measurements to µg/m^3 concentrations typically required for the modeling analyses, used: µg/m^3 = ppm x 40.9 x MW where MW = 48, 28, 46, and 64 for ozone, CO, NO_2, and SO_2, respectively.

AERMOD and CTSCREEN Air Quality Analyses

The following sections present the analyses for determining the changes to ambient air quality concentrations in the region of the MREC. These analyses are comprised of a MREC-only screening assessment to determine the worst-case emissions and stack parameters and a refined modeling assessment used to calculate the MREC changes to ambient air quality. Cumulative multisource modeling assessments, which are used to analyze the MREC plus nearby existing sources, will be performed at a later date upon consultation with the appropriate agencies.

AERMOD Screening Analysis

Operational characteristics of the combustion turbines, such as emission rate, exit velocity, and exit temperature vary by operating loads and ambient temperatures. The MREC turbines will be operated over a variety of temperature and load conditions from 25 to 100 percent, with and without inlet chilling. Thus, an air quality screening analysis was performed that considered these effects.

For the turbines, a range of operational characteristics over a variety of ambient temperatures was assessed using AERMOD and all five years of hourly meteorology (year 2011-2015). This included various turbine loads for seven ambient temperatures: 30°F, 39°F, 59°F, 61°F (annual average conditions), 76°F, 79°F and 96°F (high temperature day). The combustion turbine operating condition that resulted in the highest modeled concentration in the screening analysis for each pollutant and for averaging periods of 24 hours or less were used in the refined impact analyses. The 61°F condition was assumed to represent annual average conditions. As such, no screening analyses were performed for annual average concentrations (the annual refined analyses were modeled with the stack parameters for the 61°F case at 100 percent load with inlet chilling, which is the worst-case average operating condition).

The results of the turbine load/temperature screening analysis are listed in Appendix 5.1B. Most short-term maximum impacts were predicted to occur for the 30°F ambient temperature conditions. For NO_x and CO emissions, the worst-case turbine condition is 30°F and 100 percent load (Case 1) and for SO_2, the worst-case turbine condition is 30°F and 25 percent load (Case 4). This is because SO_2 emissions are the same for all operating conditions, so the lowest load represents the smallest plume rise and the highest impacts when emissions are equal. However, for PM10/PM2.5, the worst-case turbine condition is 96°F and 75 percent load (Case 31). The worst-case 50 percent load condition (30°F, Case 3) was used for modeling startup operations and commissioning activities. Finally, annual impacts were only summarized for the turbine condition of 100 percent load with the chiller at 61°F (Case 14) since this is expected to be the most representative condition of annual operations.

5.1.6.2 AERMOD Refined Analysis

Based on the results of the AERMOD screening analyses, all MREC sources were modeled in the AERMOD refined analysis for comparisons with Significant Impact Levels (SILs) and CAAQS/ NAAQS.

Impacts during normal operations were based on continuous turbine operations at the worst-case screening condition. Testing of the firepump (30 minutes in any one day) will not take place during startup of the turbines, so 1-hour NO_2, CO, and SO_2 impacts included the firepump only for normal operations. The refined modeling analyses did considered operation of the firepump for 8-hour CO startup conditions. Since the firepump would be tested far less than 100 hours/year, it included in 1-hour NO_2 and SO_2 NAAQS modeling analyses at the annual average emission rates per EPA guidance due to the statistical nature of these standards (it was modeled at the maximum 1-hour emission rate for the CAAQS).

For startup operations, the MREC will start with time periods of 30 minutes or less. Since Gaussian modeling is based on 1 hour steady state conditions, the startup/shutdown emission rates used for refined modeling assumed the worst-case combined hourly emission rate for startup, shutdown, and normal operations at the worst-case 50 percent load condition. Detailed emission calculations for all averaging periods are included in Appendix 5.1A. The refined modeling assessment included the following assumptions and conditions for both normal and startup/shutdown conditions:

- All turbines can start during any hour
- Fire pump testing occurs up to 30 minutes per day, 52 hours per year, but will not occur during a turbine start or shutdown hour
- Inlet Chiller operates 24 hours per day and 2,500 hours per year
- Turbines can operate 24 hours per day
- Worst-case annual modeled emissions for NO_x: 2,402 hours at base load, 150 starts, 150 shutdowns = 2,500 hours; worst-case annual modeled emission of SO_2, PM10, and PM2.5: 2,500 hours at base load; both with stack characteristics based on the annual operating condition (Case 14)
- Startup stack parameters are based on 50 percent load
- For all the CAAQS, start emissions/conditions were assessed based on the deterministic nature of all California state standards (maximum concentration over the five years modeled for one (1) hour CO, NO_2 and SO_2 standards, etc.)
- Startup CO 8-hour impacts calculated as two starts + two shutdowns + four hours base load with chillers on. The fire pump is assumed to be tested during the eight-hour period.

- For any one-hour time period, all five turbines could be in startup or shutdown.
- Fire pump will not be tested during 1-hour turbine start cycle but is included in the 8-hour start case
- PM10 and PM2.5 24-hour modeled concentrations were based on the worst-case screening condition. The firepump was also assumed to be tested during this time frame.
- The 20-meter spaced refined receptor grid for the elevated terrain area south to southeast of the MREC site was included in both the screening and refined modeling analyses as discussed above.

Also, since startup emissions for SO_2 and PM10/PM2.5 would be less than during normal operations, the short-term impacts analyses for these pollutants did not include start-up conditions. Detailed emission calculations for all averaging periods are included in Appendix 5.1A.

The worst-case modeling input information for each pollutant and averaging period are shown in Table 5.1-20 for normal operating conditions and combustion turbine startup/shutdown conditions. As discussed above, the combustion turbine stack parameters used in modeling the impacts for each pollutant and averaging period reflected the worst-case operating condition for that pollutant and averaging period identified in the load screening analysis.

CTSCREEN Modeling Analysis

CTSCREEN was used to re-model the Project impacts in complex terrain where AERMOD predicted a limited number of refined grid receptors with maximum 24-hour PM10 impacts for only one meteorological period greater than the SIL, i.e., where the maximum concentration predicted by AERMOD equaled or exceeded 5 μg/m^3. All these locations occurred in complex terrain on South Mountain. To more accurately predict the Project's actual impacts in this complex terrain, a more detailed modeling assessment was conducted using CTSCREEN, which is an EPA-approved preferred model for modeling analyses in complex terrain. *See* 40 CFR Part 51, App. W, Guideline on Air Quality Models, § 4.2.1.2. According to EPA's Modeling Guideline, "CTSCREEN can be used to obtain conservative, yet realistic, worst-case estimates for receptors located on terrain above stack height." *Id*.

A comparison of the maximum 24-hour PM10 concentrations predicted by the AERMOD and CTSCREEN analyses are given below for each of the receptor grids described above.

	AERMOD (μg/m^3)		CTSCREEN (μg/m^3)
Receptor Grid	Maximum	High Second-High	Maximum
RECGEN (310m)	N/A	N/A	1.54
Coarse (100m)	4.95	3.38	1.65
Refined (20m)	5.59	3.92	1.68

The CTSCREEN analyses show that maximum 24-hour PM10 and PM2.5 impacts are actually 1.68 μg/m^3 in complex terrain areas of South Mountain, much less than initially estimated by AERMOD. Therefore, the appropriate AERMOD 24-hour PM10/PM2.5 impacts outside the complex terrain area remodeled with CTSCREEN were reported where applicable. All of the AERMOD non-complex terrain maximum impacts below occur on the MREC fenceline due to wet-SAC PM emissions. A comparison of these AERMOD non-complex terrain maximum impacts and CTSCREEN complex terrain maximum impacts follows:

	AERMOD (μg/m^3)	CTSCREEN (μg/m^3)*
Pollutant/Avg.Time	Non-Complex Terrain	Complex Terrain
24-hour PM10/PM2.5 Maximum	3.40	1.68
24-hour PM10 High Second-High	3.38	1.68
24-hour PM2.5 5-Yr Avg./Maximum	3.06	1.68
24-hour PM2.5 5-Yr Avg./98th Percentile	1.65	1.68

* CTSCREEN results are based on scaling factors from the 1-hour concentration and are thus, not adjusted to reflect second high or percentile averages.

The CTSCREEN complex terrain impact above will be reported for the PM2.5 NAAQS assessment and the AERMOD non-complex terrain impacts above will be reported for all the other regulatory significant purposes (SILs, CAAQS, and other NAAQS assessments).

Table 5.1-20 Stack Parameters and Emission Rates for Each of the Modeled Sources

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Vel. (m/s)	Stack Diam. (m)	Emission Rates (g/s)			
					NO_x	SO_2	CO	PM10/ PM2.5
Averaging Period: 1-hour for Normal Operating Conditions (Case 1 for NOx/CO and Case 4 for SO_2)								
Each Turbine (NOx/CO)	18.29	736.9	31.28	3.6576	0.643	-	0.626	-
Each Turbine (SO_2)	18.29	676.1	16.14	3.6576	-	0.074	-	-
Fire Pump - CAAQS	7.62	803.2	44.30	0.1270	0.086	1.454E-4	0.079	-
Fire Pump - NAAQS	7.62	803.2	44.30	0.1270	1.016E-3	1.726E-6	-	-
Averaging Period: 3-hours for Normal Operating Conditions (Case 4)								
Each Turbine	18.29	676.1	16.14	3.6576	-	0.074	-	-
Fire Pump	7.62	803.2	44.30	0.1270	-	4.847E-5	-	-
Averaging Period: 8-hours for Normal Operating Conditions (Case 1)								
Each Turbine	18.29	736.9	31.28	3.6576	-	-	0.626	-
Fire Pump	7.62	803.2	44.30	0.1270	-	-	9.931E-3	-
Averaging Period: 24-hours for Normal Operating Conditions (Case 4 for SO_2 and Case 31 for PM)								
Each Turbine (SO_2)	18.29	676.1	16.14	3.6576	-	0.074	-	-
Each Turbine (PM)	18.29	738.4	24.08	3.6576	-	-	-	0.252
Fire Pump	7.62	803.2	44.30	0.1270	-	6.059E-6	-	1.910E-4
Wet SAC (per cell)	12.95	Ambient+2.22K*	7.82	4.1148				0.0096
Averaging Period: Annual (Case 14 with Chiller)								
Each Turbine	18.29	738.7	31.42	3.6576	0.161	0.0212	-	0.072
Fire Pump	7.62	803.2	44.30	0.1270	1.016E-3	1.726E-6	-	5.441E-4
Wet SAC (per cell)	12.95	Ambient+5K*	7.82	4.1148				0.0027
Averaging Period: 1-hour for Start-up/Shutdown Periods (Case 3)								
Each Turbine	18.29	704.3	20.83	3.6576	1.468	-	1.007	-
Averaging Period: 8-hours for Start-up/Shutdown Periods (Case 3)								
Each Turbine	18.29	704.3	20.83	3.6576	-	-	0.755	-
Fire Pump	7.62	803.2	44.30	0.1270	-	-	9.931E-3	-
Averaging Period: 1-hour for Part 1 of Commissioning Activities (Case 3)								
Two Turbines(each)	18.29	704.3	20.83	3.6576	8.568	-	14.774	-
Averaging Period: 8-hours for Part 1 of Commissioning Activities (Case 3)								
Two Turbines(each)	18.29	704.3	20.83	3.6576	-	-	14.364	-
Averaging Period: 1-hour for Part 2 of Commissioning Activities (Case 3)								
Five Turbines(each)	18.29	704.3	20.83	3.6576	1.680	-	2.961	-

Table 5.1-20 Stack Parameters and Emission Rates for Each of the Modeled Sources

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Vel. (m/s)	Stack Diam. (m)	Emission Rates (g/s) NO_x	SO_2	CO	PM10/ PM2.5
Averaging Period: 8-hours for Part 2 of Commissioning Activities (Case 3)								
Five Turbines(each)	18.29	704.3	20.83	3.6576	-	-	2.751	-
Averaging Period: 24-hours for Part 2 of Commissioning Activities (Case 3)								
Five Turbines(each)	18.29	704.3	20.83	3.6576	-	-	-	0.504
Averaging Period: Annual – First Year with Commissioning Activities (Case 14 with Chiller)								
Each Turbine	18.29	738.7	31.42	3.6576	0.175	-	-	0.074
Fire Pump	7.62	803.2	44.30	0.1270	1.016E-3	-	-	5.441E-4
Wet SAC (per cell)	12.95	Ambient+5K*	7.82	4.1148		-	-	0.0027

m/s = meters per second
m = meter
g/s = grams per second
* Exit temperature is a function of ambient temperature.

5.1.6.3 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 with all 5 years of meteorology. Tables 5.1-21 and 5.1-22 summarize maximum modeled concentrations for each criteria pollutant and associated averaging periods. NO_2 concentrations for normal operations were computed using the ARM following EPA guidance, namely using national default values of 0.80 (80 percent) and 0.75 (75 percent) for 1-hour and annual average NO_2/NO_x ratios, respectively. For start-up periods, NO_2 concentrations were computed using the OLM, using the conservative USEPA NO_2/NO_X stack emissions ratio of 0.50 and the default NO_2/NO_X ambient equilibrium ratio of 0.90. For the refined modeling analyses of the 1-hour CO and the 1-hour NO_2 CAAQS concentrations, AERMOD demonstrated that normal operations produced higher concentrations than startup conditions because of the routine testing of the fire pump. Other maximum facility impacts occurred in the elevated terrain south to southeast of the MREC site. These 200-meter spaced coarse receptor grid and 100-meter spaced intermediate receptor grid areas were remodeled with a 20-meter spaced refined grid. The refined grid was included in both the screening and refined modeling analyses. An evaluation of complex-terrain PM10 and PM2.5 impacts was also performed with CTSCREEN as described above.

The maximum impacts for normal and startup/shutdown facility operating conditions are compared on Table 5.1-21 to the EPA SILs for all applicable pollutants. As applicable, the maximum modeled impacts for all five years of meteorological data were used for comparisons to the SILs for all CAAQS and NAAQS, in keeping with the form of the standards. The 5-year averages of the daily maximum or annual impacts were used for the 1-hour NO_2, 1-hour SO_2, 24-hour PM2.5, and annual PM2.5 SILs in accordance with EPA guidance. Most pollutant impacts will be less than the SILs (all CO most SO_2, 24-hour PM10 (based on CTSCREEN), and all annual averaging times). The maximum MREC concentrations of 1-hour NO_2 (both normal conditions and startup periods), 1-hour SO_2, and 24-hour PM2.5 are predicted to be greater than the EPA SILs. The maximum 24-hour PM10 impacts greater than the SILs occurred in complex terrain and were remodeled with CTSCREEN, the screening version of the EPA recommended and preferred model CTDMPLUS, as described above, which are included in the tables below. Based on the maximum of CTSCREEN complex terrain and AERMOD non-complex terrain impacts, MREC 24-hour PM10 impacts will be less than the SIL. The MREC will therefore not significantly contribute to any exceedances of the 24-hour PM10 California state AAQS.

Table 5.1-21 Air Quality Impact Results for Refined Modeling Analysis of the MREC – Significant Impact Levels

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Class II SIL (µg/m³)
Normal Operating Conditions			
NO_2 [a]	1-hour Maximum (CAAQS)	86.0	-
	1-hour 5-year Average of Annual Maxima	51.5	7.5
	Annual Maximum	0.14	1.0
CO	1-hour Maximum	98.8	2,000
	8-hour Maximum	32.7	500
SO_2	1-hour Maximum	11.1	-
	1-hour 5-year Average of Annual Maxima	10.6	7.8
	3-hour Maximum	7.3	25
	24-hour Maximum	2.0	5
	Annual Maximum	0.02	1
PM10[b]	24-hour Maximum	3.40	5
	Annual Maximum	0.09	1
PM2.5	24-hour 5-year Average of Annual Maxima	3.06	1.2
	Annual Maximum	0.09	-
	5-year Average of Annual Concentrations	0.08	0.2*
Start-up/Shutdown Periods			
NO_2 [a]	1-hour Maximum	102.4	-
	1-hour 5-year Average of Annual Maxima	91.7	7.5
CO	1-hour Maximum	132.6	2,000
	8-hour Maximum	49.0	500

[a] NO_2 1-hour and annual impacts for normal conditions evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively. NO_2 1-hour impacts for start-up/shutdown periods evaluated using the Ozone Limiting Method with a NO_2/NO_X stack emissions ratio 0.50 (50 percent) and concurrent El Rio ozone data.
[b] 24-hour PM10 and PM2.5 impacts were re-evaluated with the screening model CTSCREEN, which uses the techniques contained in the USEPA preferred/recommended model CTDMPLUS. The impacts presented are discussed in detail above.
* Proposed Federal SIL

Maximum MREC concentrations are compared in Table 5.1-22 to the CAAQS and NAAQS. The maximum concentrations for all five years of meteorological data modeled were used for comparison to all the CAAQS, the annual NO_2 NAAQS and the 1-hour and 8-hour NAAQS for CO. For the other NAAQS, the MREC concentrations in the table were based on the form of the NAAQS, namely: High Second-High (H2H) values for the 3-hour SO_2 NAAQS and 24-hour PM10; the 5-year average of the annual 98th and 99th percentile 1-hour daily maxima for 1-hour NO_2 and SO_2 NAAQS, respectively; and for PM2.5, the 5-year average of the annual 98th percentile 24-hour impacts and the 5-year average of the annual impacts. Compliance with the NAAQS and CAAQS were calculated for all pollutants other than the CAAQS for PM10, which because of high background concentrations, which already exceed the CAAQS (the area is already designated as State nonattainment for the PM10 CAAQS). As noted above, the facility is already projected by AERMOD to have maximum impacts less than the SILs for annual PM10. A re-evaluation of 24-hour PM10 impacts above the SIL in elevated terrain with CTSCREEN described above are also less than the SIL. Thus, the MREC would not significantly contribute to current exceedances of the PM10 CAAQS (the only pollutant with background concentrations above the AAQS).

Table 5.1-22 Air Quality Impact Results for Refined Modeling Analysis of MREC – Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards CAAQS/NAAQS (µg/m³)	
Normal Operating Conditions						
NO_2 [a]	1-hour Maximum	86.0	75.3	161.3	339	-
	1-hour 5-year Average of Annual 98th percentiles	47.3	56.4	103.7	-	188
	Annual Maximum	0.14	13.2	13.3	57	100
CO	1-hour Maximum	98.8	4,581	4,680	23,000	40,000
	8-hour Maximum	32.7	1,260	1,293	10,000	10,000
SO_2	1-hour Maximum	11.1	10.5	21.6	655	-
	1-hour 5-year Average of Annual 99th percentiles	10.1	2.6	12.7	-	196
	3-hour Maximum	7.3	10.5	17.8	-	1300
	24-hour Maximum	2.0	5.2	7.2	105	365
	Annual Maximum	0.02	2.1	2.1	-	80
PM10[b]	24-hour Maximum	3.40	118	121	50	-
	24-hour H2H	3.38	69	72	-	150
	Annual Maximum	0.09	25.6	25.7	20	-
PM2.5	24-hour 5-year Average of Annual 98th percentiles	1.68	19	20.7	-	35
	Annual Maximum	0.09	9.6	9.7	12	-
	5-year Average of Annual Concentrations	0.08	9.4	9.5	-	12.0
Start-up/Shutdown Periods						
NO_2 [a]	1-hour Maximum	102.4	75.3	177.7	339	-
	1-hour 5-year Average of 98th percentiles	83.8	56.4	140.2	-	188
CO	1-hour Maximum	132.6	4,581	4,714	23,000	40,000
	8-hour Maximum	49.0	1,260	1,309	10,000	10,000

[a] NO_2 1-hour and annual impacts for normal conditions evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively. NO_2 1-hour impacts for start-up/shutdown periods evaluated using the Ozone Limiting Method with a NO_2/NO_X stack emissions ratio 0.50 (50 percent) and

Table 5.1-22 Air Quality Impact Results for Refined Modeling Analysis of MREC – Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards CAAQS/NAAQS (µg/m³)

concurrent El Rio ozone data.
[b] 24-hour PM10 and PM2.5 impacts were re-evaluated with the screening model CTSCREEN, which uses the techniques contained in the USEPA preferred/recommended model CTDMPLUS. The impacts presented are discussed in detail above.

5.1.6.4 MREC Commissioning Impact Analysis

The commissioning activities for the combustion turbine are expected to consist of four general phases. GE, the turbine vendor, has provided estimates of emissions and hours for each phase of the commissioning process. This schedule is summarized in Table 5.1-23 with additional details in Appendix 5.1A. The worst-case short-term emissions profile during expected commissioning-period operating loads are summarized in Table 5.1-24.

Table 5.1-23 Commissioning Schedule

Commissioning Phase	1 First Fire and Synch Checks	2 Break In Dynamic Commissioning	3 AVR and ECS Tuning	4 Performance Testing
SCR Installed	No	No	No	Yes
CO Catalyst Installed	No	No	No	Yes
Hours per Unit	48	38	34.5	88
Number of Units Operating Simultaneously	2	2	2	5
Total NO_x lbs (5 Turbines)	5,885	8,440	3,945	2,390
Total CO lbs (5 Turbines)	14,950	17,915	9,220	2,200
Total ROC lbs (5 Turbines)	265	370	360	635
Total PM10/PM2.5 lbs (5 Turbines)	600	570	600	1,760
Total SO_x lbs (5 Turbines)	191.6	112.1	101.78	259.6

Notes: per GE, see Appendix 5.1A

Table 5.1-24 Maximum Hourly Emissions Rates During Each Phase of Commissioning (Per Turbine)

Commissioning Phase	Emission Rate	NO_X	CO	ROC	PM10/PM2.5	SO_x
1	lb/hr	55.5	83.55	1.5	3.0	0.59
2	lb/hr	68.0	117.33	3.00	3.0	0.59
3	lb/hr	51.25	117.25	2.92	4.0	0.59
4	lb/hr	5.50	5.00	2.67	4.0	0.59

Notes: per GE, see Appendix 5.1A for commissioning schedule.

Days with continuous 24-hour operation were assumed in order to reduce the number of starts during the testing periods.

The modeling assumed each turbine would be in the commissioning activity that produced the maximum emissions.

The total commissioning emissions over 213 hours from all five (5) turbines are as follows:

- NO_x – 20.660 lbs or 10.33 tons
- CO – 44,285 lbs or 22.14 tons
- ROC – 1,630 lbs or 0.82 tons
- PM10/PM2.5 – 3,530 lbs or 1.77 tons
- SO_x – 665.1 lbs or 0.33 tons

During the first year of operation, plant commissioning activities, which is planned to occur over an estimated 213 hours per turbine, will have higher hourly and daily emissions profiles than during normal operations in the subsequent years of operation. There are several phases during commissioning that result in NO_x, CO, ROC, and PM10/PM2.5 emissions that are greater than during normal operations. (During commissioning, SO_2 emissions are expected to be no greater than during normal full load operations.) Typically, some of these commissioning activities occur prior to the installation of the pollution control equipment, e.g., SCR and oxidation catalyst, while the combustion turbines are being tuned to achieve optimum performance. During the initial combustion turbine tuning, NO_x and CO emission control systems would not be functioning.

For the purposes of air quality modeling, commissioning activities are divided into two parts. During the first half of the commissioning process, expected to last up to 90 hours per turbine, NO_2, and CO emissions could be considerably higher during commissioning than under other operating conditions already evaluated. Only two turbines would be commissioned during this first part of the commissioning process, with the other turbines in non-operation. During the final and second part of the commissioning lasting up to 123 hours per turbine, NO_2 and CO emissions, while still greater than normal or startup emissions at times, would be considerably less than the first part of commissioning. In addition, long term PM emissions (for the additional five days of commissioning) could exceed normal startup emissions. Therefore, five turbines were assumed to be operational during this second part of commissioning. These commissioning emissions are shown in Table 5.1-20 and 5.1-24 above. Like modeling analyses for the startup periods, the worst-case 50 percent load condition (Case 3) was evaluated for commissioning activities. The refined receptor grids from the operational modeling were also included as it produced larger impacts than the normal receptor grids. Since the duration of commissioning is extremely limited, assessment of the 1-hour NO_2, 1-hour SO_2, and 24-hour and annual PM2.5 NAAQS are not required according to EPA guidance documents (i.e., NAAQS based on 5-year averages of the eighth, fourth, and eighth highest daily maximum and annual concentrations, respectively). Testing of the firepump or operation of the wet-SAC would not be expected to occur during the commissioning period. The ozone limiting method (OLM) as described in the Air Quality Modeling Protocol was used to assess compliance with the 1-hour NO_2 CAAQS. Concurrent background ozone concentrations for the El Rio air quality monitoring site were used, along with EPA-default values of 0.5 for the NO_2/NO_x in-stack emissions ratio, 0.9 for the NO_2/NO_X ambient equilibrium ratio, and the OLMGROUP ALL option. CTSCREEN modeling of PM10 impacts during commissioning show maximum complex terrain impacts of 3.34 $\mu g/m^3$, far less than the AERMOD maximum impact in complex terrain of 12.10 $\mu g/m^3$. As before, AERMOD impacts above the 5 $\mu g/m^3$ SIL occur for a limited number of receptors and meteorological periods. The maximum and highest, second-high AERMOD impacts in non-complex terrain are 3.40 and 3.38 $\mu g/m^3$, respectively, which are slightly greater than the CTSCREEN impact. The maximum AERMOD impact in non-complex terrain is shown below for 24-hour PM10 impacts. MREC 24-hour PM10 impacts will be less than the SIL and will therefore not significantly contribute to any exceedances of the 24-hour PM10 California state AAQS. Additional descriptions of the commissioning phases and the associated emissions are contained below and in Appendix 5.1A.

Appendix 5.1A lists the specific emissions during each phase of the commissioning activity, and the proposed detailed commissioning schedule. The modeling presented in Table 5.1-25 summarizes the results of the commissioning assessment. As can be seen, the modeling demonstrates that commissioning activities will comply with all applicable National and California state ambient air quality standards (NAAQS/CAAQS) for which the MREC area is already in attainment. Like the facility modeling analyses for normal operations and start-up periods, the background PM10 concentrations already exceed the CAAQS, so combined impacts with the comparatively smaller facility impacts would also exceed the CAAQS. Based on CTSCREEN modeling, the MREC PM10 impacts are predicted to be less than the SIL and will not significantly contribute to any exceedances of the 24-hour PM10 California state AAQS.

Table 5.1-25 Air Quality Impact Results for Commissioning Modeling Analysis – Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (μg/m³)	Background (μg/m³)	Total (μg/m³)	Ambient Air Quality Standards CAAQS/NAAQS (μg/m³)	
Commissioning Activities – Part 1 (Phases 2-7)						
NO_2	1-hour Maximum	232.8	75.3	308.1	339	N/A
CO	1-hour Maximum	803	4,581	5,384	23,000	40,000
	8-hour Maximum	389	1,260	1,649	10,000	10,000
Commissioning Activities – Part 2 (Phases 8-11)						
NO_2	1-hour Maximum	117.2	75.3	192.5	339	N/A
CO	1-hour Maximum	390	4,581	4,971	23,000	40,000
	8-hour Maximum	179	1,260	1,439	10,000	10,000
PM10	24-hour Maximum	3.40	118	121	50	150
Annual - First Year with Commissioning Activities						
NO_2	Annual Maximum	0.15	13.2	13.4	57	100
PM10	Annual Maximum	0.09	25.6	25.7	20	-
PM2.5	Annual Maximum	0.09	9.6	9.7	12	N/A

Fumigation Analysis

Fumigation analyses with the EPA Model AERSCREEN (version 15181) were conducted for inversion breakup conditions based on EPA guidance given in EPA-454/R-92-019 (EPA, 1002a). Analyses from the original application were duplicated, with separate AERSCREEN runs for normal AERSCREEN impacts and fumigation impacts based on agency comments. This is because of a coding bug in AERSCREEN (version 15181) per the March 29, 2016 e-mail message from James Thurman to George Bridgers, et. al. There were no changes in the AERSCREEN impacts presented below, only a change in the AERMOD screening impacts in the following table (due to the new meteorological dataset). The worst-case stack parameters for 1-hour impacts identified in the screening analysis for the turbine stacks for 1-hour averaging times were modeled (Case 1, or 100 percent load without inlet conditioning at an ambient temperature of 30°F). Shoreline fumigation impacts were not assessed since the nearest distance to the shoreline of any large bodies of water is greater than 3 kilometers. Since AERSCREEN is a single point source model, the middle turbine stack (Turbine 3) was modeled. Other AERSCREEN inputs were the BPIP-PRIME values used for the facility analyses, the average moisture AERSURFACE output for the El Rio monitoring site, the range of ambient temperatures analyses in the facility screening analyses (30-96°F), a minimum fenceline distance of 25 meters, RURAL dispersion conditions, no flagpole receptors, a minimum wind speed of 0.5 m/s with a 10-meter anemometer height, and flat terrain. Impacts were initially evaluated for unitized emission rates (1.0 g/s for turbine stack T3).

An inversion breakup fumigation impact was predicted to occur at 6,594 meters from the turbine stacks. No inversion breakup fumigation impacts are predicted by AERSCREEN for the shorter firepump stack. Since the site vicinity is rural in nature, there was no need to adjust fumigation impacts for urban dispersion conditions. Only short-term averaging times were evaluated (fumigation impacts are generally expected to occur for 90-minutes or less). These unitized fumigation impacts are shown in Table 5.1-26 and are compared to the maximum AERSCREEN impacts for the middle turbine for flat terrain (predicted to occur 251 meters from the stack) and the maximum AERMOD impacts from the screening analysis (that includes terrain elevations and actual meteorological data, which predicts maximum impacts in the elevated terrain areas 1,372 meters south-southeast to 1,432 meters southeast of the proposed facility). As can be seen, all of these maximum fumigation impacts are less than the AERSCREEN maxima predicted to occur under normal dispersion conditions anywhere offsite. The fumigation impacts are even smaller when compared to the AERMOD screening analysis impacts for turbine stack T3. Since all short-term fumigation impacts are less than the maximum overall AERSCREEN and AERMOD screening impacts, no further analysis of additional short-term averaging times is required as described in Section 4.5.3 of EPA-454/R-92-019 (EPA, 1992a). Thus, the overall refined modeling analysis impacts are conservative with respect to fumigation impacts, so no pollutant-specific fumigation results are presented.

Table 5.1-26 Fumigation Impact Summary

Averaging Time (Unitized Impacts for 1 g/s)	**Fumigation Impacts (µg/m^3)**	**AERSCREEN Flat Terrain Impacts (µg/m^3)**	**AERMOD Screening Impacts (µg/m^3)**
1-hour	3.232	4.885	21.504
3-hour	3.232	4.885	14.248
8-hour	2.909	4.396	10.499
24-Hour	1.939	2.931	3.870
Distance (m)	6,594	251	1,372-1,432

5.1.7 Laws, Ordinances, Regulations, and Statutes

Table 5.1-27 presents a summary of local, state, and federal air quality LORS deemed applicable to the MREC. Specific LORS are discussed in greater detail in Section 5.1.6.1.

Table 5.1-27 Summary of LORS - Air Quality

LORS	**Applicability**	**Conformance (AFC Section)**
Federal Regulations		
CAAA of 1990, 40 CFR 50	MREC operations will not cause violations of state or federal AAQS.	5.1.5.1–5.1.5.9
40 CFR 52.21 (PSD)	Impact analysis shows compliance with NAAQS, the MREC will not be subject to PSD.	5.1.5.1-5.1.5.9, 5.1.3.4, Appendix 5.1B, Appendix 5.1C
40 CFR 72-75 (Acid Rain)	The MREC will submit all required applications for inclusion to the acid rain program and allowance system, CEMS will be installed as required. The MREC is subject to Title IV.	5.1.7.1, 5.1.7.2

Table 5.1-27 Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
40 CFR 60 (NSPS)	The MREC will determine subpart applicability and comply with all emissions, monitoring, and reporting requirements. 40 CFR 60, Subpart KKKK will apply to the turbines. Subpart IIII will apply to the fire pump engine.	5.1.7, 5.1.7.1
40 CFR 70 (Title V)	Title V application will be submitted pursuant to the timeframes noted in VCAPCD Regulation XXX.	5.1.7.1, 5.1.7.3
40 CFR 68 (RMP)	The MREC will evaluate substances and amounts stored, determine applicability, and comply with all program level requirements.	5.9
40 CFR 64 (CAM Rule)	Facility will be exempt from CAM Rule provisions.	5.1.7, 5.1.7.1
40 CFR 63 (HAPs, MACT)	Subpart YYYY applies to stationary combustion turbines constructed after 1-14-03 located at a major HAPs source. Emissions limits in the rule are currently stayed.	5.1.7.1
40 CFR 60, Subpart TTTT	Subpart TTTT – GHG performance standards for gas turbines. The proposed facility will be subject to only the non-base load standards based upon use of clean fuels.	5.1.7.1
State Regulations (CARB)		
CHSC 44300 et seq.	The MREC will determine applicability, and prepare inventory plans and reports as required.	5.1.7, 5.1.7.1
CHSC 41700	The VCAPCD PTC will ensure that no public nuisance results from operation of facility.	5.1.7.1, 5.1.7.2
Gov. Code 65920 et seq.	Pursuant to the Permit Streamlining Act, the Mission Rock believes the MREC is a “development project” as defined, and is seeking approvals as applicable under the Act.	n/a
Local Regulations (VCAPCD)		
Rule 23, Permit Exemptions	The 6 cell wet SAC is exempt from permit, but must meet the basic permit provisions of Rule 10 (Loss of Exemption).	5.1.7.1
Rule 50 -Visible Emissions	Limits visible emissions to Ringelmann 1 for periods greater than 3 minutes in any hour.	5.1.7.1
Rule 51-Nuisance	Prohibits the discharge of pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage businesses or property.	5.1.7.1
Rule 54-Sulfur Compounds	Prohibits sulfur emissions as SO_2 in excess of 300 ppmv (15 percent O_2), and prohibits offsite impacts of SO_2 above 0.25 ppm (1 hr avg) and 0.04 ppmv (24 hr avg).	5.1.7.1
Rule 55-Fugitive Dust Control	Requires control of fugitive dust from construction activities including track-out emissions, also prohibits visible dust emissions beyond the property line.	5.1.7.1
Rule 57.1-PM Emissions from Fuel Burning Eq.	Limits PM emissions from fuel combustion to <= 0.12 lbs/mmbtu.	5.1.7.1
Rule 64-Sulfur Content of Fuels	Limits gaseous fuel sulfur to <= 50 gr S/100scf, and liquid fuel sulfur content to <= 0.5 percent weight.	5.1.7.1
Rule 72-NSPS	See Federal LORS Section of table.	5.1.7.1

Table 5.1-27 Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Rule 73-NESHAPs	See Federal LORS Section of table.	5.1.7.1
Rule 79.4-Stationary IC Engines	Limits NO_x, CO, and ROC emissions from stationary IC engines greater than 50 bhp. Emergency IC engines operating <= 50 hours/year for testing and maintenance, and <= 200 hours/year for any purpose is exempt from the rule emissions limits.	5.1.7.1
Rule 74.23-Stationary Gas Turbines	Limits NO_x from turbines >=10 MW, firing gas fuels and using SCR to a ppm value calculated by (9XEFF/25). The proposed turbines will meet these NO_x requirements. In addition the rule requires compliance with an NH3 slip limit of 20 ppmv. The proposed ammonia slip limit for the turbines is 5 ppmv.	5.1.7.1

5.1.7.1 Specific LORS Discussion

Federal LORS

EPA implements and enforces the requirements of many of the federal air quality laws. EPA has adopted the following stationary source regulatory programs in its effort to implement the requirements of the CAA:

- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- PSD
- New Source Review (NSR)
- Title IV: Acid Rain/Deposition Program
- Title V: Operating Permits Program
- CAM Rule

National Standards of Performance for New Stationary Sources - 40 CFR Part 60, Subparts KKKK and IIII

The NSPS program provisions limit the emission of criteria pollutants from new or modified facilities in specific source categories. The applicability of these regulations depends on the equipment size or rating; material or fuel process rate; and/or the date of construction, or modification. Reconstructed sources can be affected by NSPS as well. Applicability of Subpart KKKK to the proposed new turbine supersedes applicability of Subpart GG. Compliance with BACT will insure compliance with the emissions limits of Subpart KKKK. Subpart IIII is expected to apply to the proposed fire pump engine. Compliance with the EPA and CARB tiered emissions standards, and the CARB/VCAPCD ATCM for stationary CI engines will insure compliance with IIII.

National Emission Standards for Hazardous Air Pollutants - 40 CFR Part 63

The NESHAPs program provisions limits hazardous air pollutant emissions from existing major sources of HAP emissions in specific source categories. The NESHAPs program also requires the application of maximum achievable control technology (MACT) to any new or reconstructed major source of HAP emissions to minimize those emissions. Subpart YYYY will apply to the proposed turbine. The emissions provisions of Subpart YYYY are currently subject to “stay” by EPA. Notwithstanding the foregoing, the proposed turbine is expected to comply with the emissions provisions.

PSD Program - 40 CFR Parts 51 and 52

The PSD program requires the review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies only to pollutants for which ambient concentrations do not exceed the corresponding NAAQS. The PSD program allows new sources of air pollution to be constructed, and existing sources to be modified, while maintaining the existing ambient air quality levels in the MREC region and protecting Class I areas from air quality degradation. The facility will *not* trigger the PSD program requirements.

NSR - 40 CFR Parts 51 and 52

The NSR program requires the review and permitting of new or modified major stationary sources of air pollution to allow industrial growth without interfering with the attainment of AAQS. NSR applies to pollutants for which ambient concentrations exceed the corresponding NAAQS. The AFC air quality analysis complies with all applicable NSR provisions.

Title IV - Acid Rain Program - 40 CFR Parts 72-75

The Title IV program requires the monitoring and reduction of emissions of acid rain compounds and their precursors. The primary source of these compounds is the combustion of fossil fuels. Title IV establishes national standards to limit SO_x and NO_x emissions from electrical power generating facilities. The proposed new turbines will be subject to Title IV, and will submit the appropriate applications to the air District as part of the PTC application process. The MREC will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on the MREC.

Title V - Operating Permits Program - 40 CFR Part 70

The Title V program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. Title V applies to major facilities, acid rain facilities, subject solid waste incinerator facilities, and any facility listed by EPA as requiring a Title V permit. Title V application forms applicable to the proposed new facility will be submitted pursuant to the District Title V permitting rule timeframes.

CAM Rule - 40 CFR Part 64

The CAM rules require facilities to monitor the operation and maintenance of emissions control systems and report malfunctions of any control system to the appropriate regulatory agency. The CAM rule applies to emissions units with uncontrolled potential to emit levels greater than applicable major source thresholds. However, emission control systems governed by Title V operating permits requiring continuous compliance determination methods are exempt from the CAM rule. Since the MREC will be issued a Title V permit requiring the installation and operation of continuous emissions monitoring systems, the MREC will qualify for this exemption from the requirements of the CAM rule.

Toxic Release Inventory (TRI) Program - Emergency Planning and Community Right-to-Know Act

The TRI program as applied to electric utilities, affects only those facilities in Standard Industrial Classification (SIC) Codes 4911, 4931, and 4939 that combust coal and/or oil for the purpose of generating electricity for distribution in commerce must report under this regulation. The MREC SIC Code is 4911. However, the MREC will not combust coal and/or oil for the purpose of generating electricity for distribution in commerce. Therefore, this program does not apply to the MREC.

NSPS

NSPS are federal standards promulgated for new and modified sources in designated categories codified in 40 CFR Part 60. NSPS are emission standards that are progressively tightened over time in order to achieve ongoing air quality improvement without unreasonable economic disruption. The NSPS impose uniform requirements on new and modified sources throughout the nation. The format of the standard can vary from source to source. It can be a numerical emission limit, a design standard, an equipment standard, or a work practice standard. Primary enforcement responsibility of the NSPS rests with EPA, but this authority has delegated to the VCAPCD, which is enforced through Regulation 9.

Subpart A General Provisions

Any source subject to an applicable standard under 40 CFR Part 60 is also subject to the general provisions of Subpart A. Because the MREC is subject to Subparts IIII and KKKK, the requirements of Subpart A will also apply. The MREC operator will comply with the applicable notifications, performance testing, recordkeeping and reporting outlined in Subpart A.

Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines that commence construction after July 11, 2005. Relevant to the MREC, the rule applies to the fire water pump CI engine as follows:

(i) Non-fire, water pump engines manufactured after April 1, 2006;
(ii) Fire water pump engines with less than 30 liters per cylinder manufactured after 2009; or
(iii) Fire water pump engines manufactured as a certified National Fire Protection Association fire water pump engine after July 1, 2006.

For the purpose of this rule, “manufactured” means the date the owner places the order for the equipment. Based on the timeline projected for obtaining approval of the MREC, the applicant expects that the engines will be ordered (and thus manufactured) in 2016.

Owners and operators of fire water pump engines with a displacement of less than 30 liters per cylinder must comply with the emission standards listed for all pollutants. For model year 2016 or later 175-hp engines, the limits are 2.6 grams per horsepower-hour (g/hp-hr) for CO, 3.0 g/hp-hr for non-methane hydrocarbons and NO_x combined, and 0.22 g/hp-hr for PM. The MREC will install a Tier 3 engine meeting these standards.

Subpart KKKK Standards of Performance for Stationary Combustion Turbines.

Subpart KKKK places emission limits of NO_x and SO_2 on new combustion turbines. For new combustion turbines firing natural gas with a rated heat input greater than 850 MMBtu/hr, NO_x emissions are limited to 15 ppm at 15 percent O_2 of useful output (0.43 pounds per megawatt-hour [lb/MWh]).

SO_x emissions are limited by either of the following compliance options:

1. The operator must not cause to be discharged into the atmosphere from the subject stationary combustion turbine any gases which contain SO_2 in excess of 110 ng/J (0.90 lb/MWh) gross output, or

2. The operator must not burn in the subject stationary combustion turbine any fuel which contains total potential sulfur emissions in excess of 0.060 lbs SO_2/MMBtu heat input. If the turbine simultaneously fires multiple fuels, each fuel must meet this requirement.

As described in the BACT section, the MREC will use a SCR system to reduce NO_x emissions to 2.0 ppm and pipeline natural gas to limit SO_2 emissions to 0.0006 pounds per MMBtu to meet BACT requirements, which ensures that the MREC will satisfy the requirements of Subpart KKKK.

NSPS Part 60 (Subpart TTTT) GHG Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units.

In January, 2014, EPA re-proposed the standards of performance regulating CO_2 emissions from new affected fossil-fuel-fired generating units, pursuant to Section 111(b) of the CAA. These standards were adopted in final form by EPA on August 3, 2015. The new standards would be 1,100 lbs CO_2/MWh (gross energy output on a 12 operating month rolling average basis for base loaded units), while non-base load units would have to meet a clean fuels input-based standard. The determination of base versus non-base load would be on a sliding scale that considers design efficiency and power sales.

Within Subpart TTTT, base load rating is defined as maximum amount of heat input that an Electrical Generating Unit (EGU) can combust on a steady state basis at ISO conditions. For stationary combustion turbines, base load rating includes the heat input from duct burners. Each EGU is subject to the standard if it burns more than 90 percent natural gas on a 12-month rolling basis, and if the EGU supplies more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis. Affected EGUs supplying equal to or less than the design efficiency times the potential electric output as net electric sales on a 3 year rolling average basis are considered non-base load units and are subject to a heat input limit of 120 lbs CO_2/MMBtu. Each affected 'base load' EGU is subject to the gross energy output standard of 1,000 lbs of CO_2/MWh unless the Administrator approves the EGU being subject to a net energy output standard of 1,030 lbs CO_2/MWh. The MREC turbines are not considered base load units, but rather non-base load units, and as such they must meet and will meet the heat input limit of 120 lbs CO_2/mmbtu as specified in 40 CFR 60.5508-60.5580, Subpart TTTT, Table 2.

State LORS

CARB's jurisdiction and responsibilities fall into the following five areas;

- Implement the state's motor vehicle pollution control program
- Administer and coordinate the state's air pollution research program
- Adopt and update the state's AAQS
- Review the operations of the local air pollution control districts (VCAPCDs) to insure compliance with state laws
- Review and coordinate preparation of the State Implementation Plan

Air Toxic "Hot Spots" Act – H&SC §44300-44384

The Air Toxics "Hot Spots" Information and Assessment Act requires the development of a statewide inventory of Toxic Air Contaminants (TAC) emissions from stationary sources. The program requires affected facilities to, prepare an emissions inventory plan that identifies relevant TACs and sources of TAC emissions, prepare an emissions inventory report quantifying TAC emissions, and prepare an HRA, if necessary, to quantify the health risks to the exposed public. Facilities with significant health risks must notify the exposed population, and in some instances must implement risk management plans to reduce the associated health risks.

Public Nuisance – H&SC § 41700

Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or which endanger the comfort, repose, health, or safety of the public, or that damage business or property.

Local Air District LORS-VCAPCD

VCAPCD Prohibitory Rules – General and Source Specific Regulations

The general prohibitory rules of the VCAPCD applicable to the MREC are summarized below.

Rule 23 – Exemptions from Permit Requirements

The proposed wet SAC is currently exempt from the permitting requirements of the VCAPCD. Should this exemption change, the requirement s of Rule 10 to apply for a permit to operate would apply.

Rule 50 – Visible Emissions.

Prohibits visible emissions as dark as, or darker than, Ringelmann No. 1 for periods greater than 3 minutes in any hour. The use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 51 – Nuisance.

Prohibits a facility from discharging air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property. Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 54 – Sulfur Compounds.

Prohibits sulfur emissions, calculated as SO_2, in excess of 300 ppmv at 15 percent oxygen, and prohibits offsite ambient SO_2 impacts above 0.25 ppmv (1-hour average) and 0.04 ppmv (24-hour average). Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 55 – Fugitive Dust Control.

Requires the control of dust emissions during construction activities and prohibits visible dust emissions beyond the property line; also requires mitigation of track-out onto public roadways and includes other dust mitigation requirements.

Rule 57.1 – Particulate Matter Emissions from Fuel Burning Equipment.

Prohibits PM emissions above 0.12 pound per million British thermal units (lb/MMBtu) for fuel burning equipment. Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 64 – Sulfur Content of Fuels.

Prohibits the burning of gaseous fuel with a sulfur content of more than 50 gr/100 scf and liquid fuel with a sulfur content of more than 0.5 percent sulfur by weight. Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 72 – New Source Performance Standards.

Requires units to comply with the applicable sections of the federal NSPS. See subpart KKKK analysis.

Rule 73 – National Emission Standards for Hazardous Air Pollutants.

Requires units to comply with the applicable sections of the federal NESHAP program.

Rule 74.9 – Stationary Internal Combustion Engines.

Rule limits CO, NO_x, and ROC emissions from stationary reciprocating internal combustion engines rated greater than or equal to 50 bhp. Emergency equipment operating less than or equal to 50 hours per year for testing or maintenance purposes and less than or equal to 200 hours per year for any purpose is exempt from the emission limits of Rule 74.9.

Rule 74.23 – Stationary Gas Turbine.

Limits NO_x emissions from stationary gas turbines rated greater than or equal to 10 megawatts (MW) with post-combustion controls to 9 ppmv (at 15 percent oxygen, corrected for efficiency). The NO_x emissions from the proposed turbines will be limited to 2.5 parts per million (ppmvc), and thus complies with this rule. Use of natural gas, low-NO_x burner technology, and SCR in the turbines is expected to establish compliance with the rule provisions.

GHG-Climate Change and Global Warming

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth.

Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming. According to the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment, it is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic forcings together.

State law defines GHG to include the following: CO_2, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code §38505[g]). The most common GHG that results from human activity is CO_2, followed by methane and N_2O.

Legislative Action

Assembly Bill (AB) 1493 (June 2002)

On July 22, 2002, the Governor of California signed into law AB 1493, a statute directing the CARB to "develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." The statute required CARB to develop and adopt the regulations no later than January 1, 2005. AB 1493 allows credits for reductions in GHG emissions occurring before CARB's regulations become final (i.e., an early reduction credit). AB 1493 also required that the California Climate Action Registry, in consultation with the CARB, shall adopt procedures for the reporting of reductions in GHG emissions from mobile sources no later than July 1, 2003.

Executive Order S-3-05 (June 2005)

On June 1, 2005, the Governor announced GHG emission reduction targets for California. The Governor signed Executive Order S-3-05 which established GHG emission reduction targets and charged the secretary of the California Environmental Protection Agency (Cal-EPA) with the coordination of the oversight of efforts to achieve them. The Executive Order establishes three targets for reducing global warming pollution:

- Reduce GHG emissions to 2000 emission levels by 2010;
- Reduce GHG emissions to 1990 emission levels by 2020; and,
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

Global Warming Solutions Act of 2006 (AB 32)

In August 2006, the California legislature passed AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires the state to reduce statewide greenhouse gas emissions to 1990 levels by 2020 and authorizes California resource agencies to establish a comprehensive program of regulatory and market mechanisms to achieve reductions in GHG emissions (ARB, 2006). ARB has promulgated a Cap-and-Trade Regulation, which requires covered entities, including electricity generators, petroleum refiners, large manufacturers and importers of electricity, to hold and surrender compliance instruments in an amount equivalent to their GHG emissions. Compliance instruments include allowances issued by ARB and linked jurisdictions, which currently include Québec, and offset credits.

Currently, the Cap-and-Trade Regulation requires reductions through 2020, although the ARB is considering adoption of amendments that would continue implementation of the Cap-and-Trade Program as an element of the State's plan that will be submitted to the U.S. Environmental Protection Agency pursuant to its Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662 (Oct. 23, 2015) (Clean Power Plan). The MREC is anticipated to be subject to the Cap-and-Trade Regulation and will comply with it.

Legislation failed to pass in the first year of the two-year legislative session that would have set longand mid-term targets for the State to achieve GHG reductions consistent with Governor Schwarzenegger's and Governor Brown's goals established by executive order (80% below 1990 levels by 2050 and 40% below 1990 levels by 2030, respectively). However, Governor Brown's executive order (B-30-15) charges ARB with updating the Scoping Plan developed pursuant to AB 32 to express the 2030 goal and directed all state agencies with jurisdiction over GHG emissions to implement measures to reduce emissions and thereby achieve the 2030 and 2050 targets. ARB has begun the Scoping Plan update process and is anticipated to continue implementation of the Cap-and-Trade Program to achieve these targets.

Senate Bill (SB) 1368 (August 2007)

In addition to AB 32, Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) was signed into law on August 2007. The law limits long-term investments in and procurement of electricity from base load generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the CPUC. In response, the CEC has designed regulations that establish a standard for base load generation owned by, or under long-term contract to publicly owned utilities, of 1,100 lb CO_2/MWh. A base load generation is defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent. The permitted capacity factor for the MREC will be approximately 29 percent. Therefore, as a non-baseload facility, procurement of electricity from the MREC pursuant to a long-term contract would not be subject to the emissions performance standard.

5.1.7.2 Agency Jurisdiction and Contacts

Table 5.1-28 presents data on the following:

- Air quality agencies that may or will exercise jurisdiction over air quality issues resulting from the power facility
- The most appropriate agency contact for the MREC,
- Contact address and phone information
- The agency involvement in required permits or approvals

Table 5.1-28 Agencies, Contacts, Jurisdictional Involvement, Required Permits For Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
CEC	Chris Davis 1516 Ninth St. Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
VCAPCD	Kerby Zozula Manager, Eng. Division VCAPCD 669 County Square Dr. Ventura, CA. 93003	Prepares DOC for CEC, Issues VCAPCD ATC and Permit to Operate, Primary air regulatory and enforcement agency.	DOC will be prepared subsequent to AFC submittal. AFC serves as the ATC application per Rule 26.9.

Table 5.1-28 Agencies, Contacts, Jurisdictional Involvement, Required Permits For Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
	(805) 645-1421		
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.
EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974	Oversight of all AQMD programs, including permitting and enforcement programs. PSD permitting authority for VCAPCD.	EPA Region 9 staff will receive a copy of the DOC. EPA Region 9 staff will have opportunity to comment on draft ATC.

DOC = Determination of Compliance

5.1.7.3 Permit Requirements and Schedules

An ATC application is required in accordance with the VCAPCD rules. Pursuant to VCAPCD Rule 26.9, the AFC is considered to be equivalent to the AQMD ATC permitting application. The required district permitting forms have been submitted separately to the VAPCD. These application forms in conjunction with the AFC comprise the required AQMD permitting application package. The required Title V application will be submitted within 12 months of the commencement of facility operations per the VCAPCD rules.

5.1.8 References

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APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Section 5.1, Air Quality (REDLINED)

5.1 Air Quality

5.1.1 Introduction

This section presents the methodology and results of an analysis performed to assess potential impacts of airborne emissions from the construction and operation of the MREC and the Project's compliance with applicable air quality requirements. Section 5.1.1 presents the introduction, applicant information, and the basic VCAPCD rules applicable to the MREC. Section 5.1.2 presents the MREC description, both current and proposed. Section 5.1.3 presents data on the emissions of criteria and air toxic pollutants from the MREC. Section 5.1.4 discusses the BACT evaluations for the MREC. Section 5.1.5 presents the air quality impact analysis for the MREC. Section 5.1.6 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.1.6 presents agency contacts, and Section 5.1.6 presents permit requirements and schedules. Section 5.1.7 contains references cited or consulted in preparing this section. Appendix 5.1A contains the support data for the emissions calculations. Appendix 5.1B presents the air quality impact analysis support data. Appendix 5.1C presents the dispersion modeling protocol. Appendix 5.1D presents the risk assessment support data. Appendix 5.1E delineates the estimated construction period emissions. Appendix 5.1F presents the BACT determination support data. Appendix 5.1G presents regional emissions inventory data. Appendix 5.1H presents the mitigation strategy support data.

The MREC is proposing to construct and operate a 275 MW (nominal) natural gas-fired simple-cycle power plant. The MREC is planning to operate as a peaking power plant and is proposed to operate up to approximately 2,500 hours per year, with an expected facility capacity factor of up to 29 percent.

The MREC will consist of the following:

- Installation of five LM6000 PG Sprint gas turbines which will be operated in simple-cycle mode
- A California Air Resources Board (CARB)-certified Tier 3 diesel-fueled fire pump
- A six (6) cell wet surface air condenser
- Necessary support systems and processes

The MREC design will incorporate the air pollution emission controls designed to meet VCAPCD BACT/LAER determinations. These controls will include water injection in the turbine combustors to limit NO_x production, SCR with aqueous ammonia for additional NO_x control along with an oxidation catalyst to control carbon monoxide (CO) and reactive organic compounds (ROC) emissions. The fuels to be used will include pipeline quality natural gas in the turbines and California ultra low-sulfur diesel fuel in the fire pump engine**.** The ammonia slip from the SCR system will be limited to 5 parts per million (ppm).

5.1.1.1 Regulatory Items Affecting New Source Review

The applicant is submitting the air quality impact analyses to the California Energy Commission (CEC). Pursuant to VCAPCD Rule 26.9 (Equivalency of AFC to Authority to Construct), "the APCO shall consider the AFC to be equivalent to an application for an Authority to Construct during the Determination of Compliance review, and shall apply all provisions of Rule 26 and all other District rules and regulations which apply to applications for an Authority to Construct".

The application includes discussions of emissions calculations, control technology assessments, regulatory review and modeling analysis which include impact evaluations for criteria and hazardous air pollutants.

The MREC is expected to result in emissions that will exceed the VCAPCD Rule 26.2 Major Facility significance thresholds for NO_x, and ROCs. No major source thresholds for particulate matter less than 10 or 2.5 micrometers in aerodynamic diameter (PM10/PM2.5), sulfur oxide (SO_x), or CO are stated in the VCAPCD NSR rules. BACT will be required for NOx, ROC, SOx, and PM10/PM2.5. Although not required by VCAPCD rules, BACT for CO will also be determined and implemented.

The emissions impacts associated with the Project are analyzed pursuant to VCAPCD and CEC modeling requirements. The air quality analysis will be conducted to demonstrate that impacts from NO_x, CO, SO_x, PM10 and PM2.5 will comply with the California and National Ambient Air Quality Standards (CAAQS/NAAQS) for the applicable averaging periods. Impacts from nearby sources (cumulative impacts) are also assessed for criteria pollutants.

The MREC will not trigger the Prevention of Significant Deterioration (PSD) permitting requirements, which would be required for simple cycle design with facility wide emissions equaling or exceeding 250 tons per year (tpy) for any criteria pollutant. Worst-case annual emissions are summarized in Table 5.1-1 below.

Table 5.1-1 Facility PTE Summary

Pollutant	MREC, tpy	VCAPCD Rule 26.1 Major Source Thresholds, tpy	VCAPCD Rule 26.2 Offsets, tpy	EPA Major PSD Source Thresholds (tpy)*
NO_x	28.17	25	5	250
CO	32.32	-	-	250
ROC (VOC)	4.98	25	5	250
SO_x	~~1.35~~3.69	-	15	250
PM10	13.09	-	15	250
PM2.5	13.09	-	15	250
CO_2e	410,360	-	-	75,000*

*PSD major source review would be triggered for simple cycle turbines at 250 tpy, from which the major modification thresholds are then used for the remaining pollutants. PSD review is not triggered solely based on GHG emissions. If the MREC triggered PSD for any non-GHG pollutant, then PSD would be triggered if the CO_2e emissions were equal or greater than 75,000 tpy.

PTE = potential to emit

PSD = Prevention of Significant Deterioration

Although a regulatory compliance analysis (LORS) is presented in Section 5.1.6, there are several VCAPCD regulations that directly affect the application and review process. These regulations include:

- VCAPCD New Source Review (NSR) Rule 26.2 requires that BACT be applied to all proposed new or modified sources which will result in any emissions increase of NO_x, ROC, PM10, or SO_x.
- VCAPCD Rule 26.11, indicates that all emission reduction credits proposed for use by the new source must be evaluated prior to the issuance of the district Authority to Construct (ATC).
- VCAPCD Rule 26.2 requires that an air impact analysis be prepared to insure the protection of state and federal ambient air quality standards.
- VCAPCD Rule 26.2, also requires that prior to the issuance of the ATC that all major stationary sources owned or operated by the Mission Rock, 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).
- The MREC will not require a PSD permit, per Rule 26.13 or the federal PSD regulations.

5.1.2 Project Description

5.1.2.1 MREC Site Location

The MREC will be located in Ventura County within the South Central Coast Air Basin. The MREC site is situated approximately ~~3~~ 4 miles southwest of downtown Santa Paula, California, between Mission Rock Road and Shell Road. The MREC lies south of Highway 126 (Santa Paula Highway), and approximately 2.5 miles northeast of the junction of Highway 126 and Highway 118. SPZ lies approximately 3 miles to the northeast, and the Ventura County Jail lies approximately 900 feet due west of the MREC site. See Section 1.2 for detailed location maps.

5.1.2.2 Project Equipment Specifications

The MREC will consist of the following major equipment.

- Five LM6000 PG Sprint Gas Turbines with inlet chilling
- SCR to control emissions of NO_x
- Oxidation Catalyst to control emissions of CO and VOCs
- One diesel engine powered fire pump
- A six (6) cell wet surface air condenser with drift eliminators (for inlet chilling)

All power from the facility will be delivered to the California power grid under the control of the CAISO.

The turbine equipment output specifications are summarized in Table 5.1-2 as follows:

Table 5.1-2 Combustion Turbine Equipment Output Specifications

Parameter	Minimum Cold Day (30°F)	ISO Day (59°F)	Maximum Hot Day (96°F)
Case Number	1	9	29
Net Power, kW (5 turbines)	281,125	276,676	272,083
Net Heat Rate, btu/kW-hour (HHV)	10,069	10,138	10,300
Gross Gas Turbine Power, kW (5 turbines)	290,445	286,680	286,510

Ref: GE Performance Data supplied by the Mission Rock, see Appendix 5.1A.

HHV (1021 btu/scf) as specified by GE in the fuel analysis.

Equipment specifications are summarized as follows:

Combustion Turbines (5)

- Manufacturer: GE
- Model: LM6000 PG Sprint
- Fuel: Natural gas
- Heat Input: 561.0 MMBtu/hr HHV (Case 9-ISO day)
- 566.1 MMBtu/hr HHV (Case 1-Cold day)
- Maximum Fuel consumption: <=2.773 mmscf per hour (Case 1, cold day)
- Exhaust flow: <=1,197,006 lbs/hr (Case 1, cold day)
- Exhaust temperature: 850-870 degrees Fahrenheit (°F) at the stack exit (Dependent upon ambient temperature of atmosphere and turbine load)

Fire Pump (1)

- Manufacturer: Clarke or equivalent (Tier 3)
- Fuel: Ultra low sulfur diesel
- Horsepower: 220 brake horsepower

Wet Surface Air Condenser (1)

- 6 cell Wet ~~Sac~~SAC
- Circulation rate: ~10675 GPM (all cells)
- Max TDS: ~1700 mg/l
- Max Concentration Cycles: 5
- Drift Eliminator Efficiency: 0.001%

Fuels

Natural gas will be the only fuel used by the Project to generate electricity, with the exception of the emergency diesel fire pump, which will fire ultra-low sulfur diesel fuel. The typical natural gas composition is shown in Appendix 5.1A. Natural gas combustion results in the formation of NO_x, CO, ROCs, SO_2, PM10, and PM2.5. Because natural gas is a clean-burning fuel, there will be minimal formation of combustion PM10, PM2.5, and SO_2.

The fuel used for the MREC is similar to the fuels used on similar simple-cycle power generation facilities. Table 5.1-3 presents a fuel use summary for the facility. Fuel use values are based on the maximum heat rating of each system, fuel specifications, and maximum operational scenario. Fuel analysis data for both natural gas and diesel fuel is presented in Appendix 5.1A.

- The natural gas will meet the CPUC grade specifications. The diesel fuel sulfur will be limited to 15 ppm, and will meet all California low sulfur diesel specifications.

Table 5.1-3 Estimated Fuel Use Summary for the MREC

Source	Fuel	Per Hour (mmscf)	Per Day (mmscf)	Per Year (mmscf)
CT-1	Natural gas	0.5545	13.307	1373.65
CT-2	Natural gas	0.5545	13.307	1373.65
CT-3	Natural gas	0.5545	13.307	1373.65
CT-4	Natural gas	0.5545	13.307	1373.65
CT-5	Natural gas	0.5545	13.307	1373.65
Source	**Fuel**	**Per Hour, gallons**	**Per Day, gallons**	**Per Year, gallons**
Diesel Fire Pump	Diesel Fuel	11.2	11.2	582.4

Notes: Hourly and daily fuel use based on Case 1 (cold day), annual fuel use based on Case 9 (ISO day).

The fire pump will be tested up to 1 hour per day and 1 day per week, or 52 hours per year, per NFPA testing requirements. Max total annual operating hours will be <=200.

HHV of fuel is 1021 BTU/SCF (average)

Max turbine hours per day = 24 (including SU/SD hours). Max turbine hours per year (see Appendix 5.1A)

The MREC will only use pipeline quality natural gas in the turbines and ultra-low sulfur diesel fuel for the fire pump.

CT – Combustion Turbine

mmscf = million standard cubic feet

5.1.2.3 Climate and Meteorology

Ventura County covers an area of 1,873 square miles, including 43 miles of shoreline. The County is located northwest of Los Angeles County, with Kern County to the north, Santa Barbara County to the west, and the Pacific Ocean on the southwest. There are 411 acres of state beach parks. The Los Padres National Forest accounts for 860 square miles of the northern portion of the county (46 percent of the county's land mass). Elevation changes within the county from sea level to the highest point on Mount Pinos at 8,831 feet. Ventura County ranks 26th in land size among California's 58 counties.

There are ten incorporated cities: Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, Santa Paula, Simi Valley, Thousand Oaks and San Buenaventura (Ventura), the County seat.

Ventura County offers very diverse climates. Coastal areas offer a Mediterranean climate, while the northern half of the county is mountainous with a sub-alpine climate. Interior valleys offer a mild climate moderated by the daily sea breeze that progresses through and across the county beginning in the early morning at the coast and reaching the inland valleys by early afternoon. Ventura County's mountains, valleys, and seashore give the area six different microclimates. Ventura County does experience four different seasons. The difference between the seasons, although subtle, is the distinct weather patterns.

Ventura County's air quality is influenced by both local topography and meteorological conditions. Surface and upper-level wind flow varies both seasonally and geographically in the county and inversion conditions common to the area can affect the vertical mixing and dispersion of pollutants. The prevailing wind flow patterns in the county are not necessarily those that cause high ozone values. In fact, high ozone values are often associated with atypical wind flow patterns.

Meteorological and topographical influences that are important to air quality in Ventura County are as follows:

The semi-permanent high pressure that lies off the Pacific Coast leads to a limited average rainfall of 17.5 inches per year, with warm, dry summers and relatively damp winters. Maximum summer temperatures average about 70-75°F near the coast and in the high 80s to low 90s inland. During winter, average minimum temperatures range from the high 40s along the coast to the low 40s inland. Additionally, cool, humid, marine air causes frequent fog and low clouds along the coast, generally during the night and morning hours in the late spring and early summer. The fog and low clouds can persist for several days until broken up by a change in the weather pattern.

In the coastal and coastal valley portions of the county, the sea breeze (from sea to land) is typically west-southwesterly throughout the year except for the winter period which shows predominantly east-northeasterly winds (off shore). At night, the sea breeze weakens and is replaced by light land breezes (from land to sea). The alternation of the land-sea breeze cycle can sometimes produce a "sloshing" effect, where pollutants are swept offshore at night and subsequently carried back onshore during the day. This effect is exacerbated during periods when wind speeds are low.

The terrain around Point Conception (north of Ventura County), combined with the change in orientation of the coastline from north-south to east-west can cause counterclockwise circulation (eddies) to form east of the Point. These eddies fluctuate temporally and spatially, often leading to highly variable winds along the southern coastal strip as far south as the Ventura coastal area. Point Conception also marks the change in the prevailing surface winds from northwesterly to southwesterly as noted above.

Santa Ana winds are northeasterly winds that occur primarily during fall and winter, but occasionally in spring. These are warm, dry winds blown from the high inland desert that descend down the slopes of a mountain range. Wind speeds associated with Santa Ana's are generally 15-20 mph, though they can sometimes reach speeds in excess of 60 mph. During Santa Ana conditions, air emissions in Ventura County, and the South Coast Air Basin (the Los Angeles region) are moved out to sea. These pollutants can then be moved back onshore into Ventura County in what is called a "post-Santa Ana condition." The effects of the post-Santa Ana condition can be experienced throughout the county. Not all post-Santa Ana conditions, however, lead to high pollutant concentrations in Ventura County.

Upper-level winds (measured at Vandenberg Air Force Base once each morning and afternoon) are generally from the north or northwest throughout the year, but occurrences of southerly and easterly winds do occur in winter, especially during the morning. Upper-level winds from the south and east are infrequent during the summer. When they do occur during summer, they are usually associated with periods of high ozone levels. Surface and upper-level winds can move pollutants that originate in other areas into the county.

Surface temperature inversions (0-500 ft) are most frequent during the winter, and subsidence inversions (1000-2000 ft) are most frequent during the summer. Inversions are an increase in temperature with height and are directly related to the stability of the atmosphere. Inversions act as a cap to the pollutants that are emitted below or within them and ozone concentrations are often higher directly below the base of elevated inversions than they are at the earth's surface. For this reason, elevated monitoring sites will occasionally record higher ozone concentrations than sites at lower elevations. Generally, the lower the inversion base height and the greater the rate of temperature increase from the base to the top, the more pronounced effect the inversion will have on inhibiting vertical dispersion. The subsidence inversion is very common during summer along the California coast, and is one of the principal causes of air stagnation.

Poor air quality is usually associated with "air stagnation" (high stability/restricted air movement). Therefore, it is reasonable to expect a higher frequency of pollution events in those portions of the county where light winds are frequently observed, as opposed to those portions of the county where the prevailing winds are usually strong and persistent. The annual average wind speed derived from the approved meteorological data used in the impact analysis was 5.6 mph, with calm winds persisting for approximately 5.04 percent of the time on an annual basis.

As on the rest of the Pacific Coast, a dominant characteristic of spring and summer is the nighttime and early morning cloudiness. Low clouds form regularly and frequently extend inland over the coastal valleys and foothills, but they usually dissipate during the morning and the afternoons are generally clear.

Considerable fog occurs along the coast, but the amount decreases with distance inland. The fall and winter months are usually the foggiest. Thunderstorms are rare, averaging about three a year in the regional area. The sunshine is plentiful for a marine location, with a marked increase toward the interior. Ventura County on average experiences 273 sunny days per year.

Additional climate and historical meteorological data are presented in Appendix 5.1B for the Ventura County regional area and for the following stations: Ojai (046399), and Santa Paula (047957) (WRCC 2014. The meteorological data supplied by the VCAPCD as representative of the site are presented in electronic form on the CD-ROM provided.

5.1.3 Emissions Evaluation

5.1.3.1 Facility Emissions and Permit Limitations

The approximately 9.8-acre MREC site is currently used as a vehicle salvage/dismantling yard. There are no current air pollution sources on the proposed site (except for motor vehicles), and there are no facilities on the current site that are permitted by the VCAPCD.

5.1.3.2 Facility Emissions

Installation and operation of the MREC will not result in emissions greater than 250 tpy for any criteria pollutants, and as such the MREC will be considered a minor NSR source for NO_x, CO, ROC, and PM10/PM2.5 under federal rules. The MREC will not trigger the requirements of the Federal PSD program since the emissions of one or more criteria pollutants will not exceed the 250 tpy major source applicability thresholds. The applicability determination for PSD is based on the post commissioning year emissions. The facility is expected to be a major source under the VCAPCD NSR rules for NO_x only. Criteria pollutant emissions from the new combustion turbines and auxiliary equipment are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 5.9. Backup data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The hourly, daily and annual emissions for all criteria pollutants are based upon a series of worst-case assumptions for each pollutant. The maximum hourly emissions are based on cold day conditions assuming a startup event with the remainder of the startup hour at steady state compliant conditions. The daily operation assumes 24 hours of operation with a maximum of two starts and two shutdowns. The worst-case annual emissions are based upon annual conditions (Case 14), the maximum projected hours of operation, including startups and shutdowns.

The applicant would propose that the facility limits be based on total short-term and annual emissions rather than operational hours or operational events. The turbines will be required to install CEMS for NO_x and CO. Hourly fuel use monitoring along with source test requirements will establish a compliance method to allow for continuous tracking of all emissions at the MREC. For example, the maximum annual emissions of NO_x at 28.13 tons per year would establish the turbines' PTE. Mission Rock would propose and accept hourly, daily and annual emission limits for this pollutant, but would propose that the permit would not contain any limit on the number of start events or hours of operation as the established emission limits would be continuously monitored. This way, the facility operational profiles would be solely based on PTE rather than hours which would allow for a flexible response to changing power market conditions. Thus, the short-term and annual emissions limits would establish the facility PTE rather than any individual operational profiles. This type of emissions and compliance strategy is not new, and has been implemented on numerous CEC approvals as well as district permits.

During the first year of operation, plant commissioning activities, which are planned to occur over an estimated 213 operating hours (per turbine) during the first year of operation, will have higher hourly and daily emission profiles than during normal operations in the subsequent years of operation. The emissions during the first year of operation are presented below and were included in the air quality modeling analysis along with subsequent post commissioning yearly emissions.

The MREC will be a major NSR source as defined by the VCAPCD Rule 26.2 and will be subject to VCAPCD requirements for emission offsets and air quality modeling analyses for criteria pollutants and toxics. Mission Rock has prepared an air quality emissions and impact analysis to comply with the VCAPCD and the CEC regulations. The modeling analysis includes impact evaluations for those pollutants shown in Table 5.1-4 and the CEC requirements for evaluation of MREC air quality impacts. The emissions presented in Table 5.1-4 are the worst-case potential emissions on an annual basis.

Table 5.1-4 Significant Emissions Threshold Summary

Pollutant	MREC Cumulative Increase, tpy	Federal/ State Attainment		Federal and VCAPCD Rule 26.1 Major Source Thresholds PSD/NNSR, tpy		VCAPCD Rule 26.2 Offsets, tpy	Major Source (Federal NSR/PSD)	Major Source VCAPCD Rule 26.1
NO_x	28.17	Y	Y	250	25	5	No/No	Y
SO_2	~~1.35~~3.69	Y	Y	250	-	15	No/No	N
CO	32.32	Y	Y	250	-	-	No/No	N
PM10	13.09	Y	N	250	-	15	No/No	N
PM2.5	13.09	Y	N	250	-	15	No/No	N
ROC (Ozone)	4.98	N	N	250	25	5	No/No	N

Table 5.1-4 Significant Emissions Threshold Summary

Pollutant	MREC Cumulative Increase, tpy	Federal/ State Attainment		Federal and VCAPCD Rule 26.1 Major Source Thresholds PSD/NNSR, tpy		VCAPCD Rule 26.2 Offsets, tpy	Major Source (Federal NSR/PSD)	Major Source VCAPCD Rule 26.1
CO_2e	410,360	-	-	100,000	-	75,000	No/No	N

Installation and operation of the MREC will be considered a major source under the VCAPCD 26.1 rule for NO_x and will trigger the offset requirements under VCAPCD Rule 26.2 for NO_x and ROC. The MREC will not trigger the major new source thresholds for PSD. Criteria pollutant emissions from the new combustion turbines, and emergency equipment, are delineated in the following sections, while emissions of hazardous air pollutants are delineated in Section 4.5. Support data for both the criteria and hazardous air pollutant emission calculations are provided in Appendix 5.1A.

The emissions calculations presented in the application represent the highest potential emissions based on the proposed operational scenarios.

The proposed mitigation, through the surrender of emission reduction credits as presented in Appendix 5.1H is based on the maximum operational profile for the MREC. There may be a lack of available ERCs for purchase from the existing and surrounding air basins to satisfy the maximum operational scenario for affected pollutants. If this case arises, then MREC is proposing to lower the operational emissions to a level based on the available emission offsets until such time that the offsets are available. Lowering the emissions would also lower the corresponding air quality impacts. The air quality impact analysis presented herein is based on the maximum proposed operational scenario.

5.1.3.3 Normal Operations

Operation of the proposed process and equipment systems will result in emissions to the atmosphere of both criteria and toxic air pollutants. Criteria pollutant emissions will consist primarily of NO_x, CO, ROCs, SO_x, total suspended particulates (TSP), PM10, and PM2.5. Air toxic pollutants will consist of a combination of toxic gases and toxic PM species. Table 5.1-5, lists the pollutants that may potentially be emitted from the MREC.

Table 5.1-5 Potentially Emitted Criteria and Toxic Pollutants

Criteria Pollutants	Toxic Pollutants (cont'd)
NO_x	
CO	1-3 Butadiene
ROCs	Ethylbenzene
SO_x	Formaldehyde
PM10/2.5	Hexane (n-Hexane)
GHGs	Lead
CO_2e	Manganese
Toxic Pollutants	Mercury
Ammonia	Naphthalene
PAHs	Nickel
Acetaldehyde	Propylene
Acrolein	Propylene Oxide
Arsenic	Selenium
Benzene	Silica
Beryllium	Toluene
Cadmium	Vanadium
Chromium	Xylene
Copper	Diesel Particulate Matter

PAHs = polynuclear (or polycyclic) aromatic hydrocarbons

5.1.3.4 Criteria Pollutant Emissions

Tables 5.1-6 through 5.1-11 present data on the criteria pollutant emissions expected from the facility equipment and systems under normal operating scenarios. The maximum hourly emissions are based on Case 1 (30°F day) incorporating a startup event. A startup event is defined as a one-half hour event with the turbine stack emissions in BACT compliance at the end of the 30-minute startup, with the reminder of the startup hour at steady-state compliance conditions. The worst case day for emissions is defined as two startup events, two shutdown events, and 22.7 hours of full load operation (Case 1, cold day) for a total of 24 hours of operation.

Table 5.1-6 Combustion Turbine Emissions (Startup and Steady State Operation Per Turbine)

Pollutant	Emission Factor and Units	Max Hour Emissions at Startup lb/hr	Max Hour Emissions Steady State (Cold Day) lb/hr[a]	Max Hour Emissions Steady State (ISO Day) lbs/hr[b]	Max Daily Emissions lbs
NO_x	See Appendix 5.1A	11.65	5.10	4.04	136.37
CO	See Appendix 5.1A	7.99	4.97	4.92	127.42
ROC	See Appendix 5.1A	1.36	0.71	0.71	20.12
SO_x	See Appendix 5.1A	0.59	0.59	0.~~20~~59	14.16
PM10/PM2.5	See Appendix 5.1A	2.0	2.0	2.0	48.0
Ammonia	5.0 ppmvd	~~1.89~~3.78	3.77	3.74	90.50
CO_2e	116.89 lb/mmbtu		NA		

Table 5.1-6 Combustion Turbine Emissions
(Startup and Steady State Operation Per Turbine)

Pollutant	Emission Factor and Units	Max Hour Emissions at Startup lb/hr	Max Hour Emissions Steady State (Cold Day) lb/hr[a]	Max Hour Emissions Steady State (ISO Day) lbs/hr[b]	Max Daily Emissions lbs

[a] Cold day – Case 1

[b] ISO Day-Case 9

lb/hr = pound per hour

Table 5.1-7 Startup and Shutdown Emissions (per event per turbine)

Parameter	Startup	Shutdown
NOx, lbs/event	9.1	1.2
CO, lbs/event	5.5	1.8
ROC, lbs/event	1.0	1.0
PM10/PM2.5 lbs/event	1.0	.30
SO_x, lbs/event	.~~13~~30	.~~04~~10
Event duration, mins	30	9
Estimated Number per year	150	150

Table 5.1-8 Five Combustion Turbine Emissions (Full Load, Startup and Shutdown, ~~Whichever~~whichever is Greater) for the Non-Commissioning Year

Pollutant	Emission Factor	Max Hour Emissions lbs (5 Turbines)	Max Daily Emissions lbs (5 Turbines)	Max Annual Emissions tons (5 Turbines)
NO_x	N/A	58.25	681.85	28.13
CO	N/A	39.93	637.10	32.29
ROCs	N/A	6.76	100.59	4.98
SO_x	N/A	2.95	70.82	~~1.35~~3.69
PM10/PM2.5	N/A	10.0	240.00	12.5
NH_3	N/A	18.85	452.50	22.46
CO_2e	N/A	NA	NA	410,296 (372,972 MT/yr)

See Appendix 5.1A, for detailed emissions and operational data.

Maximum hour based on five turbines in cold startup, except for PM10/PM2.5 and SO_x which is based on Case 1 operation.

Emergency equipment readiness testing will not occur during a turbine startup or run hour.

Maximum day is based on 2 startups and shutdowns, with remaining hours at Case 1 (cold day) operation.

Maximum annual NO_x, SO_x, CO, ROC, NH3, CO_2e and PM10/PM2.5 based on Case 9 (ISO Conditions).

Table 5.1-9 Diesel Fire Pump Engine and Wet SAC Emissions

220 BHP Fire Pump (Tier 3)				
Pollutant	**g/hp-hr**	**Max Hour Emissions lbs**	**Max Daily Emissions lbs**	**Max Annual Emissions tons**
PM10/PM2.5	.15	0.07	0.07	0.002
NO_x	2.8	1.36	1.36	0.035
SO_x	0.0015percent by weight	0.0023	0.0023	0.00006
CO	2.6	1.26	1.26	0.033
ROC	0.2	0.10	0.10	0.003
CO_2e	-	-	-	6.622 (6.02 MT)
Wet SAC				
PM10/PM2.5	-	0.45	10.88	0.57

Notes:

SO_x emissions based on fuel S content of 15 ppm.

The fire pump testing is based on 60 minutes per day, 52 hours per year. Max annual runtime is 200 hours.

Wet SAC emissions based on 1700 mg/l TDS at 5 cycles of concentration, 24 hrs/day, 2500 hrs/yr.

Table 5.1-10 presents a summary of the annual emissions for each operational scenario.

Table 5.1-10 MREC Maximum Potential to Emit

Pollutant	TPY
NO_x	28.17
CO	32.32
ROCs	4.983
SO_x	~~1.351~~3.69
PM10/PM2.5	13.09
NH_3	22.46
CO_2e	410,360

Table 5.1-11 presents the maximum proposed emissions for the MREC on a pollutant specific basis.

Table 5.1-11 Summary of Maximum Facility Emissions for the MREC

Pollutant	lbs/hour	lbs/day	TPY
NO_x	58.25	683.21	28.17
CO	39.93	638.36	32.32
ROCs	6.76	100.69	4.983
SO_x	2.95	70.822	~~1.351~~3.69

Table 5.1-11 Summary of Maximum Facility Emissions for the MREC

Pollutant	lbs/hour	lbs/day	TPY
PM10/PM2.5	10.45	250.98	13.09
NH_3	18.85	452.50	22.46
CO_2e	-	-	410,360 (373,030 MT)

Total facility estimated maximum emissions (including turbine SU/SD emissions). The FP will not be tested when the turbines are running, but it may be tested on a day that the turbines run.

In addition to the normal operational profiles presented above, during the first year of operation, plant commissioning activities will occur. These are planned to occur over an estimated 213 hours per turbine, and will have higher hourly and daily emission profiles than during normal operations in the subsequent years of operation. The commissioning activities schedule and emissions are summarized in Appendix 5.1-A.

GHG Emissions

MREC GHG Estimates

GHG emissions have been estimated for both the construction and operation phases of the MREC.

Construction emissions are presented in Appendix 5.1-E and include emission evaluations for the following source types:

- On and offsite construction equipment exhaust,
- Construction site delivery vehicle exhaust emissions,
- Construction site support vehicle exhaust emissions, and,
- Construction worker travel exhaust emissions.

Operational emissions of CO_2e will be primarily from the combustion of fuels in the turbine, and the emergency equipment along with SF_6 emissions from the circuit breakers. SF_6 emissions are estimated to be 57 tons/yr (51.7 MT/yr). Appendix 5.1A, contains the support data for the GHG emissions evaluation. Estimated CO_2e emissions for the MREC operational phase, based on annual average conditions, are as follows:

- CO_2e <= 410,360 tons/year (=373,030 metric tons/year)

The emission factors, GWPs, and calculation methods are based on 40 CFR 98, Subpart A, Table A-1 and Subpart C, Tables C-1 and C-2.

NSR/PSD Review

- The MREC will require a VCAPCD New Source Review (NSR) permit, as specified under Rule 26. Currently, the VCAPCD air basin is federal and State attainment or attainment/unclassified for NO_2, SO_2, and CO. The county is nonattainment (serious) for the federal 8-hr ozone standard, as well as nonattainment for the state 1-hr and 8-hr ozone standards. It is also state nonattainment for PM10 and PM2.5, but attainment for the federal standards. Based on the values in Table 5.1-11, the MREC will be a major new stationary source per VCAPCD NSR Regulation 26.

- Based upon the annual emissions presented in Table 5.1-11, the facility will not trigger the PSD program requirements for the following pollutants: NO_x, VOC, TSP, PM10, PM2.5, CO, SO_x, and GHGs.

- The MREC, pursuant to the VCAPCD NSR Rule 26, is required to generate or acquire sufficient emission reduction credits to offset the MREC emissions due to its status as a major NSR source. The table below summarizes these requirements.

Table 5.1-12 VCAPCD Emission Bank Credits Required By MREC

	PM10/PM2.5	ROC	NO_x	SO_2	CO
VCAPCD Offset Trigger Thresholds, tpy	15	5	5	15	NA
Facility PTE[a], tpy	13.09	4.98	28.17	~~1.351~~3.69	32.32
VCAPCD Offset Ratio	1:1	1.3:1	1.3:1	1:1	1:1
Total Offsets Required, tpy	0	0	~~30.12~~36.62	0	0

[a] Values derived from Section 5.1.

The sources of emission offsets could be from any of the following strategies or combination of strategies. Any required offsets or additional mitigations pursuant to California Environmental Quality Act (CEQA) and/or the District NSR regulations, will be negotiated, acquired, and implemented per the VCAPCD regulations and CEC guidance.

Mission Rock will demonstrate to the satisfaction of the VCAPCD and the CEC and that adequate emission reduction credits have been purchased prior to issuance of the ATC. The MREC emissions of 28.17 tons per year of NO_x shall be offset at a ratio of 1.3 to 1. Appendix 5.1H (Mitigation) provides the details of the proposed use of offsets to mitigate MREC emissions.

5.1.3.5 Hazardous Air Pollutants

See Section 5.9, Public Health, for a detailed discussion and quantification of HAP emissions from the MREC and the results of the health risk assessment (HRA). See Appendix 5.1D, for the public health analysis health risk assessment support materials. Section 5.9, Public Health, also discusses the need for RMPs pursuant to 40 CFR 68 and the CalARP regulations.

5.1.3.6 Construction

Construction-related emissions are based on the following:

- Mission Rock owns the current MREC site, which is 9.79 acres in size. The construction laydown area will be contained within the 50-acre site.
- Minimal site preparation will be required prior to construction of the turbines, building foundations, support structures, etc.
- Construction activity is expected to last for a total of 23 months (not including startup and commissioning).

Construction-related issues and emissions at the MREC site are consistent with issues and emissions encountered at any construction site. Compliance with the provisions of the following permits will generally result in minimal site emissions:

- Grading permit
- Storm water Pollution Prevention Plan (SWPPP) requirements (construction site provisions),
- The VCAPCD Permit to Construct (PTC), which will require compliance with the provisions of all applicable fugitive dust rules that pertain to the site construction phase

Construction emissions are summarized in Appendix 5.1E. These emissions were used to establish construction related impacts.

This applicant commits to the incorporation of the following mitigation measures or control strategies:

- Mission Rock will have an onsite 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 MREC and construction laydown and parking areas will be watered as frequently as necessary to control fugitive dust. The frequency of watering will be on a minimum schedule of two times per day during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.
- On-site vehicle speeds will be limited to 5 mph on unpaved areas within the MREC construction site.
- The construction site entrance 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 2 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, which are presently vegetated, will be re-vegetated as soon as practical.

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

- The Applicant will work with the general contractor to utilize to the extent feasible, EPA Air Resources Board 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 ppm weight sulfur).

Based on the temporary nature and the time frame for construction, Mission Rock 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 5.1E, presents the evaluation of construction related emissions as well as data on the construction related ambient air quality impacts.

Table 5.1-13 presents data on the regional air quality significance thresholds currently being implemented by the VCAPCD. The specific construction and operational thresholds were derived from the VCAPCD CEQA guidance.

Table 5.1-13 VCAPCD CEQA Significance Thresholds

Pollutant	Significance Level (for the MREC area)
NO_x	25 lbs/day
ROCs	25 lbs/day
Other Criteria Pollutants	Emissions that would cause a violation of an established air quality standard, or worsening of an existing violation
Hazardous or toxic pollutants	Cancer risk increase > 10 $x10^{-6}$ Hazard index > 1

Source: VCAPCD CEQA Guidance, October 2003.

Construction emissions, from onsite and offsite activities are expected to exceed the VCAPCD CEQA thresholds for NO_x and ROC on a daily basis. Mitigations imposed by the CEC as well as the construction modeling analysis indicates these emissions, as well as emissions from other criteria pollutants will result in less than significant impacts to air quality.

Operational emissions from all onsite activities are expected to exceed the daily threshold values for NO_x and ROC. These emissions will be mitigated to a level of “less than significant” pursuant to the VCAPCD rules and the CEC conditions of certification. Emissions of the remaining criteria pollutants, based on the impact analysis presented herein are not expected to cause a violation or, or worsen an existing violation of any established air quality standard.

In addition to the local significance criteria, the following general conformity analysis thresholds (applicable to nonattainment areas) are as follows in accordance with CFR (40 CFR Parts 6 and 51), and VCAPCD Rule 220 (General Conformity-applicable to federal actions only). The VCAPCD is “serious” nonattainment for the federal 8-hr ozone only, and as such the applicable conformity thresholds are those presented below:

- NO_x – 50 tons per year
- VOCs – 50 tons per year (assumed the same for ROCs)

Emissions from the construction phase are not estimated to exceed the conformity levels noted above. Emissions from the operational phase are subject to the VCAPCD NSR permitting provisions, and as such, are exempt from a conformity determination or analysis.

5.1.4 Best Available Control Technology Evaluation

5.1.4.1 Current Control Technologies

To evaluate BACT for the proposed turbines, the guidelines for simple-cycle gas turbines (< 50 MW) as delineated in the District, state, and federal BACT listings were reviewed. Table 5.1-14 summarizes the proposed BACT limits on the simple cycle combustion turbines.

Table 5.1-14 BACT Values for Combustion Turbines

Pollutant	BACT Emissions Range[1]	Proposed BACT
NO_x	2.5 – 5 ppmvd	2.5 ppmvd
CO	4 - 6 ppmvd	4.0 ppmvd
ROCs	2 - 3 ppmvd	1.0 ppmvd
SO_x	Natural Gas 0.25 to 0.75 gr S/100 scf	Natural Gas ~~0.25 gr S/100 scf long term~~ 0.75 gr S/100 scf ~~short term~~
PM10/PM2.5	Natural gas and GCPs	Natural gas and GCPs <= 2 lbs/hr

Sources: CARB, VCAPCD, SDAPCD, SJVUAPCD, and Bay Area Air Quality Management District (BAAQMD) BACT Guidelines.

GCPs = good combustion practices

gr S/100 scf = grains of sulfur per 100 standard cubic feet

5.1.4.2 Proposed Best Available Control Technology

Table 5.1-15 presents the proposed BACT for the new combustion turbines. The new combustion turbines will utilize aqueous ammonia as the primary reactant in the SCR system.

Table 5.1-15 Proposed BACT for the Combustion Turbines

Pollutant	Proposed BACT Emissions Level	Proposed BACT System(s)	Meets Current BACT Requirements
NO_x	2.5 ppmvd short term 2.0 ppmvd long term	DLN combustors with SCR	Yes
CO	4.0 ppmvd	Oxidation Catalyst	Yes
ROCs	1.0 ppmvd	Oxidation Catalyst	Yes
SO_x	~~0.25 gr S/100 scf long term~~ 0.75 gr S/100 scf ~~short term~~	Natural Gas	Yes
PM10/ PM2.5	<= 2 lbs/hr	Natural Gas	Yes
Ammonia	5.0 ppmvd	NH_3 Reagent/SCR System	Yes

Source: MREC Team.

Fire Pump Engine BACT

The fire pump engine will be fired exclusively on California certified ultra-low sulfur diesel fuel, and will meet all the emissions standards as specified in; CARB ATCM, EPA ARB Tier III, and NSPS Subpart IIII. Due to the low use rate of the engine for testing and maintenance, as well as its intended use for emergency fire protection, the engine meets the current BACT requirements of the VCAPCD.

Wet SAC BACT

The wet surface air condenser will be a packaged unit designed to handle the cooling needs of the turbines (inlet air chilling). The unit will have six (6) cells, with a total circulation rate of approximately 10,675 gpm. The drift eliminator efficiency for small package units of this type ranges from 0.001 to 0.005%. The proposed unit will be designed at an efficiency level of 0.001% .

Summary

Based on the above data, the proposed emissions levels for the new combustion turbines and fire pump engine satisfy the BACT requirements of the VCAPCD under Rule 26. Specifics associated with the BACT determinations can be found in Appendix 5.1F.

5.1.5 Air Quality Impact Analysis

This section describes the results, in both magnitude and spatial extent of ground level concentrations resulting from emissions from the MREC. 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 herein and presented in the Air Quality Modeling Protocol. A copy of the Air Quality Modeling Protocol is included in Appendix 5.1C. All I/O modeling files have been provided to the VCAPCD and CEC Staff under separate cover. All modeling analyses were performed using the techniques and methods as discussed with the VCAPCD and CEC.

5.1.5.1 Dispersion Modeling

AERMOD Modeling Procedures: For modeling the potential impact of the MREC 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 EPA guideline model AERMOD (~~version15181~~version 15181) was used as well as the latest versions of the AERMOD ~~preprocessors to determine surface characteristics (AERSURFACE version13016), to process meteorological data (AERMET version 15181), and~~preprocessor to determine receptor elevations and slope factors (AERMAP version 11103). The purpose of the AERMOD modeling analysis was to evaluate compliance with the California state and Federal ambient air quality standards.

Hourly observations of certain meteorological parameters are used to define the area's dispersion characteristics. These data are used in approved air dispersion models for defining a project's impact on air quality. These data must meet certain criteria established by the EPA and the later discussion details the proposed data and its applicability to the MREC.

AERMOD is a steady-state plume dispersion model that simulates transport and dispersion from multiple point, area, or volume sources based on updated characterizations of the atmospheric boundary layer. AERMOD uses Gaussian distributions in the vertical and horizontal for stable conditions, and in the horizontal for convective conditions; the vertical distribution for convective conditions is based on a bi-Gaussian probability density function of the vertical velocity. For elevated terrain AERMOD incorporates the concept of the critical dividing streamline height, in which flow below this height remains horizontal, and flow above this height tends to rise up and over terrain. AERMOD also uses the advanced PRIME algorithm to account for building wake effects.

Flagpole receptors are not proposed to be used (ground level concentrations will be calculated). AERMAP will be used to calculate receptor elevations and hill height scales for all receptors from the National Elevation Dataset (NED) ~~data~~ in accordance with EPA guidance. Selection of the receptor grids is discussed below.

AERMOD input data options will be set to default. The URBAN option will not be selected for use as the predominant land use around the MREC site is predominantly agriculture/undeveloped land. In accordance with the Auer land use classification methodology (EPA's "*Guideline on Air Quality Models*"), since the land use within the area circumscribed by a 3-kilometer (km) radius around the facility is greater than 50 percent rural, the urban dispersion options in AERMOD will not be used in the modeling analyses supporting the permitting of the facility.

Default model option for temperature gradients, wind profile exponents, and calm processing, which includes final plume rise, stack-tip downwash, and elevated receptor (complex terrain) heights option.

NO_2 Modeling Procedures: Most MREC-only NO_2 impacts were assessed using a conservative Tier 2 modeling analysis based on the ARM, adopted in the *Guideline on Air Quality Models*. The Guideline allows a nationwide default conversion rate of 75 percent for annual NO_2/NO_x ratios and 80 percent for 1-hour NO_2/NO_x ratios (not to be confused with the proposed ARM2 methodology). ARM may be performed either by using the ARM model option or by multiplying the modeled NO_x concentrations by the appropriate ratios. Based on EPA and CARB Guidance, the Tier 2 analyses can be performed without justification to, or prior approval of, the permitting authority.

A Tier 3 analysis was used to assess 1-hour NO_2 impacts during start-up/shutdown periods and commissioning activities to assess compliance with the NAAQS and CAAQS. Due to the limited number of hours of commissioning activities, modeling analyses were not required for the 1-hour NAAQS according to USEPA guidelines. The Tier 3 analysis was based on the ozone limiting method (OLM) as described in the Air Quality Modeling Protocol. The OLM analysis used ambient hourly background ozone measured at the El Rio monitoring station for the modeled years of ~~2009-2013~~2011-2015. The El Rio monitoring data has been shown above to be a conservative representation of the MREC site.

The ozone data was first processed to remove missing data similar to procedures outlined in the California Air Pollution Control Officers Association (CAPCOA) guidance document *"Modeling Compliance of The Federal 1-Hour NO_2 NAAQS"* (2011). The procedures for missing data are described in detail in the Air Quality Modeling Protocol. In support of the Tier 3 OLM NAAQS analysis, the modeling methods also included:

- In-stack NO_2/NO_x ratios (ISR) for all MREC modeled sources (turbines during commissioning activities) were based on the conservative national default of 0.5
- AERMOD-default ambient equilibrium NO_2/NO_x ratio of 0.9 was used
- The option OLMGROUP ALL was used

For the 1-hour NO_2 ~~CAAQS~~ cumulative assessment, OLM ~~was~~will be used with ~~the maximum~~ representative 1-hour NO_2 background ~~concentration~~ concentrations added to the modeled 1-hour ~~concentration. Due~~concentrations.

CTSCREEN PM10 Modeling Procedures: In addition to AERMOD, the CTSCREEN model was used to assess the ~~limited number~~PM10 SILs in the complex terrain south of ~~hours~~ the project site. The CTSCREEN model, which is a screening mode of ~~commissioning activities,~~CTDMPLUS, is a refined point source Gaussian air quality model for use in all stability conditions for complex terrain applications. The use of refined modeling techniques to assess air quality impacts is summarized in USEPA's Modeling Guideline, 40 CFR Part 51, Appendix W. In particular, upon revising Appendix W to adopt AERMOD as the replacement for ISC3, EPA specifically retained CTDMPLUS and CTSCREEN as appropriate models for detailed complex terrain analysis (see "Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule" in the November 9, 2005 Federal Register, Vol. 70, No. 216 at 70 Fed. Reg. 68218 and 68225-68226). The refined modeling analyses consists of those analytical techniques that provide more detailed treatment of terrain, physical and chemical atmospheric processes, and can provide a more refined concentration estimates. As a result, they provide a more accurate estimate of source impact and the effectiveness of control strategies. These are referred to as refined techniques and models.

Complex terrain is defined as terrain with elevations above plume height, while intermediate terrain is defined as terrain with elevations between stack top and final plume rise height. Simple terrain is defined as terrain below stack height. Historically, a distinction has been made between simple, intermediate, and complex terrain because of the capability of different air quality dispersion models to effectively handle the simulation of the dispersion of pollutants in the different terrain regimes. Most of the models approved by the USEPA were ~~not~~originally developed either for use with simple or complex terrain. The most widely used model for simple terrain has been the ISCST3 model, which was replaced as the preferred model by AERMOD.   Intermediate terrain is no longer a consideration in dispersion modeling.

In addition to the AERMOD model, the USEPA has approved the CTDMPLUS model for use in complex terrain modeling applications. *See id.*, 70 Fed. Reg. 68233. CTDMPLUS is a preferred/recommended USEPA dispersion model for terrain impacts and "provides greater resolution of concentrations about the contour of the hill feature than does AERMOD through a different plume-terrain interaction algorithm." *Id*. The challenge to using the CTDMPLUS model in many situations is the additional meteorological and terrain data that is required ~~for the~~ by the model. However, the USEPA developed a screening version of the CTDMPLUS model, called CTSCREEN. The CTSCREEN model is a refined point source Gaussian air quality model for use in all stability conditions for complex terrain applications.

CTDMPLUS in screening mode (CTSCREEN) serves several purposes in regulatory applications. When meteorological data are unavailable, "CTSCREEN can be used to obtain conservative [safely above those of refined models], yet realistic, worst-case estimates" of impacts from particular sources in complex terrain. *Id*. These estimates can be used to determine the necessity and value of obtaining on-site data for refined modeling or can simply provide conservative emission-limit estimates. In addition, CTSCREEN can be a valuable tool for designing meteorological and pollutant monitoring programs. It is important to note that CTSCREEN and the refined model, CTDMPLUS, are the same basic model. The primary difference in their make-up is in the way in which CTSCREEN obtains the meteorological conditions. For example, wind direction in CTSCREEN is calculated based on the source-terrain-dividing streamline geometry to ensure computation of the highest impacts that are likely to occur. The daytime mixed-layer heights are based on fractions of the terrain height. Other meteorological variables or parameters are chosen through a variety of possible combinations from a predetermined matrix of values.

As a result of the CTSCREEN model accounting for the dimensional nature of the plume and terrain interaction, the model requires digitized terrain of the nearby topographical features. The mathematical representation of terrain is accomplished by the terrain preprocessors, FITCON and HCRIT. CTSCREEN and CTDMPLUS are virtually the same air quality model, with the main difference between the two being the meteorological data used. The wind direction used in CTSCREEN is based on the source-terrain geometry, resulting in computation of the highest impacts likely to occur. Other meteorological variables are chosen from possible combinations from a set of predetermined values. CTSCREEN provides maximum concentration estimates that are similar to, but on the conservative side of, those that would be calculated from the CTDMPLUS model with a full year of on-site meteorological data.

CTSCREEN is appropriate for the following applications:

- Elevated point sources
- Terrain elevations above stack top
- Rural areas
- One hour to annual averaging time periods

Meteorological data used by the CTSCREEN model is internally derived by the model itself, but is similar to those 1-hour NAAQSvalues used in the screening model SCREEN3. As well as calculating maximum 1-hour concentrations at all receptors, the CTSCREEN model is designed to provide conservative estimates of worst case 3-hour, 24-hour, and annual impacts. Default scaling factors, as presented below, were used to convert calculated 1-hour concentrations to 3-hour, 24-hour, and annual estimates.

CTSCREEN Model Persistence Factors

Averaging Period	CTSCREEN Scaling Factor
1-hour	1.0
3-hour	0.7
8-hour	-
24-hour	0.15
Annual	0.03

5.1.5.2 Additional Model Selection

In addition to AERMOD and its pre-processorsCTSCREEN, several other EPA and CARB models and programs were used to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations. The models used were Building Profile Input Program for PRIME (BPIP-PRIME, current version 04274), HARP 2.03, and the AERSCREEN (version 15181) dispersion model for fumigation impacts. These models, along with options for their use and how they are used, are discussed below.

The AERSCREEN model was used to evaluate inversion breakup fumigation impacts for all short-term averaging periods (24 hours or less). The methodology outlined in EPA-454/R-92-019 (EPA, 1992a) will be followed for this analysis. Combined impacts for all sources under fumigation conditions will be evaluated.

The combined fumigation concentrations areFor sources with plume heights not subject to inversion breakup fumigation, their contributions to fumigation impacts will be determined using AERSCREEN with all meteorological conditions and ignoring terrain at the distance of the maximum fumigation concentration. The fumigation concentration is then combined with the maximum AERSCREEN concentration from the other sources. The combined fumigation concentrations are also compared to the maximum AERSCREEN concentrations under normal dispersion for all meteorological conditions. If fumigation impacts are less than AERSCREEN maxima under normal dispersion, (and AERMOD maxima for the actual meteorological and terrain data used in the refined analyses), no further analysis of fumigation is required based on Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019).

If fumigation impacts exceed AERSCREEN maxima, then fumigation impacts longer than 1-hour averages will be evaluated based on Section 4.5.3 of Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019) guidance on converting to 3-, 8- and 24-hour average concentrations. Combined impacts for all sources under fumigation conditions will be evaluated. For sources with plume heights not subject to inversion breakup fumigation, their contributions to fumigation impacts will be determined using AERSCREEN with all meteorological conditions and ignoring terrain at the distance of the maximum fumigation concentration. The fumigation concentration is then combined with the maximum AERSCREEN concentration from the other sources.

5.1.5.3 Good Engineering Practice Stack Height Analysis

Formula Good Engineering Practice (GEP) stack height is the greater of 65 meters or the height based on EPA formulas for the various onsite and offsite structures and their locations and orientations to the MREC stacks. Formula GEP stack height was calculated at 28.32 meters (about 93 feet) for the turbine stacks and 38.58 meters (about 126.5 feet) for the firepump stack~~.~~ and the six wet-SAC cells. The GEP stack heights are due to the ~~37-foot, 2-inch~~ air intake ~~filter~~superstructure for the turbine stacks and the ~~54' high~~demineralized water storage tank for the firepump stack~~.~~ and wet-SAC cells. The design stack heights of 60 feet ~~and~~ for the turbine stacks, 25 feet for the ~~turbine and~~ firepump ~~stacks, respectively~~stack, and 42.5 feet for the wet-SAC cells are all less than their formula GEP stack heights, so downwash effects were included in the modeling analysis.

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. Appendix 5.1B, Figure 5.1B-1 shows the structures included in the BPIP-PRIME downwash analysis.

5.1.5.4 Receptor Grid Selection and Coverage

~~Receptor and source base~~**AERSCREEN Modeling Procedures:** AERMOD receptor elevations and ~~receptor~~ hill slope factors were determined from the U.S. Geological Survey (USGS) NED using either 1/3-arcsecond (~10-meter) spacing for receptor grids with spacing between adjacent receptors of ~~less than~~ 100 meters or less and 1-arcsecond (~30-meter) spacing for receptor grids with receptor spacing greater than 100 meters. All coordinates were referenced to universal transverse Mercator (UTM) North American Datum 1983 (NAD83), Zone 11. The National Elevation Dataset (NED) files used will extend beyond the receptor grid boundaries as appropriate for the hill slope factors.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the MREC 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 listed below.

- Receptors were placed along the proposed MREC fence line with a 10-meter spacing.
- Receptors extending outwards from the proposed MREC fence line in all directions at least 500 meters from the MREC with a 20-meter receptor spacing were modeled, called the downwash receptor grid.
- An intermediate receptor grid with a 100-meter resolution was modeled that extended outwards from the edge of the downwash grid to 1) km from the MREC.
- The first coarse receptor grid with 200-meter spacing extended outwards from the edge of the intermediate grid to 5 km from the MREC~~, while the~~. The second coarse receptor grid with ~~500~~a 250-meter ~~receptor~~ spacing then extended from the first coarse receptor grid out to ~~10~~15 km from the MREC~~.~~ (the extent and spacing of the second coarse grid was adjusted from the original analyses based on agency comments).
- A refined receptor grid with 20-meter resolution was modeled around any location on the coarse and intermediate grids where a maximum impact was modeled that was above the concentrations on the downwash grid. Based on the locations of the maximum modeled concentrations, a single refined receptor grid was required as a number of maximum impacts occurred on the 100-meter spaced intermediate and 200-meter spaced coarse receptor grids in a common elevated terrain area south to southeast of the MREC site. This refined receptor grid was modeled in both the turbine screening and refined modeling analyses.

Concentrations within the facility fenceline will not be calculated. Receptor grid figures 5.1B-2a and 5.1B-2b in Appendix 5.1B display the receptors grids used in the modeling assessment with respect to the MREC fence line.

CTSCREEN Modeling Procedures: The use of CTSCREEN requires the CTDMPLUS Terrain Feature Processing System. CTDMPLUS requires construction of a mathematical representation of the complex terrain being analyzed. For each of the complex terrain regions to be modeled, the contours of the specific terrain feature of interest were digitized and used as input to the FITCON and HCRIT processing programs. The FITCON and HCRIT programs use the digitized data to develop continuous contours, complete the contours and extend the contours down to the stack base, fit a series of ellipses to these contour data, create polynomial equations that represent the fitted ellipses, and format the results so CTDMPLUS can use them. Contour data were based on 7.5-minute USGS topographic maps, and contour intervals of 100 feet or less as needed to accurately digitize the terrain features, shown in Figure 5.1B-3. Two sets of receptors grids were used. The first "coarse" receptor grid was used to represent overall complex terrain in South Mountain south and southeast of the MREC project site, up to a peak elevation of 1860 feet above mean sea level (1860'amls). The RECGEN receptor utility program was used to generate coarse grid receptor locations for this terrain feature. Receptors were placed along the digitized contours at approximate 310 meter intervals. AERMOD regular grid receptors were then modeled for this complex terrain area of South Mountain. Finally, 20-meter spaced receptors (similar to the AERMOD refined grid) were modeled in the areas of maximum AERMOD and CTSCREEN maxima (generally based on receptor elevations). RECGEN was not needed to generate these additional receptors based on the AERMOD receptor grids. The CTSCREEN receptor grids are shown in Figure 5.1B-4.

5.1.6 Meteorological Data Selection

The MREC, as discussed above, is located in the southwestern portion of the Santa Clara River Valley, near the mouth of the Valley. The Santa Clara River Valley has a predominant northeast and southwest orientation, with terrain rising up to over 2000 feet on each side of the valley. Based on the MREC location near the entrance to the valley, the selection of surface meteorology is an important consideration for use in assessing the MREC's impacts on regional air quality. Because the MREC location is influenced in large part by the valley orientation, surface meteorological data were reviewed to determine which data set would be considered representative of the MREC area.

The nearest representative surface meteorological data set in the general area of the MREC ~~is~~ was determined to the Camarillo Airport Automated Surface Observation Station (ASOS) by the agency about 11 kilometers (km) south of the MREC site. (The original application used the El Rio Air Quality Monitoring Station, operated by the VCAPCD, located approximately ~~7.1 kilometers (km)~~7km south-southwest of the MREC site~~. This~~ .) The Camarillo surface meteorological data set was provided by the ~~VCAPCD~~ agency already processed for AERMOD with Vandenberg Air Force Base upper air data for the most recent five-year period, ~~2009-2013, and consists of hourly-averaged measurements of wind speed, wind direction, the standard deviation of the wind direction (called sigma-theta), temperature, and relative humidity (all measured at a height of 10 meters above ground level), and solar radiation.~~2011-2015. These ~~surface data, when processed with AERMET with the~~ data ~~described below, result in data recovery greater than 90 percent for every quarter in the five-year period as shown in Table 5.1-16.~~

~~Table 5.1-16 Meteorological Missing Data and Data Recovery Rates~~

	~~Missing Hours (number of hours)~~				
~~Year~~	~~Quarter 1~~	~~Quarter 2~~	~~Quarter 3~~	~~Quarter 4~~	~~Total~~
~~2009~~	~~131~~	~~1~~	~~23~~	~~48~~	~~203~~
~~2010~~	~~58~~	~~14~~	~~10~~	~~191~~	~~273~~
~~2011~~	~~110~~	~~86~~	~~66~~	~~112~~	~~374~~
~~2012~~	~~46~~	~~73~~	~~37~~	~~18~~	~~174~~
~~2013~~	~~53~~	~~46~~	~~46~~	~~84~~	~~229~~
~~Period~~	**~~n/a~~**	**~~n/a~~**	**~~n/a~~**	**~~n/a~~**	**~~1253~~**

	Data Recovery Rate (percent)				
Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
2009	93.94	99.95	98.96	97.83	97.68
2010	97.31	99.36	99.55	91.35	96.88
2011	94.91	96.06	97.01	94.93	95.73
2012	97.89	96.66	98.32	99.18	98.02
2013	97.55	97.89	97.92	96.20	97.39
Period	**n/a**	**n/a**	**n/a**	**n/a**	**97.14**

The El Rio monitoring data was supplemented with concurrent Automatic Surface Observing System (ASOS) hourly measurements taken at the Camarillo Airport, located about 11 km south of the MREC site, downloaded from the National Climatic Data Center (NCDC) websites. The Camarillo ASOS data are expectedwere determined to be more representative of the inland MREC location than ASOS measurements taken at Oxnard Airport, which is in closer proximity to the coastline and therefore, more influenced by the coastal marine layer. Based on a review of the recorded sky cover and temperature at both Camarillo and Oxnard airports, Oxnard had a much higher incident of marine influence. There are no other ASOS stations in the immediate MREC vicinity. Camarillo ASOS measurements of cloud cover, barometric pressure and precipitation were used by AERMET to supplement the El Rio monitoring data when creating the meteorological datasets used as AERMOD inputs. The AERMET option to substitute ASOS wind and temperature data for missing El Rio measurements was not used as the data sets already exceeded the quarterly 90 percent data recovery requirements for use in regulatory modeling assessments. As no Camarillo ASOS derived wind speed and wind direction data were used, the use of EPA program AERMINUTE (version 15181) was not required.

In addition to the surface datasets, concurrent radiosonde upper air data from Vandenberg Air Force Base was input into AERMET to calculate wind and temperature profile data using the 12 Zulu (Z) sounding data (4 a.m. local standard time). These data were downloaded from the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory website. The AERMET option to expand the 12 Z sounding window by more than one hour was not used as the data set already exceeded the quarterly 90 percent data recovery requirements for use in regulatory modeling assessments.

AERMET also requires input summaries of the surface characteristics for the area surrounding the El Rio meteorological monitoring site. These surface characteristics were calculated with the EPA program AERSURFACE (version 13016) based on EPA guidance. AERSURFACE uses 1992 National Land Cover Data (NLCD) from the USGS to determine land use based on standardized land cover categories. For this analysis, the southern California NLCD file from the USGS website referenced in the AERSURFACE User's Manual (http://edcftp.cr.usgs.gov/pub/data/landcover/states/) was used. A review of historical Google Earth images shows little change in nearby land uses from the time of the 1992 NLCD to the present time.

AERSURFACE was executed in accordance with the EPA guidance documents "*AERMOD Implementation Guide,*" March 19, 2009, and "*AERSURFACE User's Guide*," EPA-454/B-08-001, revised January 16, 2013. AERSURFACE determines the midday albedo, daytime Bowen ratio, and surface roughness length representative of the surface meteorological station. ***Bowen ratio*** is based on a simple unweighted geometric mean while ***albedo*** is based on a simple unweighted arithmetic mean for the 10 by 10 km square area centered on the selected location (i.e., no direction or distance dependence for either parameter). ***Surface roughness length*** is based on an inverse distance-weighted geometric mean for upwind distances up to 1 km from the selected location. The circular surface roughness length area

(1-km radius) can be divided into any number of sectors as appropriate (EPA guidance recommends that no sector be less than 30º in width).

Two sectors were used for calculating roughness lengths based on the EPA-recommended radius of 1 km: one sector for directions from 302° to 336° northwest of the El Rio monitoring site based on the concentrated residential and commercial development in this area; and a second sector for all other directions (from 336° through north then south to 302°) based on the predominate agricultural land uses in this area. These sectors are shown in Appendix 5.1C, Figure 2. Months were assigned to the four seasons based on the seasonal assignments given by EPA for the 1-hour NO_2 NAAQS assessment for the Los Angeles area (EPA-452/P-08-001, April 2008) – namely April to June for transitional spring with short annuals, July to September for midsummer with lush vegetation, and October through March for autumn with un-harvested cropland. EPA seasonal assignments do not include late autumn after frost or winter with or without snow. Other AERSURFACE options will be selected as Airport = NO, continuous snow cover = NO, and arid = NO based on the El Rio monitoring site location and the local climatology. A summary of the AERSURFACE inputs and results are shown in Table 5.1-17.

Table 5.1-17 AERSURFACE Input and Results

AERSURFACE Results	Spring (Apr-Jun)	Summer (Jul-Sep)	Autumn (Oct-Mar)	Winter (none)
Surface Roughness (meters)				
Sector 1 (302°-336°)	0.309	0.253	0.313	N/A
Sector 2 (336°-302°)	0.220	0.046	0.220	N/A
Noontime Albedo	0.19	0.16	0.19	N/A
Bowen Ratio (Average)	0.88	0.48	0.67	N/A
Bowen Ratio (Wet)	0.52	0.33	0.42	N/A
Bowen Ratio (Dry)	2.21	1.36	1.78	N/A
AERSURFACE Inputs				
Latitude	34.252	Snow Cover		NO
Longitude	-119.143	Arid Region		NO
Datum	NAD83	Airport Location		NO
Surface Roughness Radius (km)	1.0	Number of Sectors		2

The moisture used to calculate the albedo for AERMET processing was based on 30-years of precipitation climatology in accordance with EPA recommendations. For this assessment, the nearest regional cooperative monitoring location with relatively complete data for the 30-year climatological period (with complete data for the 5-year modeling period) was the Ojai cooperative monitoring site. The past 30 years of monthly precipitation amounts are sorted (1984 through 2013) and compared to the monthly precipitation amounts for the five years modeled (2009-2013). The modeled months (2009-2013) with precipitation amounts in the range of the driest 9 years by month for the 30-year climatology are given the albedo for DRY conditions. The modeled months (2009-2013) with precipitations amounts in the range of the wettest 9 years by month for the 30-year climatology are given the albedo for WET conditions. The remainder of the modeled months (2009-2013) represents the middle 22 years by month in the 30-year precipitation climatology and these months are given the albedo for AVG (average) conditions. The 30-year precipitation climatology and moisture conditions for each month of the modeling period are shown in Table 5.1-18 (the monthly albedos input to AERMET are shown in the previous table).

Table 5.1-18 30-year Precipitation Climatology Summary and Moisture Assigned to the Months in the Modeling Period

SORT	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52
2	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.58
3	0.55	0.15	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	7.67
4	0.55	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.03	7.82
5	0.63	0.34	0.22	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.25	8.17
6	0.63	0.92	0.37	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.32	9.21
7	0.86	1.25	0.48	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.38	10.62
8	0.89	1.33	0.55	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.57	11.57
9	1.17	1.88	0.68	0.09	0.00	0.00	0.00	0.00	0.00	0.04	0.35	0.94	12.51
10	1.19	1.93	0.82	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.40	0.96	12.56
11	1.21	2.10	1.22	0.14	0.02	0.00	0.00	0.00	0.00	0.15	0.67	1.10	12.94
12	1.25	2.75	1.33	0.16	0.02	0.00	0.00	0.00	0.00	0.23	0.71	1.29	13.71
13	1.40	2.93	1.39	0.16	0.03	0.00	0.00	0.00	0.00	0.25	1.01	1.47	14.07
14	1.77	3.12	2.19	0.17	0.13	0.00	0.00	0.00	0.00	0.26	1.02	1.63	15.53
15	1.93	3.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	1.02	1.80	15.96
16	2.12	4.09	2.23	0.37	0.13	0.00	0.00	0.00	0.00	0.32	1.12	2.00	15.97
17	2.39	4.16	2.71	0.42	0.16	0.00	0.00	0.00	0.00	0.32	1.19	2.14	16.92
18	3.11	4.47	2.75	0.46	0.21	0.00	0.00	0.00	0.00	0.51	1.26	2.17	18.16
19	3.22	4.47	3.08	0.67	0.23	0.02	0.00	0.00	0.01	0.76	1.50	2.21	18.64
20	3.41	4.97	3.09	0.82	0.27	0.02	0.00	0.00	0.01	0.87	1.67	3.63	21.66
21	3.74	6.36	3.46	1.10	0.34	0.04	0.00	0.00	0.03	0.93	1.78	3.85	22.41
22	3.91	7.29	4.30	1.80	0.44	0.07	0.00	0.00	0.03	1.16	2.36	4.04	23.85
23	5.48	7.30	4.40	1.94	0.48	0.13	0.01	0.00	0.08	1.18	2.37	4.11	24.27
24	6.72	8.73	4.48	2.33	0.49	0.13	0.01	0.00	0.26	1.88	2.43	4.43	26.56
25	6.90	9.50	4.79	2.38	0.82	0.13	0.02	0.00	0.37	1.99	2.45	5.84	28.28
26	7.44	10.06	4.84	2.48	0.97	0.19	0.03	0.00	0.40	2.15	3.02	6.04	30.66
27	9.11	10.30	5.76	2.87	1.11	0.24	0.03	0.01	0.61	2.46	3.21	6.29	36.35
28	16.58	10.63	6.32	2.92	1.20	0.34	0.05	0.02	0.64	3.32	3.54	6.89	37.05
29	17.57	12.50	10.50	3.59	2.06	0.36	0.12	0.10	0.85	3.70	3.88	8.63	40.97
30	24.53	23.76	14.01	5.39	4.07	1.60	0.78	0.16	1.25	5.76	6.61	9.36	41.79
2009	0.89	4.97	0.55	0.16	0.02	0.13	0.00	0.00	0.00	3.70	0.02	3.63	14.07
2010	6.72	4.47	0.37	2.38	0.16	0.00	0.01	0.00	0.00	2.15	1.67	8.63	26.56
2011	0.55	4.09	6.32	0.16	0.97	0.24	0.00	0.00	0.01	1.16	1.78	0.25	15.53
2012	1.19	0.11	3.46	2.33	0.03	0.00	0.00	0.00	0.00	0.87	2.43	2.14	12.56
2013	1.40	0.19	1.33	0.06	0.23	0.00	0.01	0.00	0.00	0.25	0.67	0.38	4.52
2009	DRY	AVG	DRY	AVG	AVG	WET	AVG	AVG	AVG	WET	DRY	AVG	N/A
2010	WET	AVG	DRY	WET	AVG	AVG	WET	AVG	AVG	WET	AVG	WET	N/A
2011	DRY	AVG	WET	AVG	WET	WET	AVG	AVG	AVG	WET	AVG	DRY	N/A
2012	AVG	DRY	AVG	WET	AVG	AVG	AVG	AVG	AVG	AVG	WET	AVG	N/A
2013	AVG	DRY	AVG	DRY	AVG	AVG	WET	AVG	AVG	AVG	AVG	DRY	N/A

~~Table 5.1-18 30-year Precipitation Climatology Summary and Moisture Assigned to the Months in the Modeling Period~~

~~SORT~~	~~Jan~~	~~Feb~~	~~Mar~~	~~Apr~~	~~May~~	~~Jun~~	~~Jul~~	~~Aug~~	~~Sep~~	~~Oct~~	~~Nov~~	~~Dec~~	~~Annual~~

~~Sorted Data - The 30 years of climatology were sorted to determine dry/average/wet months. Generally, the driest and wettest 9 years were used to delineate dry/wet (average was anything in-between). The one exception was June-September where no precipitation was considered average. Orange cells represent months with more than 5-6 missing days of precipitation data, which were assigned to the middle of the sorted period if the missing data placed them in the driest half of the sorted order.~~

~~The area surrounding the MREC site, within 3 km, can be characterized as rural, made up mostly of agricultural uses (grasslands, pasture, and crops totally 65.5 percent) and undeveloped rural areas (shrub-lands, grasslands, forest, and wetlands totally 26.2 percent). Urban areas (high intensity residential and commercial and industrial uses) are only 2.3 percent of the area within three kilometers based on review of land use/land cover data as well as recent aerial photographic data. Some industrial land use is located immediately adjacent to the MREC site, however, based on a the radial range of three kilometers, the area surrounding the MREC site is rural In accordance with the Auer land use classification methodology (EPA's "*Guideline on Air Quality Models*"), since land use within the area circumscribed by a 3-km radius around the facility is greater than 50 percent rural, the urban~~ dispersion ~~option in AERMOD will not be used in the modeling analyses supporting the permitting of the facility.~~conditions for the MREC project.

~~The use of the 5 years of VCAPCD supplied surface meteorological data collected at the El Rio monitoring location would satisfy the definition of on-site data. EPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. Specifically, the meteorological data requirement originates from the CAA in Section 165(e)(1), which requires an analysis "of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility." This requirement and EPA's guidance on the use of onsite monitoring data are also outlined in the Onsite Meteorological Program Guidance for Regulatory Modeling Applications (EPA, 1987). The representativeness of meteorological data is dependent upon the following criteria:~~

- ~~Proximity of the meteorological monitoring site to the area under consideration~~
- ~~Complexity of the topography of the area~~
- ~~Exposure of the meteorological sensors~~
- ~~Period of time during which the data are collected~~

~~First, the El Rio meteorological monitoring site and MREC location are in close proximity to each other (the El Rio monitoring site is 7.1 km SSW of the MREC site), are at similar elevations (117' and 185' above mean sea level), and are both located near the Santa Clara River. The El Rio monitoring site and MREC location are located more than 10 km and 15 km, respectively, from the Pacific Ocean. Therefore, the strong westerly wind data that is evident at the Oxnard and Camarillo airports are not identified on the El Rio data sets. Rather, the El Rio monitoring appears to be influenced by the overall Santa Clara River valley topography. The El Rio monitor is located near the southern entrance to the Santa Clara River valley in which the MREC will be located. Thus, both locations will experience similar up-valley and down-valley flows under certain synoptic conditions. Third, the surface characteristics of land uses, roughness lengths, Bowen ratios, and albedos are very similar for the two locations as shown in Table 5.1-19. Most of the land use in the general region consists of agricultural classifications.~~

~~Table 5.1-19 Surface Characteristics for Monitoring Site and MREC Location~~

~~Standardized Land Use Category (for area within a 1-km radius)~~		~~El Rio Monitoring Site~~	~~MREC Location~~
~~Open Water~~		~~0.1%~~	~~-~~
~~Low Intensity Residential~~		~~5.0%~~	~~2.8%~~
~~High Intensity Residential~~		~~1.0%~~	~~-~~
~~Commercial/Industrial/Transportation~~		~~6.9%~~	~~3.9%~~
~~Bare Rock/Sand/Clay~~		~~1.6%~~	~~7.9%~~
~~Deciduous Forest~~		~~0.2%~~	~~0.2%~~
~~Evergreen Forest~~		~~0.5%~~	~~1.1%~~
~~Mixed Forest~~		~~1.0%~~	~~1.6%~~
~~Shrubland~~		~~1.7%~~	~~10.9%~~
~~Orchards/Vineyard/Other~~		~~0.5%~~	~~0.9%~~
~~Grasslands/Herbaceous~~		~~1.8%~~	~~12.1%~~
~~Pasture/Hay~~		~~7.5%~~	~~14.2%~~
~~Row Crops~~		~~69.1%~~	~~37.9%~~
~~Small Grains~~		~~2.2%~~	~~5.6%~~
~~Urban/Recreational Grasses~~		~~0.9%~~	~~0.2%~~
~~Woody Wetlands~~		~~-~~	~~0.5%~~
~~Emergent Herbaceous Wetlands~~		~~-~~	~~0.2%~~
~~Surface~~	~~Spring (Apr-Jun)~~	~~0.227~~	~~0.196~~
~~Roughness~~	~~Summer (Jul-Sep)~~	~~0.054~~	~~0.061~~
~~(meters)~~	~~Autumn (Oct-Mar)~~	~~0.228~~	~~0.196~~
~~Noontime~~	~~Spring (Apr-Jun)~~	~~0.19~~	~~0.19~~
~~Albedo~~	~~Summer (Jul-Sep)~~	~~0.15~~	~~0.16~~
	~~Autumn (Oct-Mar)~~	~~0.19~~	~~0.19~~
~~Bowen Ratio~~	~~Spring (Apr-Jun)~~	~~0.88~~	~~0.92~~
~~Average~~	~~Summer (Jul-Sep)~~	~~0.48~~	~~0.48~~
~~Moisture~~	~~Autumn (Oct-Mar)~~	~~0.67~~	~~0.67~~

~~AERSURFACE was executed at both the meteorological monitoring and proposed site locations using the seasons and model options described earlier for one single sector, average moisture conditions, and a surface roughness area circumscribed by a 1-km radius. Land use categories at the two site locations are similar with agriculture and grasslands/shrub-lands both comprising over 80 percent of the total land use types. The ratio of urban uses between the two sites are similar with the monitoring site location having a 6-percent greater ratio of residential and commercial use. There were some small variations in roughness lengths between the two locations based on a 1-km radius, but based on roughness length,~~

~~both areas are predominately rural and agricultural. These runs also produced almost identical results for both Bowen ratio and Albedo for the two locations, based on the 10-km area around each location.~~

~~Representativeness is defined in the document "Workshop on the Representativeness of Meteorological Observations" (Nappo et. al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Judgments of representativeness should be made only when sites are climatologically similar, as is the case with the meteorological monitoring site and the MREC location. In determining the representativeness of the meteorological data set for use in the dispersion models at the MREC site, the consideration of the correlation of terrain features to prevailing meteorological conditions, as discussed earlier, is similar at both locations since the orientation and aspect of main terrain feature(s) at the MREC location in the Santa Clara River Valley is maintained with the prevailing wind fields as measured by and contained in the meteorological dataset for the monitoring site located at the mouth of the same valley along the Santa Clara River. In other words, the same mesoscale and localized geographic and topographic features that influence wind flow patterns at the meteorological monitoring site also influence the wind flow patterns at the MREC site.~~

~~For these reasons, the El Rio meteorological data selected for use on the MREC are expected to satisfy the definition of representative meteorological data. Thus, it is CH2M's assessment that these meteorological data are similar to the dispersion conditions at the MREC site and to the regional area.~~

~~All of these data (hourly surface data from the El Rio Monitoring Station/Camarillo Airport and appropriate upper air data) were processed with the EPA programs described above (AERSURFACE and AERMET) to generate meteorological datasets to be input to AERMOD.~~

5.1.6.1 Background Air Quality

In 1970, the U.S. Congress instructed EPA to establish standards for air pollutants, which were of nationwide concern. This directive resulted from the concern of the impacts 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 NAAQS are "those which, in the judgment of the administrator [of EPA], 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 EPA], 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: SO_2, CO, ozone, NO_2, PM10, PM2.5, and lead.

The criteria pollutants are those that have been demonstrated historically to be widespread and have a potential to cause adverse health effects. EPA 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 EPA 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: a numerical limit expressed as an allowable concentration, and an averaging time that specifies the period over which the concentration value is to be measured. Table 5.1-~~20~~16 presents the current federal and California state AAQS.

Table 5.1-~~20~~16 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hour	0.09 ppm (180 µg/m^3)	-
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3) (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8-hour	9.0 ppm (10,000 µg/m^3)	9 ppm (10,000 µg/m^3)
	1-hour	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-hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3) (3-year average of annual 98th percentile daily max's)
Sulfur dioxide	Annual Average	-	~~-~~0.030 ppm (80 µg/m^3)
	24-hour	0.04 ppm (105 µg/m^3)	~~-~~0.14 ppm (365 µg/m^3)
	3-hour	-	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	0.075 ppm (196 µg/m^3) (3-year average of annual 99th percentile daily max's)
Respirable particulate matter (10 micron)	24-hour	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	12.0 µg/m^3 (3-year average)
	24-hour	-	35 µg/m^3 (3-year average of annual 98th percentiles)
Sulfates	24-hour	25 µg/m^3	-
Lead	30-day	1.5 µg/m^3	-
	3 Month Rolling Average	-	0.15 µg/m^3

Source: CARB website 10/2015

Notes:

µg/m3 = micrograms per cubic meter

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—CO is a non-reactive pollutant that is a product of incomplete combustion. Ambient CO 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, CO concentrations may be distributed more uniformly over an area out to some distance from vehicular sources. When inhaled at high concentrations, CO 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 (PM10 and PM2.5) — Both PM10 and PM2.5 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 PM10 concentrations, while others, such as vehicular traffic, affect regional PM10 concentrations.

Several studies that EPA relied on for its staff report have shown an association between exposure to particulate matter, both PM10 and PM2.5, 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. PM2.5, 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 facilities 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 facilities, 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 facilities to install CEMS in accordance with 40 CFR Part 75 and report annual emissions of SO_x and NO_x. The acid rain program provisions will apply to the MREC. The MREC will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on the MREC.

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.

Table 5.1-~~21~~17 presents the VCAPCD attainment/nonattainment status. Figure 5.1B-~~3 and Table~~ 5~~.1B-2~~ (Appendix 5.1B) show the locations of monitoring stations in Ventura County (and the South Central Coast Air Basin~~) and the~~). A summary of background air quality values for the representative monitoring sites for the period ~~2012-2014 respectively.~~

~~Ambient~~2013-2015 are shown in Table 5.1-18. These ambient monitoring data for ~~these sites for~~ the most recent 3-year period (~~2012-2014~~2013-2015) are then summarized in Table 5.1-~~22~~18, Air Quality

Monitoring Data. Data from these sites are a reasonable representation of background air quality for the MREC site and impact ~~area~~areas.

Table 5.1-~~21~~17 VCAPCD Attainment Status

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hour	No NAAQS	Nonattainment
Ozone	8-hour	Nonattainment (serious)	Nonattainment
CO	All	Unclassified/Attainment	Attainment
NO_2	All	Unclassified/Attainment	Attainment
SO_2	All	Attainment	Attainment
PM10	All	Unclassified/Attainment	Nonattainment
PM2.5	All	Unclassified/Attainment	Nonattainment
Sulfates	24-hour	No NAAQS	Attainment
Lead	All	Unclassified/Attainment	Attainment
H_2S	1-hour	No NAAQS	Unclassified/Attainment
Visibility Reducing Particles	8-hour	No NAAQS	Unclassified/Attainment

Source: CARB and VCAPCD website data, 10/2015.

~~Table 5.1-22~~

Table 5.1-18 Background Air Quality Data

Pollutant	Site	Avg. Time	2013	2014	2015
Ozone, ppm	El Rio	1-Hr Max	0.067	0.112	0.070
	El Rio	8-Hr Max	0.063	0.077	0.066
PM10, µg/m^3	El Rio	24-Hr Max* (6-day samples)	47	51	N/A
	El Rio	24-Hr H2H (6-day samples)	40	50	N/A
	El Rio	24-Hr Max (continuous)	106	118	93
	El Rio	24-Hr H2H (continuous)	60	69	61
	El Rio	Ann. Mean	24.3	27.4	25.6
PM2.5, µg/m^3	El Rio	24-Hr 98th%	18	18	22
	El Rio	Ann. Mean	9.4	9.3	9.6
NO_2, ppm	El Rio	1-Hr Max	0.040	0.039	0.036
	El Rio	1-Hr 98th%	0.033	0.030	0.028
	El Rio	Ann. Mean	0.007	0.006	0.006
CO, ppm	Santa Barbara	1-Hr Max*	2.5	4.0	2.1
	Santa Barbara	8-Hr Max*	1.1	1.1	0.8
SO_2, ppm	Santa Barbara	1-Hr Max	0.002	0.004	0.002
	Santa Barbara	1-Hr 99th%	0.002	0.001	0.001
	Santa Barbara	24-Hr Max	0.0020	0.0003	0.0010
	Santa Barbara	Ann. Mean	0.0008	0.0000	0.0001

Table 5.1-19 shows the background air quality values based upon the data presented ~~in Appendix 5.1B~~above. The background values represent the highest values reported for the most representative air quality monitoring site during any single year of the most recent three-year period for the CAAQS assessments and the appropriate values for the NAAQS according to the format of the standard as noted below. Appendix 5.1B presents ~~the~~more detailed background air quality data summaries.

Table 5.1-~~22~~19 Background Air Quality Data

Pollutant and Averaging Time	Background Value
Ozone – 1-hour Maximum CAAQS	0.112 ppm (219.9 µg/m^3)
Ozone – 8-hour Maximum CAAQS/NAAQS	0.077 ppm (151.2 µg/m^3)
PM10 – 24-hour Maximum CAAQS~~/NAAQS~~	~~57~~118 µg/m^3
PM10 – 24-hour High, Second-High NAAQS	69 µg/m^3
PM10 – Annual Maximum CAAQS	~~24.3~~25.6 µg/m^3
PM2.5 – 3-Year Average of Annual 24-hour 98th Percentiles NAAQS	~~18~~19 µg/m^3
PM2.5 – Annual Maximum CAAQS	9.~~4~~6 µg/m^3
PM2.5 – 3-Year Average of Annual Values NAAQS	9.~~1~~4 µg/m^3
CO – 1-hour Maximum CAAQS/NAAQS	4.0 ppm (4,581 µg/m^3)
CO – 8-hour Maximum CAAQS/NAAQS	1.1 ppm (1,260 µg/m^3)
NO_2 – 1-hour Maximum CAAQS	0.~~057~~040 ppm (~~107.2~~75.3 µg/m^3)
NO_2 – 3-Year Average of Annual 1-hour 98th Percentile Daily Maxima NAAQS	0.~~032~~030 ppm (~~60.2~~56.4 µg/m^3)
NO_2 – Annual Maximum CAAQS/NAAQS	0.007 ppm (13.2 µg/m^3)
SO_2 – 1-hour Maximum CAAQS	0.004 ppm (10.5 µg/m^3)
SO_2 – 3-Year Average of Annual 1-hour ~~Maximum~~99th Percentile Daily Maxima NAAQS	0.~~004~~001 ppm (~~10.5 µg~~2.6µg/m^3)
SO_2 – 24-hour	0.002 ppm (5.2 µg/m^3)
SO_2 – Annual Maximum NAAQS	0.0008 ppm (2.1 µg/m^3)

For conversion from the ppm measurements to µg/m^3 concentrations typically required for the modeling analyses, used: µg/m^3 = ppm x 40.9 x MW where MW = 48, 28, 46, and 64 for ozone, CO, NO_2, and SO_2, respectively.

AERMOD and CTSCREEN Air Quality Analyses

The following sections present the analyses for determining the changes to ambient air quality concentrations in the region of the MREC. These analyses are comprised of a MREC-only screening assessment to determine the worst-case emissions and stack parameters and a refined modeling assessment used to calculate the MREC changes to ambient air quality. Cumulative multisource modeling assessments, which are used to analyze the MREC plus nearby existing sources, will be performed at a later date upon consultation with the appropriate agencies.

AERMOD Screening Analysis

Operational characteristics of the combustion turbines, such as emission rate, exit velocity, and exit temperature vary by operating loads and ambient temperatures. The MREC turbines will be operated over a variety of temperature and load conditions from 25 to 100 percent, with and without inlet chilling. Thus, an air quality screening analysis was performed that considered these effects.

For the turbines, a range of operational characteristics over a variety of ambient temperatures was assessed using AERMOD and all five years of hourly meteorology (year ~~2009-2013~~2011-2015). This included various turbine loads for seven ambient temperatures: 30°F, 39°F, 59°F, 61°F (annual average conditions), 76°F, 79°F and 96°F (high temperature day). The combustion turbine operating condition that resulted in the highest modeled concentration in the screening analysis for each pollutant and for averaging periods of 24 hours or less were used in the refined impact analyses. The 61°F condition was assumed to represent annual average conditions. As such, no screening analyses were performed for annual average concentrations (the annual refined analyses were modeled with the stack parameters for the 61°F case at 100 percent load with inlet chilling, which is the worst-case average operating condition).

The results of the turbine load/temperature screening analysis are listed in Appendix 5.1B. Most short-term maximum impacts were predicted to occur for the 30°F ambient temperature conditions. For NO_x and CO emissions, the worst-case turbine condition is 30°F and 100 percent load (Case 1) and for SO_2, the worst-case turbine condition is 30°F and 25 percent load (Case 4). This is because SO_2 emissions are the same for all operating conditions, so the lowest load represents the smallest plume rise and the highest impacts when emissions are equal. However, for PM10/PM2.5, the worst-case turbine condition is 96°F and 75 percent load (Case 31). The worst-case 50 percent load condition (30°F, Case 3) was used for modeling startup operations and commissioning activities. Finally, annual impacts were only summarized for the turbine condition of 100 percent load with the chiller at 61°F (Case 14) since this is expected to be the most representative condition of annual operations.

5.1.6.2 AERMOD Refined Analysis

Based on the results of the AERMOD screening analyses, all MREC sources were modeled in the AERMOD refined analysis for comparisons with Significant Impact Levels (SILs) and CAAQS/ NAAQS.

Impacts during normal operations were based on continuous turbine operations at the worst-case screening condition. Testing of the firepump (30 minutes in any one day) will not take place during startup of the turbines, so 1-hour NO_2, CO, and SO_2 impacts included the firepump only for normal operations. The refined modeling analyses did considered operation of the firepump for 8-hour CO startup conditions. Since the firepump would be tested far less than 100 hours/year, it included in 1-hour NO_2 and SO_2 NAAQS modeling analyses at the annual average emission rates per EPA guidance due to the statistical nature of these standards (it was modeled at the maximum 1-hour emission rate for the CAAQS).

For startup operations, the MREC will start with time periods of 30 minutes or less. Since Gaussian modeling is based on 1 hour steady state conditions, the startup/shutdown emission rates used for refined modeling assumed the worst-case combined hourly emission rate for startup, shutdown, and normal operations at the worst-case 50 percent load condition. Detailed emission calculations for all averaging periods are included in Appendix 5.1A. The refined modeling assessment included the following assumptions and conditions for both normal and startup/shutdown conditions:

- All turbines can start during any hour
- Fire pump testing occurs up to 30 minutes per day, 52 hours per year, but will not occur during a turbine start or shutdown hour
- Inlet Chiller operates 24 hours per day and 2,500 hours per year
- Turbines can operate 24 hours per day
- Worst-case annual modeled emissions for NO_x~~, PM10 and PM2.5~~: 2,402 hours at base load, 150 starts, 150 shutdowns = 2,500 hours~~,~~; worst-case annual modeled emission of SO_2, PM10, and PM2.5: 2,500 hours at base load; both with stack characteristics based on the annual operating condition (Case 14)
- Startup stack parameters are based on 50 percent load

- For all the CAAQS, start emissions/conditions were assessed based on the deterministic nature of all California state standards (maximum concentration over the five years modeled for one (1) hour CO, NO_2 and SO_2 standards, etc.)
- Startup CO 8-hour impacts calculated as two starts + two shutdowns + four hours base load with chillers on. The fire pump is assumed to be tested during the eight-hour period.
- For any one-hour time period, all five turbines could be in startup or shutdown.
- Fire pump will not be tested during 1-hour turbine start cycle but is included in the 8-hour start case
- PM10 and PM2.5 24-hour modeled concentrations were based on the worst-case screening condition. The firepump was also assumed to be tested during this time frame.
- The 20-meter spaced refined receptor grid for the elevated terrain area south to southeast of the MREC site was included in both the screening and refined modeling analyses as discussed above.

Also, since startup emissions for SO_2 and PM10/PM2.5 would be less than during normal operations, the short-term impacts analyses for these pollutants did not include start-up conditions. Detailed emission calculations for all averaging periods are included in Appendix 5.1A.

The worst-case modeling input information for each pollutant and averaging period are shown in Table 5.1-~~23~~20 for normal operating conditions and combustion turbine startup/shutdown conditions. As discussed above, the combustion turbine stack parameters used in modeling the impacts for each pollutant and averaging period reflected the worst-case operating condition for that pollutant and averaging period identified in the load screening analysis.

CTSCREEN Modeling Analysis

CTSCREEN was used to re-model the Project impacts in complex terrain where AERMOD predicted a limited number of refined grid receptors with maximum 24-hour PM10 impacts for only one meteorological period greater than the SIL, i.e., where the maximum concentration predicted by AERMOD equaled or exceeded 5 μg/m³. All these locations occurred in complex terrain on South Mountain. To more accurately predict the Project's actual impacts in this complex terrain, a more detailed modeling assessment was conducted using CTSCREEN, which is an EPA-approved preferred model for modeling analyses in complex terrain. *See* 40 CFR Part 51, App. W, Guideline on Air Quality Models, § 4.2.1.2. According to EPA's Modeling Guideline, "CTSCREEN can be used to obtain conservative, yet realistic, worst-case estimates for receptors located on terrain above stack height." *Id*.

A comparison of the maximum 24-hour PM10 concentrations predicted by the AERMOD and CTSCREEN analyses are given below for each of the receptor grids described above.

	AERMOD (μg/m³)		CTSCREEN (μg/m³)
Receptor Grid	Maximum	High Second-High	Maximum
RECGEN (310m)	N/A	N/A	1.54
Coarse (100m)	4.95	3.38	1.65
Refined (20m)	5.59	3.92	1.68

The CTSCREEN analyses show that maximum 24-hour PM10 and PM2.5 impacts are actually 1.68 μg/m³ in complex terrain areas of South Mountain, much less than initially estimated by AERMOD. Therefore, the appropriate AERMOD 24-hour PM10/PM2.5 impacts outside the complex terrain area remodeled with CTSCREEN were reported where applicable. All of the AERMOD non-complex terrain maximum impacts below occur on the MREC fenceline due to wet-SAC PM emissions. A comparison of these AERMOD non-complex terrain maximum impacts and CTSCREEN complex terrain maximum impacts follows:

Pollutant/Avg.Time	AERMOD ($\mu g/m^3$) Non-Complex Terrain	CTSCREEN ($\mu g/m^3$)* Complex Terrain
24-hour PM10/PM2.5 Maximum	3.40	1.68
24-hour PM10 High Second-High	3.38	1.68
24-hour PM2.5 5-Yr Avg./Maximum	3.06	1.68
24-hour PM2.5 5-Yr Avg./98th Percentile	1.65	1.68

* CTSCREEN results are based on scaling factors from the 1-hour concentration and are thus, not adjusted to reflect second high or percentile averages.

The CTSCREEN complex terrain impact above will be reported for the PM2.5 NAAQS assessment and the AERMOD non-complex terrain impacts above will be reported for all the other regulatory significant purposes (SILs, CAAQS, and other NAAQS assessments).

Table 5.1-2320 Stack Parameters and Emission Rates for Each of the Modeled Sources

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Vel. (m/s)	Stack Diam. (m)	Emission Rates (g/s) NO_x	SO_2	CO	PM10/ PM2.5
Averaging Period: 1-hour for Normal Operating Conditions (Case 1 for NOx/CO and Case 4 for SO_2)								
Each Turbine (NOx/CO)	18.29	736.9	31.28	3.6576	0.643	-	0.626	-
Each Turbine (SO_2)	18.29	676.1	16.14	3.6576	-	0.074	-	-
Fire Pump - CAAQS	7.62	803.2	44.30	0.1270	0.086	1.454E-4	0.079	-
Fire Pump - NAAQS	7.62	803.2	44.30	0.1270	1.016E-3	1.726E-6	-	-
Averaging Period: 3-hours for Normal Operating Conditions (Case 4)								
Each Turbine	18.29	676.1	16.14	3.6576	-	0.074	-	-
Fire Pump	7.62	803.2	44.30	0.1270	-	4.847E-5	-	-
Averaging Period: 8-hours for Normal Operating Conditions (Case 1)								
Each Turbine	18.29	736.9	31.28	3.6576	-	-	0.626	-
Fire Pump	7.62	803.2	44.30	0.1270	-	-	9.931E-3	-
Averaging Period: 24-hours for Normal Operating Conditions (Case 4 for SO_2 and Case 31 for PM)								
Each Turbine (SO_2)	18.29	676.1	16.14	3.6576	-	0.074	-	-
Each Turbine (PM)	18.29	738.4	24.08	3.6576	-	-	-	0.252
Fire Pump	7.62	803.2	44.30	0.1270	-	6.059E-6	-	1.910E-4
Wet SAC (per cell)	12.95	Ambient+2.22K*	7.82	4.1148				0.0096
Averaging Period: Annual (Case 14 with Chiller)								
Each Turbine	18.29	738.7	31.42	3.6576	0.161	-0.0212	-	0.072
Fire Pump	7.62	803.2	44.30	0.1270	1.016E-3	-1.726E-6	-	5.441E-4
Wet SAC (per cell)	12.95	-Ambient+5K*	7.82	4.1148				0.0027
Averaging Period: 1-hour for Start-up/Shutdown Periods (Case 3)								
Each Turbine	18.29	704.3	20.83	3.6576	1.468	-	1.007	-
Averaging Period: 8-hours for Start-up/Shutdown Periods (Case 3)								
Each Turbine	18.29	704.3	20.83	3.6576	-	-	0.755	-
Fire Pump	7.62	803.2	44.30	0.1270	-	-	9.931E-3	-

Table 5.1-~~23~~20 Stack Parameters and Emission Rates for Each of the Modeled Sources

	Stack Height (m)	Stack Temp. (Kelvin)	Exit Vel. (m/s)	Stack Diam. (m)	Emission Rates (g/s)			
					NO_x	SO_2	CO	PM10/ PM2.5
Averaging Period: 1-hour for Part 1 of Commissioning Activities (Case 3)								
Two Turbines(each)	18.29	704.3	20.83	3.6576	8.568	-	14.774	-
Averaging Period: 8-hours for Part 1 of Commissioning Activities (Case 3)								
Two Turbines(each)	18.29	704.3	20.83	3.6576	-	-	14.364	-
Averaging Period: 1-hour for Part 2 of Commissioning Activities (Case 3)								
~~Two~~Five Turbines(each)	18.29	704.3	20.83	3.6576	1.680	-	2.961	-
Averaging Period: 8-hours for Part 2 of Commissioning Activities (Case 3)								
~~Two~~Five Turbines(each)	18.29	704.3	20.83	3.6576	-	-	2.751	-
Averaging Period: 24-hours for Part 2 of Commissioning Activities (Case 3)								
~~Two~~Five Turbines(each)	18.29	704.3	20.83	3.6576	-	-	-	0.504
Averaging Period: Annual – First Year with Commissioning Activities (Case 14 with Chiller)								
Each Turbine	18.29	738.7	31.42	3.6576	0.175	-	-	0.074
Fire Pump	7.62	803.2	44.30	0.1270	1.016E-3	-	-	5.441E-4
Wet SAC (per cell)	12.95	Ambient+5K*	7.82	4.1148		-	-	0.0027

m/s = meters per second
m = meter
g/s = grams per second
* Exit temperature is a function of ambient temperature.

5.1.6.3 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 with all 5 years of meteorology. ~~Table~~Tables 5.1-~~24 summarizes~~21 and 5.1-22 summarize maximum modeled concentrations for each criteria pollutant and associated averaging periods. ~~The annual average~~NO_2 concentrations ~~of NO_2~~for normal operations were computed using the ARM following EPA guidance, namely using national default values of 0.80 (80 percent) and 0.75 (75 percent) for 1-hour and annual average NO_2/NO_x ratios, respectively. For start-up periods, NO_2 concentrations were computed using the OLM, using the conservative USEPA NO_2/NO_X stack emissions ratio of 0.50 and the default NO_2/NO_X ambient equilibrium ratio of 0.90. For the refined modeling analyses of the 1-hour CO and the 1-hour NO_2 CAAQS concentrations, AERMOD demonstrated that ~~facility base load~~normal operations produced higher concentrations than startup conditions because of the routine testing of the fire pump. Other maximum facility impacts occurred in the elevated terrain south to southeast of the MREC site. These 200-meter spaced coarse receptor grid and 100-meter spaced intermediate receptor grid areas were remodeled with a 20-meter spaced refined grid. The refined grid was included in both the screening and refined modeling analyses. An evaluation of complex-terrain PM10 and PM2.5 impacts was also performed with CTSCREEN as described above.

The maximum impacts for normal and startup/shutdown facility operating conditions are compared on Table 5.1-~~24~~21 to the EPA SILs for all applicable pollutants. As applicable, the maximum modeled impacts for all five years of meteorological data were used for comparisons to the SILs for all CAAQS and NAAQS, in keeping with the form of the standards. The 5-year averages of the daily maximum or annual impacts were used for the 1-hour NO_2, 1-hour SO_2, 24-hour PM2.5, and annual PM2.5 SILs in accordance with EPA guidance. Most pollutant impacts will be less than the SILs (all CO~~,~~ most SO_2, ~~and~~24-hour PM10

~~for~~(based on CTSCREEN), and all annual averaging times~~ and NO_2 and PM2.5 for annual averages).~~). The maximum MREC concentrations of 1-hour NO_2 (both normal conditions and startup periods~~)~~), 1-hour SO_2, and 24-hour PM2.5 are predicted to be greater than the EPA SILs. The maximum 24-hour PM10 impacts greater than the SILs occurred in complex terrain and were remodeled with CTSCREEN, the screening version of the EPA recommended and preferred model CTDMPLUS, as described above, which are included in the tables below. Based on the maximum of CTSCREEN complex terrain and AERMOD non-complex terrain impacts, MREC 24-hour PM10 impacts will be less than the SIL. The MREC will therefore not significantly contribute to any exceedances of the 24-hour PM10 California state AAQS.

Table 5.1-~~24~~21 Air Quality Impact Results for Refined Modeling Analysis of the MREC – Significant Impact Levels

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Class II SIL (µg/m³)
Normal Operating Conditions			
NO_2 [a]	1-hour Maximum (CAAQS)	~~80.1~~86.0	-
	1-hour ~~3~~5-year Average of ~~Maximums~~Annual Maxima	~~39.4~~51.5	7.5
	Annual Maximum	0.~~20~~14	1.0
CO	1-hour Maximum	~~91.9~~98.8	2,000
	8-hour Maximum	~~23.5~~32.7	500
SO_2	1-hour Maximum	~~9.8~~11.1	-
	1-hour ~~3~~5-year Average of ~~Maximums~~Annual Maxima	~~8.3~~10.6	7.8
	3-hour Maximum	~~5.9~~7.3	25
	24-hour Maximum	~~1.4~~2.0	5
	Annual Maximum	0.02	1
~~PM10~~PM10[b]	24-hour Maximum	3.~~82~~40	5
	Annual Maximum	0.~~15~~09	1
PM2.5	24-hour 5-year Average of ~~Ma Maximums~~ Annual Maxima	~~2.57~~3.06	1.2
	Annual Maximum	0.~~15~~09	-
	5-year Average of Annual Concentrations	0.~~13~~08	0.~~3~~2*
Start-up/Shutdown Periods			
NO_2 [a]	1-hour Maximum	~~133.0~~102.4	-
	1-hour 5-year Average of ~~Maximums~~Annual Maxima	~~113.5~~91.7	7.5
CO	1-hour Maximum	~~114.0~~132.6	2,000
	8-hour Maximum	~~37.3~~49.0	500

[a] NO_2 1-hour and annual impacts for normal conditions evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively. NO_2 1-hour impacts for start-up/shutdown periods evaluated using the Ozone Limiting Method with a NO_2/NO_X stack emissions ratio 0.50 (50 percent) and concurrent El Rio ozone data.
[b] 24-hour PM10 and PM2.5 impacts were re-evaluated with the screening model CTSCREEN, which uses the techniques contained in the USEPA preferred/recommended model CTDMPLUS. The impacts presented are discussed in detail above.
* Proposed Federal SIL

Maximum MREC concentrations are compared in Table 5.1-~~25~~22 to the CAAQS and NAAQS. The maximum concentrations for all five years of meteorological data modeled were used for comparison to all the CAAQS, the annual NO_2 NAAQS and the 1-hour and 8-hour NAAQS for CO. For the other NAAQS, the MREC concentrations in the table were based on the form of the NAAQS, namely: High Second-High (H2H) values for the 3-hour SO_2 NAAQS and 24-hour PM10; the 5-year average of the annual 98th and 99th percentile 1-hour daily maxima for 1-hour NO_2 and SO_2 NAAQS, respectively; and for PM2.5, the 5-year average of the annual 98th percentile 24-hour impacts and the 5-year average of the annual impacts. Compliance with the NAAQS and CAAQS were calculated for all pollutants other than the CAAQS for PM10, which because of high background concentrations, which already exceed the CAAQS (the area is already designated as State nonattainment for the PM10 CAAQS). As noted above, the facility is already projected by AERMOD to have maximum impacts less than the SILs for ~~both 24-hour and~~ annual PM10~~(the only pollutant with background concentrations above the AAQS).~~. A re-evaluation of 24-hour PM10 impacts above the SIL in elevated terrain with CTSCREEN described above are also less than the SIL. Thus, the MREC would not significantly contribute to current exceedances of the ~~CAAQS.~~PM10 CAAQS (the only pollutant with background concentrations above the AAQS).

Table 5.1-~~25~~22 Air Quality Impact Results for Refined Modeling Analysis of MREC – Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (μg/m³)	Background (μg/m³)	Total (μg/m³)	Ambient Air Quality Standards CAAQS/NAAQS (μg/m³)	
Normal Operating Conditions						
NO_2 [a]	1-hour Maximum	~~80.1~~86.0	~~107.2~~75.3	~~187~~161.3	339	-
	1-hour ~~3~~5-year Average of Annual 98th ~~percent~~percentiles	~~26.1~~47.3	~~60.2~~56.4	~~86.3~~103.7	-	188
	Annual Maximum	0.~~20~~14	13.2	13.~~4~~3	57	100
CO	1-hour Maximum	~~91.9~~98.8	4,581	4,~~673~~680	23,000	40,000
	8-hour Maximum	~~23.5~~32.7	1,260	1,~~284~~293	10,000	10,000
SO_2	1-hour Maximum	~~9.8~~11.1	10.5	~~20.3~~21.6	655	-
	1-hour ~~3~~5-year Average of Annual 99th ~~percent~~percentiles	~~6.3~~10.1	~~5.~~2.6	~~11.5~~12.7	-	196
	3-hour Maximum	~~4.~~7.3	10.5	~~15.2~~17.8	-	1300
	24-hour Maximum	~~1.4~~2.0	5.2	~~6.6~~7.2	105	~~-~~365
	Annual Maximum	0.02	2.1	2.1	-	80
~~PM10~~PM 10[b]	24-hour Maximum	3.~~82~~40	~~57~~118	~~61~~121	50	-
	24-hour H2H	3.~~32~~38	~~57~~69	~~60~~72	-	150
	Annual Maximum	0.~~15~~09	~~24.3~~25.6	~~24.4~~25.7	20	-
PM2.5	24-hour ~~3~~5-year Average of Annual 98th ~~percent~~percentiles	1.~~43~~68	~~18~~19	~~19.4~~20.7	-	35
	Annual Maximum	0.~~15~~09	9.~~4~~6	9.~~5~~7	12	-

Table 5.1-~~25~~22 Air Quality Impact Results for Refined Modeling Analysis of MREC – Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards CAAQS/NAAQS (µg/m³)	
	~~3~~5-year Average of Annual Concentrations	0.~~13~~08	9.~~1~~4	9.~~2~~5	-	12.0
Start-up/Shutdown Periods						
NO_2 [a]	1-hour Maximum	~~133.0~~102.4	~~107.2~~75.3	~~240.2~~177.7	339	-
	1-hour ~~3~~5-year Average of 98th ~~percent~~percentiles	~~74.9~~83.8	~~60.2~~56.4	~~135.1~~140.2	-	188
CO	1-hour Maximum	~~114.0~~132.6	4,581	4,~~695~~714	23,000	40,000
	8-hour Maximum	~~37.3~~49.0	1,260	1,~~290~~309	10,000	10,000

[a] NO_2 1-hour and annual impacts for normal conditions evaluated using the Ambient Ratio Method with 0.80 (80 percent) and 0.75 (75 percent) ratios, respectively. NO_2 1-hour impacts for start-up/shutdown periods evaluated using the Ozone Limiting Method with a NO_2/NO_X stack emissions ratio 0.50 (50 percent) and concurrent El Rio ozone data.

[b] 24-hour PM10 and PM2.5 impacts were re-evaluated with the screening model CTSCREEN, which uses the techniques contained in the USEPA preferred/recommended model CTDMPLUS. The impacts presented are discussed in detail above.

5.1.6.4 MREC Commissioning Impact Analysis

The commissioning activities for the combustion turbine are expected to consist of four general phases. GE, the turbine vendor, has provided estimates of emissions and hours for each phase of the commissioning process. This schedule is summarized in Table 5.1-~~26~~23 with additional details in Appendix 5.1A. The worst-~~-~~case short-term emissions profile during expected commissioning-period operating loads are summarized in Table 5.1-~~27~~24.

Table 5.1-~~26~~23 Commissioning Schedule

Commissioning Phase	1 First Fire and Synch Checks	2 Break In Dynamic Commissioning	3 AVR and ECS Tuning	4 Performance Testing
SCR Installed	No	No	No	Yes
CO Catalyst Installed	No	No	No	Yes
Hours per Unit	48	38	34.5	88
Number of Units Operating Simultaneously	2	2	2	~~2~~5
Total NO_x lbs (5 Turbines)	5,885	8,440	3,945	2,390
Total CO lbs (5 Turbines)	14,950	17,915	9,220	2,200
Total ROC lbs (5 Turbines)	265	370	360	635
Total PM10/PM2.5 lbs (5 Turbines)	600	570	600	1,760
Total SO_x lbs (5 Turbines)	191.6	112.1	101.78	259.6

Notes: per GE, see Appendix 5.1A

Table 5.1-2724 Maximum Hourly Emissions Rates During Each Phase of Commissioning (Per Turbine)

Commissioning StagePhase	Emission Rate	NO_X	CO	ROC	PM10/PM2.5	SO_x
1	lb/hr	55.5	83.55	1.5	3.0	0.59
2	lb/hr	68.0	117.33	3.00	3.0	0.59
3	lb/hr	51.25	117.25	2.92	34.0	0.59
4	lb/hr	5.50	5.00	2.67	4.0	0.59

Notes: per GE, see Appendix 5.1A for commissioning schedule.

Days with continuous 24-hour operation were assumed in order to reduce the number of starts during the testing periods.

The modeling assumed each turbine would be in the commissioning activity that produced the maximum emissions.

The total commissioning emissions over 213 hours from theall five (5) turbines during the 213 hours per turbine are expected to be as follows:

- NO_x – 4,13220.660 lbs or 2.0710.33 tons
- CO – 8,858– 44,285 lbs or 4.4322.14 tons
- ROC – 327– 1,630 lbs or 0.16482 tons
- PM10/PM2.5 – 706– 3,530 lbs or 1.77 tons
- SO_x – 665.1 lbs or 0.353 tons
- SO_x – 213 lbs or 0.10733 tons

During the first year of operation, plant commissioning activities, which is planned to occur over an estimated 213 hours per turbine, will have higher hourly and daily emissions profiles than during normal operations in the subsequent years of operation. There are several phases during commissioning that result in NO_x, CO, ROC, and PM10/PM2.5 emissions that are greater than during normal operations. (During commissioning, SO_2 emissions are expected to be no greater than during normal full load operations.) Typically, some of these commissioning activities occur prior to the installation of the pollution control equipment, e.g., SCR and oxidation catalyst, while the combustion turbines are being tuned to achieve optimum performance. During the initial combustion turbine tuning, NO_x and CO emission control systems would not be functioning.

For the purposes of air quality modeling, commissioning activities are divided into two parts. During the first half of the commissioning process, expected to last up to 90 hours per turbine, NO_2, and CO emissions could be considerably higher during commissioning than under other operating conditions already evaluated. Only two turbines would be commissioned during this first part of the commissioning process, with the other turbines in non-operation. During the final and second part of the commissioning lasting up to 123 hours per turbine, NO_2 and CO emissions, while still greater than normal or startup emissions at times, would be considerably less than the first part of commissioning. In addition, long term PM emissions (for the additional five days of commissioning) could exceed normal startup emissions. Therefore, five turbines were assumed to be operational during this second part of commissioning. These commissioning emissions are shown in Table 5.1-2320 and 5.1-2724 above. Like modeling analyses for the startup periods, the worst-case 50 percent load condition (Case 3) was evaluated for commissioning activities. The refined receptor grids from the operational modeling were also included as it produced larger impacts than the normal receptor grids. Since the duration of commissioning is extremely limited, assessment of the 1-hour NO_2, 1-hour SO_2, and 24-hour and annual PM2.5 NAAQS are not required according to EPA guidance documents (i.e., NAAQS based on 5-year averages of the eighth, fourth, and eighth highest daily maximum and annual concentrations, respectively). Further testingTesting of the firepump or operation of the wet-SAC would not be expected to occur during the commissioning period. Finally, theThe ozone limiting method (OLM) as described in the Air Quality Modeling Protocol was used to assess compliance with the 1-hour NO_2 CAAQS. Concurrent background ozone concentrations for the El Rio air quality monitoring site ~~(the same location as the modeled meteorological data) were used, along with EPA-default value of 0.5 for the NO_2/NO_x in-stack ratio and the OLMGROUP ALL option.~~were used, along with EPA-default values of 0.5 for the NO_2/NO_X in-stack emissions ratio, 0.9 for the NO_2/NO_X ambient equilibrium ratio, and the OLMGROUP ALL option. CTSCREEN modeling of PM10 impacts during commissioning show maximum complex terrain impacts of 3.34 µg/m^3, far less than the AERMOD maximum impact in complex terrain of 12.10 µg/m^3. As before, AERMOD impacts above the 5 µg/m^3 SIL occur for a limited number of receptors and meteorological periods. The maximum and highest, second-high AERMOD impacts in non-complex terrain are 3.40 and 3.38 µg/m^3, respectively, which are slightly greater than the CTSCREEN impact. The maximum AERMOD impact in non-complex terrain is shown below for 24-hour PM10 impacts. MREC 24-hour PM10 impacts will be less than the SIL and will therefore not significantly contribute to any exceedances of the 24-hour PM10 California state AAQS. Additional descriptions of the commissioning phases and the associated emissions are contained below and in Appendix 5.1A.

Appendix 5.1A lists the specific emissions during each phase of the commissioning activity, and the proposed detailed commissioning schedule. The modeling presented in Table 5.1-~~28~~25 summarizes the results of the commissioning assessment. As can be seen, the modeling demonstrates that commissioning activities will comply with all applicable National and California state ambient air quality standards (NAAQS/CAAQS) for which the MREC area is already in attainment. Like the facility modeling analyses for normal operations and start-up periods, the background PM10 concentrations already exceed the CAAQS, so combined impacts with the comparatively smaller facility impacts would also exceed the CAAQS. Based on CTSCREEN modeling, the MREC PM10 impacts are predicted to be less than the SIL and will not significantly contribute to any exceedances of the 24-hour PM10 California state AAQS.

Table 5.1-~~28~~25 Air Quality Impact Results for Commissioning Modeling Analysis – Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards CAAQS/NAAQS (µg/m³)	
Commissioning Activities – Part 1 (Phases 2-7)						
NO_2	1-hour Maximum	~~207.0~~232.8	~~107.2~~75.3	~~314.2~~308.1	339	N/A
CO	1-hour Maximum	~~714~~803	4,581	5,~~295~~384	23,000	40,000
	8-hour Maximum	~~296~~389	1,260	1,~~556~~649	10,000	10,000
Commissioning Activities – Part 2 (Phases 8-11)						
NO_2	1-hour Maximum	~~95.1~~117.2	~~107.2~~75.3	~~202.3~~192.5	339	N/A
CO	1-hour Maximum	~~335~~390	4,581	4,~~916~~971	23,000	40,000
	8-hour Maximum	~~136~~179	1,260	1,~~396~~439	10,000	10,000
PM10	24-hour Maximum	~~8.4~~3.40	~~57~~118	~~65.4~~121	50	150
Annual - First Year with Commissioning Activities						
NO_2	Annual Maximum	0.15	13.2	13.4	57	100
PM10	Annual Maximum	0.09	25.6	25.7	20	-
PM2.5	Annual Maximum	0.09	9.6	9.7	12	N/A

Fumigation Analysis

Fumigation analyses with the EPA Model AERSCREEN (version 15181) were conducted for inversion breakup conditions based on EPA guidance given in EPA-454/R-92-019 (EPA, 1002a). ~~The worst-case stack parameters~~Analyses from the original application were duplicated, with separate AERSCREEN runs for normal AERSCREEN impacts and fumigation impacts based on agency comments. This is because of a coding bug in AERSCREEN (version 15181) per the March 29, 2016 e-mail message from James Thurman to George Bridgers, et. al. There were no changes in the AERSCREEN impacts presented below, only a change in the AERMOD screening impacts in the following table (due to the new meteorological dataset). The worst-case stack parameters for 1-hour impacts identified in the screening analysis for the turbine stacks for 1-hour averaging times were modeled (Case 1, or 100 percent load ~~with chiller on~~without inlet conditioning at an ambient temperature of 30°F). Shoreline fumigation impacts were not assessed since the nearest distance to the shoreline of any large bodies of water is greater than 3 kilometers. Since AERSCREEN is a single point source model, the middle turbine stack (Turbine 3) was modeled. Other AERSCREEN inputs were the BPIP-PRIME values used for the facility analyses, the average moisture AERSURFACE output ~~used~~ for the ~~AERMET runs~~El Rio monitoring site, the range of ambient temperatures analyses in the facility screening analyses (30-96°F), a minimum fenceline distance of 25 meters, RURAL dispersion conditions, no flagpole receptors, a minimum wind speed of 0.5 m/s with a 10-meter anemometer height, and flat terrain. Impacts were initially evaluated for unitized emission rates (1.0 g/s for turbine stack T3).

An inversion breakup fumigation impact was predicted to occur at 6,594 meters from the turbine stacks. No inversion breakup fumigation impacts are predicted by AERSCREEN for the shorter firepump stack. Since the site vicinity is rural in nature, there was no need to adjust fumigation impacts for urban dispersion conditions. Only short-term averaging times were evaluated (fumigation impacts are generally expected to occur for 90-minutes or less). These unitized fumigation impacts are shown in Table 5.1-~~29~~26 and ~~were~~are compared to the maximum AERSCREEN impacts for the middle turbine for flat terrain (predicted to occur 251 meters from the stack) and the maximum AERMOD impacts from the screening analysis (that includes terrain elevations and actual meteorological data, which predicts maximum impacts in the elevated terrain areas 1~~.4 to 2.0 km~~,372 meters south~~-~~southeast to 1,432 meters southeast of the proposed facility). As can be seen, all of these maximum~~ 1-hour~~ fumigation impacts are less than the AERSCREEN maxima predicted to occur under normal dispersion conditions anywhere offsite. The fumigation impacts are even smaller when compared to the AERMOD screening analysis impacts for turbine stack T3~~, which consider terrain effects for all the sources combined (shown in the modeling documents).~~. Since all short-term fumigation impacts are less than the maximum overall AERSCREEN and AERMOD screening impacts, no further analysis of additional short-term averaging times is required as described in Section 4.5.3 of EPA-454/R-92-019 (EPA, 1992a). Thus, the overall refined modeling analysis impacts are conservative with respect to fumigation impacts, so no pollutant-specific fumigation results are presented.

Table 5.1-~~29~~26 Fumigation Impact Summary

Averaging Time (Unitized Impacts for 1 g/s)	Fumigation Impacts (µg/m^3)	AERSCREEN Flat Terrain Impacts (µg/m^3)	AERMOD Screening Impacts (µg/m^3)
1-hour	3.232	4.885	~~18.897~~21.504
3-hour	3.232	4.885	~~11.077~~14.248
8-hour	2.909	4.396	~~7.709~~10.499
24-Hour	1.939	2.931	~~2.592~~3.870
Distance (m)	6,594	251	1,~~417~~372-1,~~964~~432

Table 5.1-~~29~~26 Fumigation Impact Summary

Averaging Time (Unitized Impacts for 1 g/s)	Fumigation Impacts (μg/m^3)	AERSCREEN Flat Terrain Impacts (μg/m^3)	AERMOD Screening Impacts (μg/m^3)

5.1.7 Laws, Ordinances, Regulations, and Statutes

Table 5.1-~~30~~27 presents a summary of local, state, and federal air quality LORS deemed applicable to the MREC. Specific LORS are discussed in greater detail in Section 5.1.6.1.

Table 5.1-~~30~~27 Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Federal Regulations		
CAAA of 1990, 40 CFR 50	MREC operations will not cause violations of state or federal AAQS.	5.1.5.1–5.1.5.9
40 CFR 52.21 (PSD)	Impact analysis shows compliance with NAAQS, the MREC will not be subject to PSD.	5.1.5.1-5.1.5.9, 5.1.3.4, Appendix 5.1B, Appendix 5.1C
40 CFR 72-75 (Acid Rain)	The MREC will submit all required applications for inclusion to the acid rain program and allowance system, CEMS will be installed as required. The MREC is subject to Title IV.	5.1.7.1, 5.1.7.2
40 CFR 60 (NSPS)	The MREC will determine subpart applicability and comply with all emissions, monitoring, and reporting requirements. 40 CFR 60, Subpart KKKK will apply to the turbines. Subpart IIII will apply to the fire pump engine.	5.1.7, 5.1.7.1
40 CFR 70 (Title V)	Title V application will be submitted pursuant to the timeframes noted in VCAPCD Regulation XXX.	5.1.7.1, 5.1.7.3
40 CFR 68 (RMP)	The MREC will evaluate substances and amounts stored, determine applicability, and comply with all program level requirements.	5.9
40 CFR 64 (CAM Rule)	Facility will be exempt from CAM Rule provisions.	5.1.7, 5.1.7.1
40 CFR 63 (HAPs, MACT)	Subpart YYYY applies to stationary combustion turbines constructed after 1-14-03 located at a major HAPs source. Emissions limits in the rule are currently stayed.	5.1.7.1
40 CFR 60, Subpart TTTT	Subpart TTTT – GHG performance standards for gas turbines. The proposed facility will be subject to only the non-base load standards based upon use of clean fuels.	5.1.7.1
State Regulations (CARB)		
CHSC 44300 et seq.	The MREC will determine applicability, and prepare inventory plans and reports as required.	5.1.7, 5.1.7.1
CHSC 41700	The VCAPCD PTC will ensure that no public nuisance results from operation of facility.	5.1.7.1, 5.1.7.2
Gov. Code 65920 et seq.	Pursuant to the Permit Streamlining Act, the Mission Rock believes the MREC is a “development project” as defined, and is seeking approvals as applicable under the Act.	n/a

Table 5.1-~~30~~27 Summary of LORS - Air Quality

LORS	Applicability	Conformance (AFC Section)
Local Regulations (VCAPCD)		
Rule 23, Permit Exemptions	The 6 cell wet SAC is exempt from permit, but must meet the basic permit provisions of Rule 10 (Loss of Exemption).	5.1.7.1
Rule 50 -Visible Emissions	Limits visible emissions to Ringelmann 1 for periods greater than 3 minutes in any hour.	5.1.7.1
Rule 51-Nuisance	Prohibits the discharge of pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage businesses or property.	5.1.7.1
Rule 54-Sulfur Compounds	Prohibits sulfur emissions as SO_2 in excess of 300 ppmv (15 percent O_2), and prohibits offsite impacts of SO_2 above 0.25 ppm (1 hr avg) and 0.04 ppmv (24 hr avg).	5.1.7.1
Rule 55-Fugitive Dust Control	Requires control of fugitive dust from construction activities including track-out emissions, also prohibits visible dust emissions beyond the property line.	5.1.7.1
Rule 57.1-PM Emissions from Fuel Burning Eq.	Limits PM emissions from fuel combustion to <= 0.12 lbs/mmbtu.	5.1.7.1
Rule 64-Sulfur Content of Fuels	Limits gaseous fuel sulfur to <= 50 gr S/100scf, and liquid fuel sulfur content to <= 0.5 percent weight.	5.1.7.1
Rule 72-NSPS	See Federal LORS Section of table.	5.1.7.1
Rule 73-NESHAPs	See Federal LORS Section of table.	5.1.7.1
Rule 79.4-Stationary IC Engines	Limits NO_x, CO, and ROC emissions from stationary IC engines greater than 50 bhp. Emergency IC engines operating <= 50 hours/year for testing and maintenance, and <= 200 hours/year for any purpose is exempt from the rule emissions limits.	5.1.7.1
Rule 74.23-Stationary Gas Turbines	Limits NO_x from turbines >=10 MW, firing gas fuels and using SCR to a ppm value calculated by (9XEFF/25). The proposed turbines will meet these NO_x requirements. In addition the rule requires compliance with an NH3 slip limit of 20 ppmv. The proposed ammonia slip limit for the turbines is 5 ppmv.	5.1.7.1

5.1.7.1 Specific LORS Discussion

Federal LORS

EPA implements and enforces the requirements of many of the federal air quality laws. EPA has adopted the following stationary source regulatory programs in its effort to implement the requirements of the CAA:

- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
- PSD
- New Source Review (NSR)
- Title IV: Acid Rain/Deposition Program
- Title V: Operating Permits Program
- CAM Rule

National Standards of Performance for New Stationary Sources - 40 CFR Part 60, Subparts KKKK and IIII

The NSPS program provisions limit the emission of criteria pollutants from new or modified facilities in specific source categories. The applicability of these regulations depends on the equipment size or rating; material or fuel process rate; and/or the date of construction, or modification. Reconstructed sources can be affected by NSPS as well. Applicability of Subpart KKKK to the proposed new turbine supersedes applicability of Subpart GG. Compliance with BACT will insure compliance with the emissions limits of Subpart KKKK. Subpart IIII is expected to apply to the proposed fire pump engine. Compliance with the EPA and CARB tiered emissions standards, and the CARB/VCAPCD ATCM for stationary CI engines will insure compliance with IIII.

National Emission Standards for Hazardous Air Pollutants - 40 CFR Part 63

The NESHAPs program provisions limits hazardous air pollutant emissions from existing major sources of HAP emissions in specific source categories. The NESHAPs program also requires the application of maximum achievable control technology (MACT) to any new or reconstructed major source of HAP emissions to minimize those emissions. Subpart YYYY will apply to the proposed turbine. The emissions provisions of Subpart YYYY are currently subject to “stay” by EPA. Notwithstanding the foregoing, the proposed turbine is expected to comply with the emissions provisions.

PSD Program - 40 CFR Parts 51 and 52

The PSD program requires the review and permitting of new or modified major stationary sources of air pollution to prevent significant deterioration of ambient air quality. PSD applies only to pollutants for which ambient concentrations do not exceed the corresponding NAAQS. The PSD program allows new sources of air pollution to be constructed, and existing sources to be modified, while maintaining the existing ambient air quality levels in the MREC region and protecting Class I areas from air quality degradation. The facility will *not* trigger the PSD program requirements.

NSR - 40 CFR Parts 51 and 52

The NSR program requires the review and permitting of new or modified major stationary sources of air pollution to allow industrial growth without interfering with the attainment of AAQS. NSR applies to pollutants for which ambient concentrations exceed the corresponding NAAQS. The AFC air quality analysis complies with all applicable NSR provisions.

Title IV - Acid Rain Program - 40 CFR Parts 72-75

The Title IV program requires the monitoring and reduction of emissions of acid rain compounds and their precursors. The primary source of these compounds is the combustion of fossil fuels. Title IV establishes national standards to limit SO_x and NO_x emissions from electrical power generating facilities. The proposed new turbines will be subject to Title IV, and will submit the appropriate applications to the air District as part of the PTC application process. The MREC will participate in the Acid Rain allowance program through the purchase of SO_2 allowances. Sufficient quantities of SO_2 allowances are available for use on the MREC.

Title V - Operating Permits Program - 40 CFR Part 70

The Title V program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. Title V applies to major facilities, acid rain facilities, subject solid waste incinerator facilities, and any facility listed by EPA as requiring a Title V permit. Title V application forms applicable to the proposed new facility will be submitted pursuant to the District Title V permitting rule timeframes.

CAM Rule - 40 CFR Part 64

The CAM rules require facilities to monitor the operation and maintenance of emissions control systems and report malfunctions of any control system to the appropriate regulatory agency. The CAM rule applies to emissions units with uncontrolled potential to emit levels greater than applicable major source thresholds. However, emission control systems governed by Title V operating permits requiring continuous compliance determination methods are exempt from the CAM rule. Since the MREC will be issued a Title V permit requiring the installation and operation of continuous emissions monitoring systems, the MREC will qualify for this exemption from the requirements of the CAM rule.

Toxic Release Inventory (TRI) Program - Emergency Planning and Community Right-to-Know Act

The TRI program as applied to electric utilities, affects only those facilities in Standard Industrial Classification (SIC) Codes 4911, 4931, and 4939 that combust coal and/or oil for the purpose of generating electricity for distribution in commerce must report under this regulation. The MREC SIC Code is 4911. However, the MREC will not combust coal and/or oil for the purpose of generating electricity for distribution in commerce. Therefore, this program does not apply to the MREC.

NSPS

NSPS are federal standards promulgated for new and modified sources in designated categories codified in 40 CFR Part 60. NSPS are emission standards that are progressively tightened over time in order to achieve ongoing air quality improvement without unreasonable economic disruption. The NSPS impose uniform requirements on new and modified sources throughout the nation. The format of the standard can vary from source to source. It can be a numerical emission limit, a design standard, an equipment standard, or a work practice standard. Primary enforcement responsibility of the NSPS rests with EPA, but this authority has delegated to the VCAPCD, which is enforced through Regulation 9.

Subpart A General Provisions

Any source subject to an applicable standard under 40 CFR Part 60 is also subject to the general provisions of Subpart A. Because the MREC is subject to Subparts IIII and KKKK, the requirements of Subpart A will also apply. The MREC operator will comply with the applicable notifications, performance testing, recordkeeping and reporting outlined in Subpart A.

Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion

Engines

Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines that commence construction after July 11, 2005. Relevant to the MREC, the rule applies to the fire water pump CI engine as follows:

(i) Non-fire, water pump engines manufactured after April 1, 2006;
(ii) Fire water pump engines with less than 30 liters per cylinder manufactured after 2009; or

~~Or~~

(iii) Fire water pump engines manufactured as a certified National Fire Protection Association fire water pump engine after July 1, 2006.

For the purpose of this rule, “manufactured” means the date the owner places the order for the equipment. Based on the timeline projected for obtaining approval of the MREC, the applicant expects that the engines will be ordered (and thus manufactured) in 2016.

Owners and operators of fire water pump engines with a displacement of less than 30 liters per cylinder must comply with the emission standards listed for all pollutants. For model year 2016 or later 175-hp engines, the limits are 2.6 grams per horsepower-hour (g/hp-hr) for CO, 3.0 g/hp-hr for non-methane hydrocarbons and NO_x combined, and 0.22 g/hp-hr for PM. The MREC will install a Tier 3 engine meeting these standards.

Subpart KKKK Standards of Performance for Stationary Combustion Turbines.

Subpart KKKK places emission limits of NO_x and SO_2 on new combustion turbines. For new combustion turbines firing natural gas with a rated heat input greater than 850 MMBtu/hr, NO_x emissions are limited to 15 ppm at 15 percent O_2 of useful output (0.43 pounds per megawatt-hour [lb/MWh]).

SO_x emissions are limited by either of the following compliance options:

1. The operator must not cause to be discharged into the atmosphere from the subject stationary combustion turbine any gases which contain SO_2 in excess of 110 ng/J (0.90 lb/MWh) gross output, or
2. The operator must not burn in the subject stationary combustion turbine any fuel which contains total potential sulfur emissions in excess of 0.060 lbs SO_2/MMBtu heat input. If the turbine simultaneously fires multiple fuels, each fuel must meet this requirement.

As described in the BACT section, the MREC will use a SCR system to reduce NO_x emissions to 2.0 ppm and pipeline natural gas to limit SO_2 emissions to 0.0006 pounds per MMBtu to meet BACT requirements, which ensures that the MREC will satisfy the requirements of Subpart KKKK.

NSPS Part 60 (Subpart TTTT) GHG Standards of Performance for GHG Emissions for New Stationary Sources: Electric Utility Generating Units.

In January, 2014, EPA re-proposed the standards of performance regulating CO_2 emissions from new affected fossil-fuel-fired generating units, pursuant to Section 111(b) of the CAA. These standards were adopted in final form by EPA on August 3, 2015. The new standards would be 1,100 lbs CO_2/MWh (gross energy output on a 12 operating month rolling average basis for base loaded units), while non-base load units would have to meet a clean fuels input-based standard. The determination of base versus non-base load would be on a sliding scale that considers design efficiency and power sales.

Within Subpart TTTT, base load rating is defined as maximum amount of heat input that an Electrical Generating Unit (EGU) can combust on a steady state basis at ISO conditions. For stationary combustion turbines, base load rating includes the heat input from duct burners. Each EGU is subject to the standard if it burns more than 90 percent natural gas on a 12-month rolling basis, and if the EGU supplies more than the design efficiency times the potential electric output as net-electric sales on a 3 year rolling average basis. Affected EGUs supplying equal to or less than the design efficiency times the potential electric output as net electric sales on a 3 year rolling average basis are considered non-base load units and are subject to a heat input limit of 120 lbs CO_2/MMBtu. Each affected 'base load' EGU is subject to the gross energy output standard of 1,000 lbs of CO_2/MWh unless the Administrator approves the EGU being subject to a net energy output standard of 1,030 lbs CO_2/MWh. The MREC turbines are not considered base load units, but rather non-base load units, and as such they must meet and will meet the heat input limit of 120 lbs CO_2/mmbtu as specified in 40 CFR 60.5508-60.5580, Subpart TTTT, Table 2.

State LORS

CARB's jurisdiction and responsibilities fall into the following five areas;

- Implement the state's motor vehicle pollution control program
- Administer and coordinate the state's air pollution research program
- Adopt and update the state's AAQS
- Review the operations of the local air pollution control districts (VCAPCDs) to insure compliance with state laws
- Review and coordinate preparation of the State Implementation Plan

Air Toxic "Hot Spots" Act – H&SC §44300-44384

The Air Toxics "Hot Spots" Information and Assessment Act requires the development of a statewide inventory of Toxic Air Contaminants (TAC) emissions from stationary sources. The program requires affected facilities to, prepare an emissions inventory plan that identifies relevant TACs and sources of TAC emissions, prepare an emissions inventory report quantifying TAC emissions, and prepare an HRA, if necessary, to quantify the health risks to the exposed public. Facilities with significant health risks must notify the exposed population, and in some instances must implement risk management plans to reduce the associated health risks.

Public Nuisance – H&SC § 41700

Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or which endanger the comfort, repose, health, or safety of the public, or that damage business or property.

Local Air District LORS-VCAPCD

VCAPCD Prohibitory Rules – General and Source Specific Regulations

The general prohibitory rules of the VCAPCD applicable to the MREC are summarized below.

Rule 23 – Exemptions from Permit Requirements

The proposed wet SAC is currently exempt from the permitting requirements of the VCAPCD. Should this exemption change, the requirement s of Rule 10 to apply for a permit to operate would apply.

Rule 50 – Visible Emissions.

Prohibits visible emissions as dark as, or darker than, Ringelmann No. 1 for periods greater than 3 minutes in any hour. The use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 51 – Nuisance.

Prohibits a facility from discharging air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property. Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 54 – Sulfur Compounds.

Prohibits sulfur emissions, calculated as SO_2, in excess of 300 ppmv at 15 percent oxygen, and prohibits offsite ambient SO_2 impacts above 0.25 ppmv (1-hour average) and 0.04 ppmv (24-hour average). Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 55 – Fugitive Dust Control.

Requires the control of dust emissions during construction activities and prohibits visible dust emissions beyond the property line; also requires mitigation of track-out onto public roadways and includes other dust mitigation requirements.

Rule 57.1 – Particulate Matter Emissions from Fuel Burning Equipment.

Prohibits PM emissions above 0.12 pound per million British thermal units (lb/MMBtu) for fuel burning equipment. Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 64 – Sulfur Content of Fuels.

Prohibits the burning of gaseous fuel with a sulfur content of more than 50 gr/100 scf and liquid fuel with a sulfur content of more than 0.5 percent sulfur by weight. Use of natural gas in the turbines and low sulfur diesel fuel in the emergency engines is expected to establish compliance with the rule provisions.

Rule 72 – New Source Performance Standards.

Requires units to comply with the applicable sections of the federal NSPS. See subpart KKKK analysis.

Rule 73 – National Emission Standards for Hazardous Air Pollutants.

Requires units to comply with the applicable sections of the federal NESHAP program.

Rule 74.9 – Stationary Internal Combustion Engines.

Rule limits CO, NO_x, and ROC emissions from stationary reciprocating internal combustion engines rated greater than or equal to 50 bhp. Emergency equipment operating less than or equal to 50 hours per year for testing or maintenance purposes and less than or equal to 200 hours per year for any purpose is exempt from the emission limits of Rule 74.9.

Rule 74.23 – Stationary Gas Turbine.

Limits NO_x emissions from stationary gas turbines rated greater than or equal to 10 megawatts (MW) with post-combustion controls to 9 ppmv (at 15 percent oxygen, corrected for efficiency). The NO_x emissions from the proposed turbines will be limited to 2.5 parts per million (ppmvc), and thus complies with this rule. Use of natural gas, low-NO_x burner technology, and SCR in the turbines is expected to establish compliance with the rule provisions.

GHG-Climate Change and Global Warming

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth.

Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming. According to the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment, it is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic forcings together.

State law defines GHG to include the following: CO_2, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code §38505[g]). The most common GHG that results from human activity is CO_2, followed by methane and N_2O.

Legislative Action

Assembly Bill (AB) 1493 (June 2002)

On July 22, 2002, the Governor of California signed into law AB 1493, a statute directing the CARB to "develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." The statute required CARB to develop and adopt the regulations no later than January 1, 2005. AB 1493 allows credits for reductions in GHG emissions occurring before CARB's regulations become final (i.e., an early reduction credit). AB 1493 also required that the

California Climate Action Registry, in consultation with the CARB, shall adopt procedures for the reporting of reductions in GHG emissions from mobile sources no later than July 1, 2003.

Executive Order S-3-05 (June 2005)

On June 1, 2005, the Governor announced GHG emission reduction targets for California. The Governor signed Executive Order S-3-05 which established GHG emission reduction targets and charged the secretary of the California Environmental Protection Agency (Cal-EPA) with the coordination of the oversight of efforts to achieve them. The Executive Order establishes three targets for reducing global warming pollution:

- Reduce GHG emissions to 2000 emission levels by 2010;
- Reduce GHG emissions to 1990 emission levels by 2020; and,
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

Global Warming Solutions Act of 2006 (AB 32)

In August 2006, the California legislature passed AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires the state to reduce statewide greenhouse gas emissions to 1990 levels by 2020 and authorizes California resource agencies to establish a comprehensive program of regulatory and market mechanisms to achieve reductions in GHG emissions (ARB, 2006). ARB has promulgated a Cap-and-Trade Regulation, which requires covered entities, including electricity generators, petroleum refiners, large manufacturers and importers of electricity, to hold and surrender compliance instruments in an amount equivalent to their GHG emissions. Compliance instruments include allowances issued by ARB and linked jurisdictions, which currently include Québec, and offset credits.

Currently, the Cap-and-Trade Regulation requires reductions through 2020, although the ARB is considering adoption of amendments that would continue implementation of the Cap-and-Trade Program as an element of the State's plan that will be submitted to the U.S. Environmental Protection Agency pursuant to its Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662 (Oct. 23, 2015) (Clean Power Plan). The MREC is anticipated to be subject to the Cap-and-Trade Regulation and will comply with it.
Utility Generating Units, 80 Fed. Reg. 64662 (Oct. 23, 2015) (Clean Power Plan). The MREC is anticipated to be subject to the Cap-and-Trade Regulation and will comply with it.

Legislation failed to pass in the first year of the two-year legislative session that would have set long-and longand
mid-term targets for the State to achieve GHG reductions consistent with Governor Schwarzenegger's and Governor Brown's goals established by executive order (80% below 1990 levels by 2050 and 40% below 1990 levels by 2030, respectively). -However, Governor Brown's executive order (B-30-15) charges ARB with updating the Scoping Plan developed pursuant to AB 32 to express the 2030 goal and directed all state agencies with jurisdiction over GHG emissions to implement measures to reduce emissions and thereby achieve the 2030 and 2050 targets. -ARB has begun the Scoping Plan update process and is anticipated to continue implementation of the Cap-and-Trade Program to achieve these targets.

Senate Bill (SB) 971368 (August 2007)

In addition to AB 32, Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) was signed into law on August 2007. The law limits long-term investments in and procurement of electricity from base load generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the CPUC. In response, the CEC has designed regulations that establish a standard for base load generation owned by, or under long-term contract to publicly owned utilities, of 1,100 lb CO_2/MWh. A base load generation is defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent. The permitted capacity factor for the MREC will be approximately 29 percent. Therefore, as a non-baseload facility, procurement of electricity from the MREC pursuant to a long-term contract would not be subject to the emissions performance standard.

5.1.7.2 Agency Jurisdiction and Contacts

Table 5.1-~~31~~28 presents data on the following:

- Air quality agencies that may or will exercise jurisdiction over air quality issues resulting from the power facility
- The most appropriate agency contact for the MREC,
- Contact address and phone information
- The agency involvement in required permits or approvals

Table 5.1-~~31~~28 Agencies, Contacts, Jurisdictional Involvement, Required Permits For Air Quality

Agency	Contact	Jurisdictional Area	Permit Status
CEC	Chris Davis 1516 Ninth St. Sacramento, CA 95814	Primary reviewing and certification agency.	Will certify the facility under the energy siting regulations and CEQA. Certification will contain a variety of conditions pertaining to emissions and operation.
VCAPCD	Kerby Zozula Manager, Eng. Division VCAPCD 669 County Square Dr. Ventura, CA. 93003 (805) 645-1421	Prepares DOC for CEC, Issues VCAPCD ATC and Permit to Operate, Primary air regulatory and enforcement agency.	DOC will be prepared subsequent to AFC submittal. AFC serves as the ATC application per Rule 26.9.
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.
EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974	Oversight of all AQMD programs, including permitting and enforcement programs. PSD permitting authority for VCAPCD.	EPA Region 9 staff will receive a copy of the DOC. EPA Region 9 staff will have opportunity to comment on draft ATC.

DOC = Determination of Compliance

5.1.7.3 Permit Requirements and Schedules

An ATC application is required in accordance with the VCAPCD rules. Pursuant to VCAPCD Rule 26.9, the AFC is considered to be equivalent to the AQMD ATC permitting application. The required district permitting forms have been submitted separately to the VAPCD. These application forms in conjunction with the AFC comprise the required AQMD permitting application package. The required Title V application will be submitted within 12 months of the commencement of facility operations per the VCAPCD rules.

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APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Section 5.9, PUBLIC HEALTH (CLEAN)

5.9 Public Health

This section presents the methodology and results of a HRA performed to assess potential effects and public exposure associated with airborne emissions from the routine operation of the MREC. Section 5.9.1 describes the affected environment. Section 5.9.2 presents an environmental analysis of the operation of the power facility and associated facilities. Section 5.9.3 discusses cumulative effects. Section 5.9.4 discusses mitigation measures. Section 5.9.5 presents applicable LORS, permit requirements, schedules, and agency contacts. Section 5.9.5 contains references cited or consulted in preparing this section. Appendix 5.1D contains the HRA support data.

Mission Rock is proposing to construct and operate a 285 MW (nominal rated) simple-cycle power plant consisting of five GE LM6000 PG Sprint CTGs, an emergency fire pump system, a six (6) cell wet surface air condenser (wet SAC), and associated support equipment. A complete description of the MREC is presented in Section 2.0.

Air will be the dominant pathway for public exposure to chemical substances released by the MREC. Emissions to the air will consist primarily of combustion by-products produced by the new combustion turbines and the fire pump engine. Potential health risks from combustion emissions will occur almost entirely by direct inhalation. To be conservative, additional pathways were included in the health risk modeling, however, direct inhalation is considered the most likely exposure pathway. The HRA was conducted in accordance with guidance established by the California OEHHA and the CARB.

Combustion byproducts with established CAAQS or NAAQS, including NO_x, CO, and fine particulate matter (PM10/PM2.5) are addressed in Section 5.1, Air Quality. However, some discussion of the potential health risks associated with these substances is presented in this section. Human health risks associated with the potential accidental release of stored acutely hazardous materials are discussed in the Hazardous Materials Handling section.

5.9.1 Affected Environment

The MREC will be located in Ventura County within the South Central Coast Air Basin. The MREC site is situated approximately 3 miles southwest of downtown Santa Paula, California, between Mission Rock Road and Shell Road The site lies south of SR-126 (Santa Paula Highway). The site lies approximately 2.5 miles northeast of the junction of SR-126 and SR-118. SPZ lies approximately 3 miles to the northeast, and the Ventura County Jail lies approximately 900 feet due west of the site.

The MREC site is situated in Ventura County census tract 0005.00, which has a population value of 1867 individuals per the 2010 census.

Sensitive receptors are defined as groups of individuals that may be more susceptible to health risks due to chemical exposure. Schools, both public and private, day care facilities, convalescent homes, and hospitals are of particular concern. A partial list of the nearest sensitive receptors based upon receptor type, are listed in Table 5.9-1. Residences and worker receptors are not technically defined as “sensitive receptors” by OEHHA. Nearby receptors of these types are included in Table 5.9-1 for informational purposes only. Appendix 5.1D, delineates data on the population by census tract within a 6-mile radius of the site, as well as a comprehensive list of sensitive receptors analyzed in the HRA.

Table 5.9-1 Nearest Sensitive Receptors By Receptor Type

Receptor Type	UTM Coordinates (East/North), m	Elevation, (feet above mean sea level)
Residence-North	306264, 3799566	203
Residence-South	306144, 3795267	421

Table 5.9-1 Nearest Sensitive Receptors By Receptor Type

Receptor Type	UTM Coordinates (East/North), m	Elevation, (feet above mean sea level)
Residence-East	306531, 3798541	189
Residence-West	304929, 3797623	175
Residence-R1a*	306551, 3798554	189
Residence-R1b*	306529, 3798630	190
Residence-R2*	306325, 3798714	186
Worker	306257, 3798462	185
School	306381, 3800656	244
Hospital/Health Facility	297887, 3789325	61
Daycare Center	None Identified	-
Convalescent Home	295842, 3793169	165
Jail/Detention Center	305532, 3798464	189

Source: All coordinates from Google Earth (center location of each receptor location).

1 The nearest school is approximately 1.25 miles (6,600 feet) from the MREC site, therefore no VCAPCD Risk notifications are required.

See Appendix 5.1D for a complete list of sensitive receptors analyzed in the HRA.

*Residential locations identified in the noise survey added for completeness.

Air quality and health risk data presented by CARB in the 2009 Almanac of Emissions and Air Quality for the state shows that over the period from 1990 through 2008, the average concentrations for the top 10 TACs have been substantially reduced, and the associated health risks for the state are showing a steady downward trend as well. This same trend is expected to have occurred in the South Central Coast Air Basin. CARB-estimated emissions inventory values for the top 10 TACs for 2008 are presented in Table 5.9-2. Data for years subsequent to 2008 are not available from CARB at this time. Mission Rock is not aware of any recent (within the last 5 years) public health studies related to respiratory illnesses, cancers or related diseases concerning the local area within a 6-mile radius of the MREC site.

Table 5.9-2 Top 10 TAC Emissions-2008

TAC	Statewide Emissions (tons/year)	South Central Coast Air Basin Emissions (tons/year)	VCAPCD Emissions (tons/year)
Acetaldehyde	9103	386	161
Benzene	10794	573	246
1,3 Butadiene	3754	186	68
Carbon tetrachloride	4.04	<0.01	0
Chromium 6	0.61	<0.03	<0.01
Para-Dichlorobenzene	1508	61	33
Formaldehyde	20951	917	380
Methylene Chloride	6436	307	157
Perchloroethylene	4982	168	71
Diesel PM	35884	927	436

Table 5.9-2 Top 10 TAC Emissions-2008

TAC	Statewide Emissions (tons/year)	South Central Coast Air Basin Emissions (tons/year)	VCAPCD Emissions (tons/year)

Source: California Almanac of Emissions and Air Quality-2009, CARB-PTSD.

5.9.2 Environmental Analysis

The environmental effects on public health from construction and operation of the MREC are presented in the following sections.

5.9.2.1 Significance Criteria

Cancer Risk

Cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be 30 years). Carcinogens are not assumed to have a threshold below which there would be no human health effect. In other words, any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure, the lower the cancer risk (i.e., a linear, no-threshold model). Under various state and local regulations, an incremental cancer risk greater than 10 in a million due to a project is considered to be a significant effect on public health. For example, the 10 in a million risk level is used by the Air Toxics Hot Spots (AB 2588) program and Proposition 65 as the public notification level for air toxic emissions from existing sources.

Non-Cancer Risk

Non-cancer health effects can be classified as either chronic or acute. In determining the potential health risks of non-cancerous air toxics, it is assumed there is a dose of the chemical of concern below which there would be no effect on human health. The air concentration corresponding to this dose is called the Reference Exposure Level (REL). Non-cancer health risks are measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are typically summed with the resulting totals expressed as hazard indices for each organ system. A hazard index of less than 1.0 is considered to be an insignificant health risk. For this HRA, all hazard quotients were summed regardless of target organ. This method leads to a conservative, upper-bound assessment. RELs used in the hazard index calculations were those published in the CARB/OEHHA listings dated May 2015 (Carb, 2015).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure, caused by chemicals accumulating in the body. Because chemical accumulation to toxic levels typically occurs slowly, symptoms of chronic effects usually do not appear until long after exposure commences. The lowest no-effect chronic exposure level for a non-carcinogenic air toxic is the chronic REL. Below this threshold, the body is capable of eliminating or detoxifying the chemical rapidly enough to prevent its accumulation. The chronic hazard index was calculated using the hazard quotients calculated with annual concentrations.

Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. For most chemicals, the air concentration required to produce acute effects is higher than the level required to produce chronic effects because the exposure duration is shorter. Because acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures, all hazard quotients are typically summed to calculate the acute hazard index. One-hour average concentrations are divided by the acute RELs to obtain a hazard index for health effects caused by relatively high, short-term exposures to air toxics.

5.9.2.2 Construction Phase Effects

The construction phase of the MREC is expected to take approximately 23 months (followed by several months of startup and commissioning). No significant public health effects are expected during the construction phase. Strict construction practices that incorporate safety and compliance with applicable LORS will be followed (see Section 5.9.5). In addition, mitigation measures to reduce air emissions from construction effects will be implemented as described in Section 5.1, Air Quality, and Appendix 5.1E.

Temporary emissions from construction-related activities are discussed in Section 5.1, Air Quality and Appendix 5.1E. Construction-related emissions are temporary and localized, resulting in no long-term effects to the public.

Small quantities of hazardous waste may be generated during the construction phase of the MREC. Hazardous waste management plans will be in place so the potential for public exposure is minimal. Refer to the Waste Management, for more information. No acutely hazardous materials will be used or stored on-site during construction (see the Hazardous Materials Handling section). To ensure worker safety during construction, safe work practices will be followed (see the Worker Safety section).

5.9.2.3 Operational Phase Effects

Environmental consequences potentially associated with the operation of the MREC are potential human exposure to chemical substances emitted to the air. The human health risks potentially associated with these chemical substances were evaluated in a HRA. The chemical substances potentially emitted to the air from the MREC turbines, and IC engine are listed in Table 5.9-3.

Table 5.9-3 Chemical Substances Potentially Emitted to the Air from the MREC

Criteria Pollutants
PM
CO
SOx
NOx
VOC
Lead
Noncriteria Pollutants (Toxic Pollutants)
Ammonia, Arsenic, Acetaldehyde, Acrolein
Benzene, Beryllium
Cadmium, Chromium, Copper
1-3 Butadiene
Ethylbenzene
Formaldehyde
Hexane (n-Hexane)
Lead
Nickel, Naphthalene
Manganese, Mercury
PAHs, Propylene, Propylene Oxide
Selenium, Silica
Toluene
Vanadium
Xylene

Table 5.9-3 Chemical Substances Potentially Emitted to the Air from the MREC

Criteria Pollutants
Diesel Particulate Matter

PAH = polynuclear (or polycyclic) aromatic hydrocarbon

Tables 5.9-4 and 5.9-5 present the estimated toxic pollutant emissions from the facility processes.

Table 5.9-4 Toxic Pollutant Emissions Estimates (lbs/hr)

Pollutant/Device	Each Turbine	5 Turbines	Fire Pump
Ammonia	3.77	18.9	-
Total PAHs (BaP)	0.0000267	0.000134	-
Acetaldehyde	0.00452	0.0226	-
Acrolein	0.000721	0.0036	-
Benzene	0.00136	0.00679	-
1-3 Butadiene	0.0000487	0.000243	-
Ethylbenzene	0.00363	0.0181	-
Formaldehyde	0.201	1.0	-
Hexane	0.0287	0.144	-
Naphthalene	0.000147	0.00074	-
Propylene	0.0855	0.428	-
Propylene Oxide	0.00328	0.0164	-
Toluene	0.0147	0.0736	-
Xylene	0.00725	0.0362	-
Diesel PM	-	-	0.07

Table 5.9-5 Toxic Pollutant Emissions Estimates (lbs/year)

Pollutant/Device	Each Turbine	5 Turbines	Fire Pump
Ammonia	9430	47150	-
Total PAHs (BaP)	0.0662	0.331	-
Acetaldehyde	11.2	56	-
Acrolein	1.79	8.93	-
Benzene	3.37	16.8	-
1-3 Butadiene	0.121	0.603	-
Ethylbenzene	8.98	44.9	-
Formaldehyde	498	2490	-
Hexane	71.2	356	-

Naphthalene	0.365	1.83	-
Propylene	212	1060	-
Propylene Oxide	8.13	40.7	-
Toluene	36.5	183	-
Xylene	18	90	-
Diesel PM	-	-	3.78

Table 5.9-5 (continued) Wet SAC Toxic Pollutant Emissions Estimates

Substance	Lbs/Hr/Cell	Lbs/Yr/Cell
Arsenic	3.47E-8	8.68E-5
Beryllium	3.43E-9	8.57E-6
Cadmium	4.90E-9	1.22E-5
Total Chromium	5.34E-9	1.34E-5
Copper	1.25E-7	3.12E-4
Lead	1.56E-8	3.89E-5
Manganese	1.16E-3	2.89E+0
Mercury	1.47E-10	3.67E-7
Nickel	4.01E-8	1.00E-4
Selenium	4.72E-7	1.18E-3
Silica	3.20E-4	8.01E-1
Vanadium	2.67E-8	6.68E-5

Emissions of criteria pollutants will adhere to NAAQS and CAAQS as discussed in Section 5.1, Air Quality. The MREC also will include emission control technologies necessary to meet the required emission standards specified for criteria pollutants under VCAPCD rules. Offsets will be required because the MREC will be a major source under the Districts NSR rule. Finally, air dispersion modeling results (presented in Section 5.1, Air Quality) show that emissions will not result in concentrations of criteria pollutants in air that exceed ambient air quality standards (either NAAQS or CAAQS). These standards are intended to protect the general public with a wide margin of safety. Therefore, the MREC is not anticipated to have a significant effect on public health from emissions of criteria pollutants.

Potential effects associated with emissions of toxic pollutants to the air from the MREC are summarized in Appendix 5.1D. The HRA was prepared using guidelines developed by OEHHA and CARB, as implemented in the latest version of the Hotspots Analysis and Reporting Program (HARP) model (Version 2.0.3, ADMRT #16217).

5.9.2.4 Public Health Effect Study Methods

Emissions of toxic pollutants potentially associated with the MREC were estimated using emission factors approved by CARB and EPA. Concentrations of these pollutants in air potentially associated with MREC emissions were estimated using the HARP dispersion modeling module. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in an HRA, accounting for site-specific terrain and meteorological conditions. Health risks potentially associated with the estimated concentrations of pollutants in the air were characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with reference exposure levels for non-cancer health effects (for non-carcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI) located at the maximum impact receptor (MIR). The hypothetical MEI is an individual assumed to be located at the MIR location, where the highest concentrations of air pollutants associated with MREC emissions are predicted to occur, based on the air dispersion modeling. This location was assumed to be equivalent to a residential receptor exposed for the maximum 30-year period. Human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. If there is no significant effect associated with concentrations in air at the MIR location, it is unlikely that there would be significant effects in any location in the vicinity of the MREC. The highest offsite concentration location represents the MIR.

Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated excess lifetime cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of the concentration in air and a unit risk value. The unit risk value is defined as the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 $\mu g/m^3$ over a 30-year lifetime. In other words, it represents the increased cancer risk associated with continuous exposure to a concentration in the air over a 30-year lifetime. Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in the air was performed by comparing modeled concentrations in air with the RELs. An REL is a concentration in the air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in the air and the REL. This ratio is referred to as a hazard quotient. The unit risk values and RELs used to characterize health risks associated with modeled concentrations in the air were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CARB, 2015), and are presented in Table 5.9-6.

Table 5.9-6 Toxicity Values Used to Characterize Health Risks (Inhalation)

Compound	Unit Risk Factor $(\mu g/m^3)^{-1}$	Chronic Reference Exposure Level $(\mu g/m^3)$	Acute Reference Exposure Level $(\mu g/m^3)$	8 Hour Reference Exposure Level $(\mu g/m^3)$
Ammonia	-	200	3,200	-
Acetaldehyde	0.0000027	140	470	300
Acrolein	-	0.35	2.5	0.7
Arsenic	0.0033	0.015	0.20	0.015
Benzene	0.000029	3	27	3
Beryllium	0.0024	0.007	-	-
1-3 Butadiene	0.00017	2	660	9
Cadmium	0.0042	0.020	-	-
Chromium	0.15	0.20	-	-
Copper	-	-	100	-
Ethylbenzene	0.0000025	2,000	-	-
Formaldehyde	0.000006	9	55	9
Hexane	-	7,000	-	-

Table 5.9-6 Toxicity Values Used to Characterize Health Risks (Inhalation)

Compound	Unit Risk Factor (µg/m³)$^{-1}$	Chronic Reference Exposure Level (µg/m³)	Acute Reference Exposure Level (µg/m³)	8 Hour Reference Exposure Level (µg/m³)
Lead	0.000012	-	-	-
Manganese	-	0.090	-	-
Mercury	-	0.030	0.60	0.060
Naphthalene	0.000034	9	-	-
Nickel	0.00026	0.014	0.20	0.060
PAHs (as BaP)	0.0011	-	-	-
Propylene	-	3,000	-	
Propylene Oxide	.0000037	30	3,100	-
Selenium	-	30	3100	-
Silica	-	3.0	-	-
Toluene	-	300	37,000	-
Vanadium	-	-	30	-
Xylene	-	700	22,000	-
Diesel Particulate	0.0003	5	-	-

Source: CARB/OEHHA, 2015.

Emissions of the various toxic and/or HAPs are delineated in detail in Appendix 5.1A.

5.9.2.5 Characterization of Risks from Toxic Air Pollutants

The excess lifetime cancer risk associated with concentrations in air estimated for the MREC MIR location is estimated to be 5.17 x 10^{-6}. Excess lifetime cancer risks at this level are unlikely to represent significant public health effects that require additional controls of facility emissions. Risks higher than 1 x 10^{-6} may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Health effects risk thresholds are listed in Table 5.9-7, Health Effects Significant Threshold Levels for VCAPCD. Risks associated with pollutants potentially emitted from the MREC are presented in Table 5.9-8. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix 5.1D. As described previously, human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. If there is no significant effect associated with concentrations in air at the MIR location, it is unlikely that there would be significant effects in any other location in the vicinity of the MREC.

Table 5.9-7 Health Effects Significant Threshold Levels for VCAPCD

Risk Category	Risk Threshold
Significant Health Risk	>=10 x 10^{-6}

Table 5.9-7 Health Effects Significant Threshold Levels for VCAPCD

Risk Category	Risk Threshold
	HI >= 1

Per VCAPCD CEQA Guidelines, 2003.

VCAPCD, Engr. Division, Policies and Procedures, July 2002, Air Toxics Review of Permit Applications.

Table 5.9-8 MREC HRA Summary

	Turbines and Fire Pump	
Risk Category	**MREC MIR Values**	**Applicable Significance Threshold**
Cancer Risk	5.17^{-06}	See values in Table 5.9-7.
Chronic Hazard Index	0.00982	
Acute Hazard Index	0.00124	
Cancer Burden	<0.0018	

Source: MREC Team, 2015.

Notes:

1. MIR effect area lies within Tract 0005.00. MIR receptor lies at the MREC fence line.
2. MIR receptor is #30, 306266, 3798327.

To evaluate population risk, regulatory agencies have used the cancer burden as a method to account for the number of excess cancer cases that could potentially occur in a population. The population burden can be calculated by multiplying the cancer risk at a census block centroid times the number of people who live in the census block, and adding up the cancer cases across the zone of impact. A census block is defined as the smallest entity for which the Census Bureau collects and tabulates decennial census information; it is bounded on all sides by visible and non-visible features shown on Census Bureau maps. A centroid is defined as the central location within a specified geographic area.

Cancer burden is calculated on the basis of lifetime (30 year) risks. It is independent of how many people move in or out of the vicinity of an individual facility. The number of cancer cases is considered independent of the number of people exposed, within some lower limits of exposed population size, and the length of exposure (within reason). For example, if 10,000 people are exposed to a carcinogen at a concentration with a $1x10^{-5}$ cancer risk for a lifetime the cancer burden is 0.1, and if 100,000 people are exposed to a 1×10^{-5} risk the cancer burden is 1.

There are different methods that can be used as measure of population burden. The number of individuals residing within a 1×10^{-6}, 1×10^{-5}, and/or 1×10^{-4} isopleth is another potential measure of population burden. The approach used herein is based on this method using the 1×10^{-6} isopleth distance and the estimated population values within that established radius. Appendix 5.1D presents the data assumptions used to calculate cancer burden for the MREC.

As described previously, human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. Therefore, the risks for all of these individuals would be lower (and in most cases, substantially lower) than 5.17×10^{-6}. The estimated cancer burden was <0.0018, indicating that emissions from the MREC would not be associated with any increase in cancer cases in the previously defined population. In addition, the cancer burden is less than the VCAPCD significant threshold values. As stated previously, the methods used in this calculation considerably overstate the potential cancer burden, further suggesting that MREC emissions are unlikely to represent a significant public health effect in terms of cancer risk.

The acute and chronic hazard quotients associated with concentrations in air are shown in Table 5.9-8. The acute and chronic hazard quotients for all target organs fall below 1.0. As described previously, a hazard quotient less than 1.0 is unlikely to represent significant effect to public health. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in the *HARP-2 Users Guides* (HARP, 2015, ADMRT #16217) as well as the *OEHHA 2015 Air Toxics Hot Spots Health Risk Assessment Guidance* document (OEHHA/CARB, 2015). As described previously, human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. If there is no significant effect associated with concentrations in the air at the MIR location, it is unlikely that there would be significant effects in any other location in the vicinity of the MREC.

Detailed risk and hazard values are provided in the HARP output presented in Appendix 5.1D, (electronic files on CD-ROM).

The estimates of excess lifetime cancer risks and non-cancer risks associated with chronic or acute exposures fall below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans. In other words, the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

An excess lifetime cancer risk of 1×10^{-6} is typically used as a screening threshold of significance for potential exposure to carcinogenic substances in air. The excess cancer risk level of 1×10^{-6}, which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration to use quantitative HRA for regulating carcinogens in food additives in light of the zero tolerance provision of the Delany Amendment (Hutt, 1985). The associated dose, known as a “virtually safe dose,” has become a standard used by many policy makers and the lay public for evaluating cancer risks. However, a study of regulatory actions pertaining to carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions, found that regulatory action was not taken to control estimated risks below 1×10^{-6} (one in a million), which are called de minimis risks. De minimis risks are historically considered risks of no regulatory concern. Chemical exposures with risks above 4×10^{-3} (4 in 10 thousand), called de manifestis risks, were consistently regulated. De manifestis risks are typically risks of regulatory concern. The risks falling between these two extremes were regulated in some cases, but not in others (Travis et al 1987).

The estimated lifetime cancer risks to the maximally exposed individual located at the MREC MIR are well below the 10×10^{-6} significance level. In addition, the cancer burden is less than the State of California recommended threshold value of 1.0. These risk estimates were calculated using assumptions that are highly health conservative. Evaluation of the risks associated with the MREC emissions should consider that the conservatism in the assumptions and methods used in risk estimation considerably overstates the risks from MREC emissions. Based on the results of this HRA, there are no significant public health effects anticipated from emissions of toxic pollutant to the air from the MREC.

5.9.2.6 Hazardous Materials

Hazardous materials may be used and stored at the MREC site. The hazardous materials stored in significant quantities on-site and descriptions of their uses are presented in the Hazardous Materials

Handling section. Use of chemicals at the MREC site will be in accordance with standard practices for storage and management of hazardous materials. Normal use of hazardous materials, therefore, will not pose significant effects to public health. While mitigation measures will be in place to prevent releases, accidental releases that migrate off-site could result in potential effects to the public.

The California Accidental Release Program regulations (CalARP) and CFR Title 40 Part 68 under the CAA establish emergency response planning requirements for acutely hazardous materials. These regulations require preparation of a Risk Management Plan (RMP), which is a comprehensive program to identify hazards and predict the areas that may be affected by a release of a program listed hazardous material. Any RMP-listed materials proposed to be used at the MREC are discussed in the Hazardous Materials Handling section.

The proposed new turbines' SCR systems will use an on-site ammonia storage and distribution systems. New storage tanks for substances such as ammonia for the SCR system will be installed for the new turbines. An offsite consequence analysis will be performed to assess potential risks to offsite human populations if a spill were to occur.

5.9.2.7 Operation Odors

The MREC is not expected to emit or cause to be emitted any substances that could cause odors.

5.9.2.8 Electromagnetic Field Exposure

Electromagnetic fields (EMFs) occur independently of one another as electric and magnetic fields at the 60-Hz frequency used in transmission lines, and both are created by electric charges. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields falls off rapidly as the distance from the source increases (proportional to the inverse of the square of distance).

Because the electric transmission lines do not typically travel through residential areas, and based on findings of the National Institute of Environmental Health Sciences (NIEHS) (1999), EMF exposures are not expected to result in a significant effect on public health. The NIEHS report to the U.S. Congress found that "the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm" (NIEHS, 1999).

California does not presently have a regulatory level for magnetic fields. However, the values estimated for the MREC are well below those established by states that do have limits. Other states have established regulations for magnetic field strengths that have limits ranging from 150 milligauss to 250 milligauss at the edge of the right-of-way, depending on voltage. The CEC does not presently specify limits on magnetic fields for standard types and sizes of transmission lines.

5.9.2.9 Legionella

In addition to being a source of potential TACs, the possibility exists for bacterial growth to occur in cooling tower cells, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling tower cells and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

The State of California regulates recycled water for use in cooling tower cells in CCR, Title 22, Section 60303. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation does not apply to the MREC since it does not intend to use reclaimed water for cooling purposes.

EPA published an extensive review of Legionella in a human health criteria document (EPA, 1999). The EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling tower cells can aid in the transmission of Legionella from water to air. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk - however small - of disease in humans.

In 2008, the Cooling Tower Institute (CTI) issued its revised report and guidelines for the best practices for control of Legionella (CTI, 2008). To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling tower cells, and the overall general control of microbiological populations. Good preventive maintenance is very important in the efficient operation of cooling tower cells and other evaporative equipment. Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. The efficacy of any biocide in ensuring that bacteria, and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures, and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, an appropriate biocide program and anti-biofilm agent monitoring program would be prepared and implemented for the entirewet SAC, including the six new wet SAC cells associated with the MREC. These programs would ensure that proper levels of biocide and other agents are maintained within wet SAC water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup.

The MREC will have a six (6) cell wet SAC. As such, MREC will prepare and implement a wet SAC water treatment program designed to reduce the potential for Legionella as noted above.

5.9.2.10 Summary of Effects

Results from the air toxics HRA based on emissions modeling indicate that there will be no significant incremental public health risks from construction or operation of the MREC. Results from criteria pollutant modeling for routine operations indicate that potential ambient concentrations of NO_2, CO, SO_2, and PM10 will not significantly affect air quality (Section 5.1, Air Quality). Potential concentrations are below the federal and California standards established to protect public health, including the more sensitive members of the population.

5.9.3 Cumulative Effects

The HRA for the MREC indicates that the maximum cancer risk will be approximately 5.17×10^{-6} at the point of maximum exposure to air toxics from power facility emissions. The MREC risk level is well below the VCAPCD "significant health risk" thresholds. Non-cancer chronic and acute effects, i.e. hazard index values, are also well below the VCAPCD significance thresholds, as is the estimated cancer burden rate.

An analysis of the cumulative impacts of the MREC, per CEC practice based on modeling studies conducted by staff, is typically only required if the proposed facility is generally within 0.5 miles of another existing large toxics emissions source. No such sources were identified within the default distance of 0.5 miles. In addition, the cancer risks and non-cancer health impacts estimated for the MREC using conservative assumptions are below significance with minimal predicted impacts to offsite receptors.

In 1998, the OEHHA listed DPM, a primary combustion product from diesel engines, as a TAC, based on its potential to cause cancer, premature deaths, and other health problems. According to CARB and EPA, mobile source emissions account for much of the sources of cancer risk associated with TAC. According to EPA estimates, mobile sources (e.g., cars, trucks, and buses) of TAC account for as much as half of all cancers attributed to outdoor sources of TAC. More recent research illustrates that health risks from DPM are highest in areas of concentrated emissions, such as near ports, rail yards, freeways, or warehouse distribution centers. Additionally, the MATES-III (2008) study conducted by the SCAQMD showed that mobile sources in the South Coast Air Basin represent the greatest contributors to the estimated cancer risks (about 84 percent). This conclusion is most likely true for the counties in the South Central Coast Air Basin (including the VCAPCD).

Standards have been adopted by CARB and EPA to reduce DPM emissions from new on-road heavy-duty vehicles. EPA estimates that, when fully implemented, the program is predicted to result in particulate emission levels and the corresponding health impacts that are approximately 95 percent below baseline levels. In addition, ongoing federal and state diesel motor vehicle emission reduction programs are in place and will continue to significantly reduce DPM emissions. These programs indicate that the MREC's potential health impact will not be cumulatively significant.

5.9.4 Mitigation Measures

5.9.4.1 Criteria Pollutants

Emissions of criteria pollutants will be minimized by applying BACT to the MREC. BACT for the turbines, and fire pump engine, is delineated in Appendix 5.1F.

The MREC location is in an area that is designated by the federal air agencies as non-attainment for ozone and unclassified-attainment for particulate matter. Pursuant to the VCAPCD NSR Rule, offsets are required for the MREC. Therefore, further mitigation of emissions is not required to protect public health.

5.9.4.2 Toxic Pollutants

Emissions of toxic pollutants to the air will be minimized through the use of BACT/T-BACT at the MREC, (i.e., the use of clean fuels, and an oxidation catalyst on the individual turbines for the control of VOCs and gaseous toxic constituents).

Legionella Mitigation Measure

Since the MREC is proposing the use of a wet SAC, a Legionella mitigation plan will be developed.

5.9.4.3 Hazardous Materials

Mitigation measures for hazardous materials are presented below and discussed in more detail in the Hazardous Materials Handling section. Potential public health effects from the use of hazardous materials are only expected to occur as a result of an accidental release. The facility has many safety features designed to prevent and minimize effects from the use and accidental release of hazardous materials. The MREC site will include the design features listed below.

- Curbs, berms, and/or secondary containment structures will be provided where accidental release of chemicals may occur.
- A fire-protection system will be included to detect, alarm, and suppress a fire, in accordance with applicable LORS.
- Construction of all storage systems will be in accordance with applicable construction standards, seismic standards, and LORS.

If required, a RMP for the MREC will be prepared prior to commencement of MREC operations. The RMP will estimate the risk presented by handling affected materials at the MREC site. The RMP will include a hazard analysis, off-site consequence analysis, seismic assessment, emergency response plan, and training procedures. The RMP process will accurately identify and propose adequate mitigation measures to reduce the risk to the lowest possible level.

A safety program will be implemented and will include safety training programs for contractors and operations personnel, including instructions on the following:

- Proper use of personal protective equipment
- *S*afety operating procedures
- Fire safety
- (Emergency response actions

The safety program will also include programs on safely operating and maintaining systems that use hazardous materials. Emergency procedures for MREC personnel include power facility evacuation, hazardous material spill cleanup, fire prevention, and emergency response.

Areas subject to potential leaks of hazardous materials will be paved and bermed. Incompatible materials will be stored in separate containment areas. Containment areas will be drained to either a collection sump or to holding or neutralization tanks. Also, piping and tanks exposed to potential traffic hazards will be additionally protected by traffic barriers.

5.9.5 Laws, Ordinances, Regulations, and Standards

An overview of the regulatory process for public health issues is presented in this section. The relevant LORS that affect public health and are applicable to the MREC are identified in Table 5.9-9. The conformity of the MREC to each of the LORS applicable to public health is also presented in this table, as well as references to the selection locations within this report where each of these issues is addressed. Table 5.9-9 also summarizes the primary agencies responsible for public health, as well as the general category of the public health concern regulated by each of these agencies.

Table 5.9-9 Summary of LORS – Public Health

LORS	Applicability	Primary Regulatory Agency	MREC Conformance	Conformance (AFC Section)
CAA Title III	Public exposure to air pollutants	EPA Region 9 CARB VCAPCD	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels. Emissions of criteria pollutants will be minimized by applying BACT to the MREC.	5.9.1.5, and Appendix 5.1D

Table 5.9-9 Summary of LORS – Public Health

LORS	Applicability	Primary Regulatory Agency	MREC Conformance	Conformance (AFC Section)
Health and Safety Code 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed thresholds that require exposure warnings.	5.9.1.5, 5.9.1.6, 5.9.3.3, and Appendix 5.1D
40 CFR Part 68 (RMP) and CalARP Program Title 19	Public exposure to acutely hazardous materials	EPA Region 9 Riverside County Department of Health Services Riverside County Fire Department	A vulnerability analysis will be performed to assess potential risks from a spill or rupture from any affected storage tank. An RMP (if required) will be prepared prior to commencement of MREC operations.	5.9.1.6, and Appendix5.1D
Health and Safety Code Sections 25531 to 25541	Public exposure to acutely hazardous materials	Riverside County Department of Health Services CARB VCAPCD	A vulnerability analysis will be performed to assess potential risks from a spill or rupture from any affected storage tank.	5.9.1.6, and Appendix 5.1D
CHSC 25500-25542	Hazmat Inventory	State Office of Emergency Services and Riverside County Department of Environmental Health	Prepare all required Hazardous Materials plans and inventories, distribute to affected agencies	See Hazardous Materials Section
CHSC 44300 et seq.	AB2588 Air Toxics Program	VCAPCD	Participate in the AB2588 inventory and reporting program at the District level.	Appendix 5.1A, Appendix 5.1D, initial reporting TBD by VCAPCD
VCAPCD CEQA Guidelines, 2003	Toxics NSR	VCAPCD	Establishes risk and hazard index values. The facility is expected to comply with these values.	Section 5.1, Section 5.9, Appendix 5.1D
VCAPCD Rule 73	NESHAPS	VCAPCD	Requires compliance with applicable NESHAPs.	Section 5.1 and 5.9
CHSC 25249.5	Proposition 65	OEHHA	Comply with all signage and notification requirements.	See Hazardous Materials Section
Health and Safety Code Sections 44360 to 44366 (Air Toxics “Hot Spots” Information and Assessment Act—AB 2588)	Public exposure to TACs	CARB VCAPCD	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels.	5.9.1, Appendix 5.1D

5.9.5.1 Permits Required and Schedule

Agency-required permits related to public health include an RMP and VCAPCD Permit to Construct/Permit to Operate. These requirements are discussed in detail in the Hazardous Materials Handling section and section 5.1, Air Quality, respectively.

5.9.5.2 Agencies Involved and Agency Contacts

Table 5.9-10 provides contact information for agencies involved with Public Health.

Table 5.9-10 **Summary of Agency Contacts for Public Health**

Public Health Concern	Primary Regulatory Agency	Regulatory Contact
Public exposure to air pollutants	EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974
	CARB	Mike Tollstrup 1001 1 Street, 19th Floor Sacramento, CA 95814 (916) 322-6026
	VCAPCD	Kerby Zozula Manager, Eng. Division VCAPCD 669 County Square Dr. Ventura, CA. 93003 (805) 645-1421
Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	Cynthia Oshita or Susan Long P.O. Box 4010 Sacramento, CA 95812-4010 (916) 445-6900
Public exposure to acutely hazardous materials	EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974
	Ventura County EHD-CUPA Hazmat Division	David Wadsworth 800 S. Victoria Ave. Ventura, CA. 93009 (805)654-3523

Source: MREC Team, 2015.

5.9.6 References

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APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Section 5.9, PUBLIC HEALTH (REDLINED)

5.9 Public Health

This section presents the methodology and results of a HRA performed to assess potential effects and public exposure associated with airborne emissions from the routine operation of the MREC. Section 5.9.1 describes the affected environment. Section 5.9.2 presents an environmental analysis of the operation of the power facility and associated facilities. Section 5.9.3 discusses cumulative effects. Section 5.9.4 discusses mitigation measures. Section 5.9.5 presents applicable LORS, permit requirements, schedules, and agency contacts. Section 5.9.5 contains references cited or consulted in preparing this section. Appendix 5.1D contains the HRA support data.

Mission Rock is proposing to construct and operate a 285 MW (nominal rated) simple-cycle power plant consisting of five GE LM6000 PG Sprint CTGs, an emergency fire pump system, a six (6) cell wet surface air condenser (wet SAC), and associated support equipment. A complete description of the MREC is presented in Section 2.0.

Air will be the dominant pathway for public exposure to chemical substances released by the MREC. Emissions to the air will consist primarily of combustion by-products produced by the new combustion turbines and the fire pump engine. Potential health risks from combustion emissions will occur almost entirely by direct inhalation. To be conservative, additional pathways were included in the health risk modeling, however, direct inhalation is considered the most likely exposure pathway. The HRA was conducted in accordance with guidance established by the California OEHHA and the CARB.

Combustion byproducts with established CAAQS or NAAQS, including NO_x, CO, and fine particulate matter (PM10/PM2.5) are addressed in Section 5.1, Air Quality. However, some discussion of the potential health risks associated with these substances is presented in this section. Human health risks associated with the potential accidental release of stored acutely hazardous materials are discussed in the Hazardous Materials Handling section.

5.9.1 Affected Environment

The MREC will be located in Ventura County within the South Central Coast Air Basin. The MREC site is situated approximately 3 miles southwest of downtown Santa Paula, California, between Mission Rock Road and Shell Road The site lies south of SR-126 (Santa Paula Highway). The site lies approximately 2.5 miles northeast of the junction of SR-126 and SR-118. SPZ lies approximately 3 miles to the northeast, and the Ventura County Jail lies approximately 900 feet due west of the site.

The MREC site is situated in Ventura County census tract 0005.00, which has a population value of 1867 individuals per the 2010 census.

Sensitive receptors are defined as groups of individuals that may be more susceptible to health risks due to chemical exposure. Schools, both public and private, day care facilities, convalescent homes, and hospitals are of particular concern. A partial list of the nearest sensitive receptors based upon receptor type, are listed in Table 5.9-1. Residences and worker receptors are not technically defined as “sensitive receptors” by OEHHA. Nearby receptors of these types are included in Table 5.9-1 for informational purposes only. Appendix 5.1D, delineates data on the population by census tract within a 6-mile radius of the site, as well as a comprehensive list of sensitive receptors analyzed in the HRA.

Table 5.9-1 Nearest Sensitive Receptors By Receptor Type

Receptor Type	UTM Coordinates (East/North), m	Elevation, (feet above mean sea level)
Residence-North	306264, 3799566	203
Residence-South	306144, 3795267	421

Table 5.9-1 Nearest Sensitive Receptors By Receptor Type

Receptor Type	UTM Coordinates (East/North), m	Elevation, (feet above mean sea level)
Residence-East	306531, 3798541	189
Residence-West	304929, 3797623	175
Residence-R1a*	306551, 3798554	189
Residence-R1b*	306529, 3798630	190
Residence-R2*	306325, 3798714	186
Worker	306257, 3798462	185
School	306381, 3800656	244
Hospital/Health Facility	297887, 3789325	61
Daycare Center	None Identified	-
Convalescent Home	295842, 3793169	165
Jail/Detention Center	305532, 3798464	189

Source: All coordinates from Google Earth (center location of each receptor location).

1 The nearest school is approximately 1.25 miles (6,600 feet) from the MREC site, therefore no VCAPCD Risk notifications are required.

See Appendix 5.1D for a complete list of sensitive receptors analyzed in the HRA.

*Residential locations identified in the noise survey added for completeness.

Air quality and health risk data presented by CARB in the 2009 Almanac of Emissions and Air Quality for the state shows that over the period from 1990 through 2008, the average concentrations for the top 10 TACs have been substantially reduced, and the associated health risks for the state are showing a steady downward trend as well. This same trend is expected to have occurred in the South Central Coast Air Basin. CARB-estimated emissions inventory values for the top 10 TACs for 2008 are presented in Table 5.9-2. Data for years subsequent to 2008 are not available from CARB at this time. Mission Rock is not aware of any recent (within the last 5 years) public health studies related to respiratory illnesses, cancers or related diseases concerning the local area within a 6-mile radius of the MREC site.

Table 5.9-2 Top 10 TAC Emissions-2008

TAC	Statewide Emissions (tons/year)	South Central Coast Air Basin Emissions (tons/year)	VCAPCD Emissions (tons/year)
Acetaldehyde	9103	386	161
Benzene	10794	573	246
1,3 Butadiene	3754	186	68
Carbon tetrachloride	4.04	<0.01	0
Chromium 6	0.61	<0.03	<0.01
Para-Dichlorobenzene	1508	61	33
Formaldehyde	20951	917	380
Methylene Chloride	6436	307	157
Perchloroethylene	4982	168	71
Diesel PM	35884	927	436

Table 5.9-2 Top 10 TAC Emissions-2008

TAC	Statewide Emissions (tons/year)	South Central Coast Air Basin Emissions (tons/year)	VCAPCD Emissions (tons/year)

Source: California Almanac of Emissions and Air Quality-2009, CARB-PTSD.

5.9.2 Environmental Analysis

The environmental effects on public health from construction and operation of the MREC are presented in the following sections.

5.9.2.1 Significance Criteria

Cancer Risk

Cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be ~~70~~30 years). Carcinogens are not assumed to have a threshold below which there would be no human health effect. In other words, any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure, the lower the cancer risk (i.e., a linear, no-threshold model). Under various state and local regulations, an incremental cancer risk greater than 10 in a million due to a project is considered to be a significant effect on public health. For example, the 10 in a million risk level is used by the Air Toxics Hot Spots (AB 2588) program and Proposition 65 as the public notification level for air toxic emissions from existing sources.

Non-Cancer Risk

Non-cancer health effects can be classified as either chronic or acute. In determining the potential health risks of non-cancerous air toxics, it is assumed there is a dose of the chemical of concern below which there would be no effect on human health. The air concentration corresponding to this dose is called the Reference Exposure Level (REL). Non-cancer health risks are measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are typically summed with the resulting totals expressed as hazard indices for each organ system. A hazard index of less than 1.0 is considered to be an insignificant health risk. For this HRA, all hazard quotients were summed regardless of target organ. This method leads to a conservative, upper-bound assessment. RELs used in the hazard index calculations were those published in the CARB/OEHHA listings dated May 2015 (Carb, 2015).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure, caused by chemicals accumulating in the body. Because chemical accumulation to toxic levels typically occurs slowly, symptoms of chronic effects usually do not appear until long after exposure commences. The lowest no-effect chronic exposure level for a non-carcinogenic air toxic is the chronic REL. Below this threshold, the body is capable of eliminating or detoxifying the chemical rapidly enough to prevent its accumulation. The chronic hazard index was calculated using the hazard quotients calculated with annual concentrations.

Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. For most chemicals, the air concentration required to produce acute effects is higher than the level required to produce chronic effects because the exposure duration is shorter. Because acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures, all hazard quotients are typically summed to calculate the acute hazard index. One-hour average concentrations are divided by the acute RELs to obtain a hazard index for health effects caused by relatively high, short-term exposures to air toxics.

5.9.2.2 Construction Phase Effects

The construction phase of the MREC is expected to take approximately 23 months (followed by several months of startup and commissioning). No significant public health effects are expected during the construction phase. Strict construction practices that incorporate safety and compliance with applicable LORS will be followed (see Section 5.9.5). In addition, mitigation measures to reduce air emissions from construction effects will be implemented as described in Section 5.1, Air Quality, and Appendix 5.1E.

Temporary emissions from construction-related activities are discussed in Section 5.1, Air Quality and Appendix 5.1E. Construction-related emissions are temporary and localized, resulting in no long-term effects to the public.

Small quantities of hazardous waste may be generated during the construction phase of the MREC. Hazardous waste management plans will be in place so the potential for public exposure is minimal. Refer to the Waste Management, for more information. No acutely hazardous materials will be used or stored on-site during construction (see the Hazardous Materials Handling section). To ensure worker safety during construction, safe work practices will be followed (see the Worker Safety section).

5.9.2.3 Operational Phase Effects

Environmental consequences potentially associated with the operation of the MREC are potential human exposure to chemical substances emitted to the air. The human health risks potentially associated with these chemical substances were evaluated in a HRA. The chemical substances potentially emitted to the air from the MREC turbines, and IC engine are listed in Table 5.9-3.

Table 5.9-3 Chemical Substances Potentially Emitted to the Air from the MREC

Criteria Pollutants
PM
CO
SOx
NOx
VOC
Lead
Noncriteria Pollutants (Toxic Pollutants)
Ammonia, Arsenic, Acetaldehyde, Acrolein
Benzene, Beryllium
Cadmium, Chromium, Copper
1-3 Butadiene
Ethylbenzene
Formaldehyde
Hexane (n-Hexane)
Lead
Nickel, Naphthalene
Manganese, Mercury
PAHs, Propylene, Propylene Oxide
Selenium, Silica
Toluene
Vanadium
Xylene

Table 5.9-3 Chemical Substances Potentially Emitted to the Air from the MREC

Criteria Pollutants
Diesel Particulate Matter

PAH = polynuclear (or polycyclic) aromatic hydrocarbon

Tables 5.9-4 and 5.9-5 present the estimated toxic pollutant emissions from the facility processes.

Table 5.9-4 Toxic Pollutant Emissions Estimates (lbs/hr)

Pollutant/Device	Each Turbine	5 Turbines	Fire Pump
Ammonia	3.77	18.9	-
Total PAHs (BaP)	0.0000267	0.000134	-
Acetaldehyde	0.00452	0.0226	-
Acrolein	0.000721	0.0036	-
Benzene	0.00136	0.00679	-
1-3 Butadiene	0.0000487	0.000243	-
Ethylbenzene	0.00363	0.0181	-
Formaldehyde	0.201	1.0	-
Hexane	0.0287	0.144	-
Naphthalene	0.000147	0.00074	-
Propylene	0.0855	0.428	-
Propylene Oxide	0.00328	0.0164	-
Toluene	0.0147	0.0736	-
Xylene	0.00725	0.0362	-
Diesel PM	-	-	0.07

Table 5.9-5 Toxic Pollutant Emissions Estimates (lbs/year)

Pollutant/Device	Each Turbine	5 Turbines	Fire Pump
Ammonia	9430	47150	-
Total PAHs (BaP)	0.0662	0.331	-
Acetaldehyde	11.2	56	-
Acrolein	1.79	8.93	-
Benzene	3.37	16.8	-
1-3 Butadiene	0.121	0.603	-
Ethylbenzene	8.98	44.9	-
Formaldehyde	498	2490	-
Hexane	71.2	356	-

Naphthalene	0.365	1.83	-
Propylene	212	1060	-
Propylene Oxide	8.13	40.7	-
Toluene	36.5	183	-
Xylene	18	90	-
Diesel PM	-	-	3.78

Table 5.9-5 (continued) Wet SAC Toxic Pollutant Emissions Estimates

Substance	Lbs/Hr/Cell	Lbs/Yr/Cell
Arsenic	3.47E-8	8.68E-5
Beryllium	3.43E-9	8.57E-6
Cadmium	4.90E-9	1.22E-5
Total Chromium	5.34E-9	1.34E-5
Copper	1.25E-7	3.12E-4
Lead	1.56E-8	3.89E-5
Manganese	1.16E-3	2.89E+0
Mercury	1.47E-10	3.67E-7
Nickel	4.01E-8	1.00E-4
Selenium	4.72E-7	1.18E-3
Silica	3.20E-4	8.01E-1
Vanadium	2.67E-8	6.68E-5

Emissions of criteria pollutants will adhere to NAAQS and CAAQS as discussed in Section 5.1, Air Quality. The MREC also will include emission control technologies necessary to meet the required emission standards specified for criteria pollutants under VCAPCD rules. Offsets will be required because the MREC will be a major source under the Districts NSR rule. Finally, air dispersion modeling results (presented in Section 5.1, Air Quality) show that emissions will not result in concentrations of criteria pollutants in air that exceed ambient air quality standards (either NAAQS or CAAQS). These standards are intended to protect the general public with a wide margin of safety. Therefore, the MREC is not anticipated to have a significant effect on public health from emissions of criteria pollutants.

Potential effects associated with emissions of toxic pollutants to the air from the MREC are summarized in Appendix 5.1D. The HRA was prepared using guidelines developed by OEHHA and CARB, as implemented in the latest version of the Hotspots Analysis and Reporting Program (HARP) model (Version 2.0.3, ADMRT #16217).

5.9.2.4 Public Health Effect Study Methods

Emissions of toxic pollutants potentially associated with the MREC were estimated using emission factors approved by CARB and EPA. Concentrations of these pollutants in air potentially associated with MREC emissions were estimated using the HARP dispersion modeling module. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in an HRA, accounting for site-specific terrain and meteorological conditions. Health risks potentially associated with the estimated concentrations of pollutants in the air were characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with reference exposure levels for non-cancer health effects (for non-carcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI) located at the maximum impact receptor (MIR). The hypothetical MEI is an individual assumed to be located at the MIR location, where the highest concentrations of air pollutants associated with MREC emissions are predicted to occur, based on the air dispersion modeling. This location was assumed to be equivalent to a residential receptor exposed for the maximum ~~70~~30-year period. Human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. If there is no significant effect associated with concentrations in air at the MIR location, it is unlikely that there would be significant effects in any location in the vicinity of the MREC. The highest offsite concentration location represents the MIR.

Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated excess lifetime cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of the concentration in air and a unit risk value. The unit risk value is defined as the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 $\mu g/m^3$ over a ~~70~~30-year lifetime. In other words, it represents the increased cancer risk associated with continuous exposure to a concentration in the air over a ~~70~~30-year lifetime. Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in the air was performed by comparing modeled concentrations in air with the RELs. An REL is a concentration in the air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in the air and the REL. This ratio is referred to as a hazard quotient. The unit risk values and RELs used to characterize health risks associated with modeled concentrations in the air were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CARB, 2015), and are presented in Table 5.9-6.

Table 5.9-6 Toxicity Values Used to Characterize Health Risks (Inhalation)

Compound	Unit Risk Factor $(\mu g/m^3)^{-1}$	Chronic Reference Exposure Level $(\mu g/m^3)$	Acute Reference Exposure Level $(\mu g/m^3)$	8 Hour Reference Exposure Level $(\mu g/m^3)$
Ammonia	-	200	3,200	-
Acetaldehyde	0.0000027	140	470	300
Acrolein	-	0.35	2.5	0.7
Arsenic	0.0033	0.015	0.20	0.015
Benzene	0.000029	3	27	3
Beryllium	0.0024	0.007	-	-
1-3 Butadiene	0.00017	2	660	9
Cadmium	0.0042	0.020	-	-
Chromium	0.15	0.20	-	-
Copper	-	-	100	-
Ethylbenzene	0.0000025	2,000	-	-
Formaldehyde	0.000006	9	55	9
Hexane	-	7,000	-	-

Table 5.9-6 Toxicity Values Used to Characterize Health Risks (Inhalation)

Compound	Unit Risk Factor $(\mu g/m^3)^{-1}$	Chronic Reference Exposure Level $(\mu g/m^3)$	Acute Reference Exposure Level $(\mu g/m^3)$	8 Hour Reference Exposure Level $(\mu g/m^3)$
Lead	0.000012	-	-	-
Manganese	-	0.090	-	-
Mercury	-	0.030	0.60	0.060
Naphthalene	0.000034	9	-	-
Nickel	0.00026	0.014	0.20	0.060
PAHs (as BaP)	0.0011	-	-	-
Propylene	-	3,000	-	
Propylene Oxide	.0000037	30	3,100	-
Selenium	-	30	3100	-
Silica	-	3.0	-	-
Toluene	-	300	37,000	-
Vanadium	-	-	30	-
Xylene	-	700	22,000	-
Diesel Particulate	0.0003	5	-	-

Source: CARB/OEHHA, 2015.

Emissions of the various toxic and/or HAPs are delineated in detail in Appendix 5.1A.

5.9.2.5 Characterization of Risks from Toxic Air Pollutants

The excess lifetime cancer risk associated with concentrations in air estimated for the MREC MIR location is estimated to be 5.~~24~~17 x 10^{-6}. Excess lifetime cancer risks at this level are unlikely to represent significant public health effects that require additional controls of facility emissions. Risks higher than 1 x 10^{-6} may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Health effects risk thresholds are listed in Table 5.9-7, Health Effects Significant Threshold Levels for VCAPCD. Risks associated with pollutants potentially emitted from the MREC are presented in Table 5.9-8. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in Appendix 5.1D. As described previously, human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. If there is no significant effect associated with concentrations in air at the MIR location, it is unlikely that there would be significant effects in any other location in the vicinity of the MREC.

Table 5.9-7 Health Effects Significant Threshold Levels for VCAPCD

Risk Category	Risk Threshold
Significant Health Risk	>=10 x 10^{-6}

Table 5.9-7 Health Effects Significant Threshold Levels for VCAPCD

Risk Category	Risk Threshold
	HI >= 1

Per VCAPCD CEQA Guidelines, 2003.

VCAPCD, Engr. Division, Policies and Procedures, July 2002, Air Toxics Review of Permit Applications.

Table 5.9-8 MREC HRA Summary

	Turbines and Fire Pump	
Risk Category	MREC MIR Values	Applicable Significance Threshold
Cancer Risk	5.~~24~~17^{-06}	See values in Table 5.9-7.
Chronic Hazard Index	0.~~0137~~00982	
Acute Hazard Index	0.~~00179~~00124	
Cancer Burden	<0.~~001867~~0018	

Source: MREC Team, 2015.

Notes:

1. MIR effect area lies within Tract 0005.00. MIR receptor lies at the MREC fence line.
2. MIR receptor is #~~27, 306273.8, 3798390.~~30, 306266, 3798327.

To evaluate population risk, regulatory agencies have used the cancer burden as a method to account for the number of excess cancer cases that could potentially occur in a population. The population burden can be calculated by multiplying the cancer risk at a census block centroid times the number of people who live in the census block, and adding up the cancer cases across the zone of impact. A census block is defined as the smallest entity for which the Census Bureau collects and tabulates decennial census information; it is bounded on all sides by visible and non-visible features shown on Census Bureau maps. A centroid is defined as the central location within a specified geographic area.

Cancer burden is calculated on the basis of lifetime (~~70~~30 year) risks. It is independent of how many people move in or out of the vicinity of an individual facility. The number of cancer cases is considered independent of the number of people exposed, within some lower limits of exposed population size, and the length of exposure (within reason). For example, if 10,000 people are exposed to a carcinogen at a concentration with a 1×10^{-5} cancer risk for a lifetime the cancer burden is 0.1, and if 100,000 people are exposed to a 1×10^{-5} risk the cancer burden is 1.

There are different methods that can be used as measure of population burden. The number of individuals residing within a 1×10^{-6}, 1×10^{-5}, and/or 1×10^{-4} isopleth is another potential measure of population burden. The approach used herein is based on this method using the 1×10^{-6} isopleth distance and the estimated population values within that established radius. Appendix 5.1D presents the data assumptions used to calculate cancer burden for the MREC.

As described previously, human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. Therefore, the risks for all of these individuals would be lower (and in most cases, substantially lower) than 5.~~24~~17 x 10^{-6}. The estimated cancer burden was <0.~~001867~~0018, indicating that emissions from the MREC would not be associated with any increase in cancer cases in the previously defined population. In addition, the cancer burden is less than the VCAPCD significant threshold values. As stated previously, the methods used in this calculation considerably overstate the potential cancer burden, further suggesting that MREC emissions are unlikely to represent a significant public health effect in terms of cancer risk.

The acute and chronic hazard quotients associated with concentrations in air are shown in Table 5.9-8. The acute and chronic hazard quotients for all target organs fall below 1.0. As described previously, a hazard quotient less than 1.0 is unlikely to represent significant effect to public health. Further description of the methodology used to calculate health risks associated with emissions to the air is presented in the *HARP-2 Users Guides* (HARP, 2015, ADMRT #16217) as well as the *OEHHA 2015 Air Toxics Hot Spots Health Risk Assessment Guidance* document (OEHHA/CARB, 2015). As described previously, human health risks associated with emissions from the MREC are unlikely to be higher at any other location than at the location of the MIR. If there is no significant effect associated with concentrations in the air at the MIR location, it is unlikely that there would be significant effects in any other location in the vicinity of the MREC.

Detailed risk and hazard values are provided in the HARP output presented in Appendix 5.1D, (electronic files on CD-ROM).

The estimates of excess lifetime cancer risks and non-cancer risks associated with chronic or acute exposures fall below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans. In other words, the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

An excess lifetime cancer risk of 1×10^{-6} is typically used as a screening threshold of significance for potential exposure to carcinogenic substances in air. The excess cancer risk level of 1×10^{-6}, which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration to use quantitative HRA for regulating carcinogens in food additives in light of the zero tolerance provision of the Delany Amendment (Hutt, 1985). The associated dose, known as a “virtually safe dose,” has become a standard used by many policy makers and the lay public for evaluating cancer risks. However, a study of regulatory actions pertaining to carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions, found that regulatory action was not taken to control estimated risks below 1×10^{-6} (one in a million), which are called de minimis risks. De minimis risks are historically considered risks of no regulatory concern. Chemical exposures with risks above 4×10^{-3} (4 in 10 thousand), called de manifestis risks, were consistently regulated. De manifestis risks are typically risks of regulatory concern. The risks falling between these two extremes were regulated in some cases, but not in others (Travis et al 1987).

The estimated lifetime cancer risks to the maximally exposed individual located at the MREC MIR are well below the 10×10^{-6} significance level. In addition, the cancer burden is less than the State of California recommended threshold value of 1.0. These risk estimates were calculated using assumptions that are highly health conservative. Evaluation of the risks associated with the MREC emissions should consider that the conservatism in the assumptions and methods used in risk estimation considerably overstates the risks from MREC emissions. Based on the results of this HRA, there are no significant public health effects anticipated from emissions of toxic pollutant to the air from the MREC.

5.9.2.6 Hazardous Materials

Hazardous materials may be used and stored at the MREC site. The hazardous materials stored in significant quantities on-site and descriptions of their uses are presented in the Hazardous Materials

Handling section. Use of chemicals at the MREC site will be in accordance with standard practices for storage and management of hazardous materials. Normal use of hazardous materials, therefore, will not pose significant effects to public health. While mitigation measures will be in place to prevent releases, accidental releases that migrate off-site could result in potential effects to the public.

The California Accidental Release Program regulations (CalARP) and CFR Title 40 Part 68 under the CAA establish emergency response planning requirements for acutely hazardous materials. These regulations require preparation of a Risk Management Plan (RMP), which is a comprehensive program to identify hazards and predict the areas that may be affected by a release of a program listed hazardous material. Any RMP-listed materials proposed to be used at the MREC are discussed in the Hazardous Materials Handling section.

The proposed new turbines' SCR systems will use an on-site ammonia storage and distribution systems. New storage tanks for substances such as ammonia for the SCR system will be installed for the new turbines. An offsite consequence analysis will be performed to assess potential risks to offsite human populations if a spill were to occur.

5.9.2.7 Operation Odors

The MREC is not expected to emit or cause to be emitted any substances that could cause odors.

5.9.2.8 Electromagnetic Field Exposure

Electromagnetic fields (EMFs) occur independently of one another as electric and magnetic fields at the 60-Hz frequency used in transmission lines, and both are created by electric charges. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields falls off rapidly as the distance from the source increases (proportional to the inverse of the square of distance).

Because the electric transmission lines do not typically travel through residential areas, and based on findings of the National Institute of Environmental Health Sciences (NIEHS) (1999), EMF exposures are not expected to result in a significant effect on public health. The NIEHS report to the U.S. Congress found that "the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm" (NIEHS, 1999).

California does not presently have a regulatory level for magnetic fields. However, the values estimated for the MREC are well below those established by states that do have limits. Other states have established regulations for magnetic field strengths that have limits ranging from 150 milligauss to 250 milligauss at the edge of the right-of-way, depending on voltage. The CEC does not presently specify limits on magnetic fields for standard types and sizes of transmission lines.

5.9.2.9 Legionella

In addition to being a source of potential TACs, the possibility exists for bacterial growth to occur in cooling tower cells, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling tower cells and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

The State of California regulates recycled water for use in cooling tower cells in CCR, Title 22, Section 60303. This section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. This regulation does not apply to the MREC since it does not intend to use reclaimed water for cooling purposes.

EPA published an extensive review of Legionella in a human health criteria document (EPA, 1999). The EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling tower cells can aid in the transmission of Legionella from water to air. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Thus, the presence of even small numbers of Legionella bacteria presents a risk - however small - of disease in humans.

In 2008, the Cooling Tower Institute (CTI) issued its revised report and guidelines for the best practices for control of Legionella (CTI, 2008). To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling tower cells, and the overall general control of microbiological populations. Good preventive maintenance is very important in the efficient operation of cooling tower cells and other evaporative equipment. Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. The efficacy of any biocide in ensuring that bacteria, and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures, and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, an appropriate biocide program and anti-biofilm agent monitoring program would be prepared and implemented for the entirewet SAC, including the six new wet SAC cells associated with the MREC. These programs would ensure that proper levels of biocide and other agents are maintained within wet SAC water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup.

The MREC will have a six (6) cell wet SAC. As such, MREC will prepare and implement a wet SAC water treatment program designed to reduce the potential for Legionella as noted above.

5.9.2.10 Summary of Effects

Results from the air toxics HRA based on emissions modeling indicate that there will be no significant incremental public health risks from construction or operation of the MREC. Results from criteria pollutant modeling for routine operations indicate that potential ambient concentrations of NO_2, CO, SO_2, and PM10 will not significantly affect air quality (Section 5.1, Air Quality). Potential concentrations are below the federal and California standards established to protect public health, including the more sensitive members of the population.

5.9.3 Cumulative Effects

The HRA for the MREC indicates that the maximum cancer risk will be approximately 5.~~24~~17 x 10^{-6} at the point of maximum exposure to air toxics from power facility emissions. The MREC risk level is well below the VCAPCD "significant health risk" thresholds. Non-cancer chronic and acute effects, i.e. hazard index values, are also well below the VCAPCD significance thresholds, as is the estimated cancer burden rate.

An analysis of the cumulative impacts of the MREC, per CEC practice based on modeling studies conducted by staff, is typically only required if the proposed facility is generally within 0.5 miles of another existing large toxics emissions source. No such sources were identified within the default distance of 0.5 miles. In addition, the cancer risks and non-cancer health impacts estimated for the MREC using conservative assumptions are below significance with minimal predicted impacts to offsite receptors.

In 1998, the OEHHA listed DPM, a primary combustion product from diesel engines, as a TAC, based on its potential to cause cancer, premature deaths, and other health problems. According to CARB and EPA, mobile source emissions account for much of the sources of cancer risk associated with TAC. According to EPA estimates, mobile sources (e.g., cars, trucks, and buses) of TAC account for as much as half of all cancers attributed to outdoor sources of TAC. More recent research illustrates that health risks from DPM are highest in areas of concentrated emissions, such as near ports, rail yards, freeways, or warehouse distribution centers. Additionally, the MATES-III (2008) study conducted by the SCAQMD showed that mobile sources in the South Coast Air Basin represent the greatest contributors to the estimated cancer risks (about 84 percent). This conclusion is most likely true for the counties in the South Central Coast Air Basin (including the VCAPCD).

Standards have been adopted by CARB and EPA to reduce DPM emissions from new on-road heavy-duty vehicles. EPA estimates that, when fully implemented, the program is predicted to result in particulate emission levels and the corresponding health impacts that are approximately 95 percent below baseline levels. In addition, ongoing federal and state diesel motor vehicle emission reduction programs are in place and will continue to significantly reduce DPM emissions. These programs indicate that the MREC's potential health impact will not be cumulatively significant.

5.9.4 Mitigation Measures

5.9.4.1 Criteria Pollutants

Emissions of criteria pollutants will be minimized by applying BACT to the MREC. BACT for the turbines, and fire pump engine, is delineated in Appendix 5.1F.

The MREC location is in an area that is designated by the federal air agencies as non-attainment for ozone and unclassified-attainment for particulate matter. Pursuant to the VCAPCD NSR Rule, offsets are required for the MREC. Therefore, further mitigation of emissions is not required to protect public health.

5.9.4.2 Toxic Pollutants

Emissions of toxic pollutants to the air will be minimized through the use of BACT/T-BACT at the MREC, (i.e., the use of clean fuels, and an oxidation catalyst on the individual turbines for the control of VOCs and gaseous toxic constituents).

Legionella Mitigation Measure

Since the MREC is proposing the use of a wet SAC, a Legionella mitigation plan will be developed.

5.9.4.3 Hazardous Materials

Mitigation measures for hazardous materials are presented below and discussed in more detail in the Hazardous Materials Handling section. Potential public health effects from the use of hazardous materials are only expected to occur as a result of an accidental release. The facility has many safety features designed to prevent and minimize effects from the use and accidental release of hazardous materials. The MREC site will include the design features listed below.

- Curbs, berms, and/or secondary containment structures will be provided where accidental release of chemicals may occur.
- A fire-protection system will be included to detect, alarm, and suppress a fire, in accordance with applicable LORS.
- Construction of all storage systems will be in accordance with applicable construction standards, seismic standards, and LORS.

If required, a RMP for the MREC will be prepared prior to commencement of MREC operations. The RMP will estimate the risk presented by handling affected materials at the MREC site. The RMP will include a hazard analysis, off-site consequence analysis, seismic assessment, emergency response plan, and training procedures. The RMP process will accurately identify and propose adequate mitigation measures to reduce the risk to the lowest possible level.

A safety program will be implemented and will include safety training programs for contractors and operations personnel, including instructions on the following:

- Proper use of personal protective equipment
- *S*afety operating procedures
- Fire safety
- (Emergency response actions

The safety program will also include programs on safely operating and maintaining systems that use hazardous materials. Emergency procedures for MREC personnel include power facility evacuation, hazardous material spill cleanup, fire prevention, and emergency response.

Areas subject to potential leaks of hazardous materials will be paved and bermed. Incompatible materials will be stored in separate containment areas. Containment areas will be drained to either a collection sump or to holding or neutralization tanks. Also, piping and tanks exposed to potential traffic hazards will be additionally protected by traffic barriers.

5.9.5 Laws, Ordinances, Regulations, and Standards

An overview of the regulatory process for public health issues is presented in this section. The relevant LORS that affect public health and are applicable to the MREC are identified in Table 5.9-9. The conformity of the MREC to each of the LORS applicable to public health is also presented in this table, as well as references to the selection locations within this report where each of these issues is addressed. Table 5.9-9 also summarizes the primary agencies responsible for public health, as well as the general category of the public health concern regulated by each of these agencies.

Table 5.9-9 Summary of LORS – Public Health

LORS	Applicability	Primary Regulatory Agency	MREC Conformance	Conformance (AFC Section)
CAA Title III	Public exposure to air pollutants	EPA Region 9 CARB VCAPCD	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels. Emissions of criteria pollutants will be minimized by applying BACT to the MREC.	5.9.1.5, and Appendix 5.1D

Table 5.9-9 Summary of LORS – Public Health

LORS	Applicability	Primary Regulatory Agency	MREC Conformance	Conformance (AFC Section)
Health and Safety Code 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed thresholds that require exposure warnings.	5.9.1.5, 5.9.1.6, 5.9.3.3, and Appendix 5.1D
40 CFR Part 68 (RMP) and CalARP Program Title 19	Public exposure to acutely hazardous materials	EPA Region 9 Riverside County Department of Health Services Riverside County Fire Department	A vulnerability analysis will be performed to assess potential risks from a spill or rupture from any affected storage tank. An RMP (if required) will be prepared prior to commencement of MREC operations.	5.9.1.6, and Appendix5.1D
Health and Safety Code Sections 25531 to 25541	Public exposure to acutely hazardous materials	Riverside County Department of Health Services CARB VCAPCD	A vulnerability analysis will be performed to assess potential risks from a spill or rupture from any affected storage tank.	5.9.1.6, and Appendix 5.1D
CHSC 25500-25542	Hazmat Inventory	State Office of Emergency Services and Riverside County Department of Environmental Health	Prepare all required Hazardous Materials plans and inventories, distribute to affected agencies	See Hazardous Materials Section
CHSC 44300 et seq.	AB2588 Air Toxics Program	VCAPCD	Participate in the AB2588 inventory and reporting program at the District level.	Appendix 5.1A, Appendix 5.1D, initial reporting TBD by VCAPCD
VCAPCD CEQA Guidelines, 2003	Toxics NSR	VCAPCD	Establishes risk and hazard index values. The facility is expected to comply with these values.	Section 5.1, Section 5.9, Appendix 5.1D
VCAPCD Rule 73	NESHAPS	VCAPCD	Requires compliance with applicable NESHAPs.	Section 5.1 and 5.9
CHSC 25249.5	Proposition 65	OEHHA	Comply with all signage and notification requirements.	See Hazardous Materials Section
Health and Safety Code Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Public exposure to TACs	CARB VCAPCD	Based on results of HRA as per CARB/OEHHA guidelines, toxic contaminants do not exceed acceptable levels.	5.9.1, Appendix 5.1D

5.9.5.1 Permits Required and Schedule

Agency-required permits related to public health include an RMP and VCAPCD Permit to Construct/Permit to Operate. These requirements are discussed in detail in the Hazardous Materials Handling section and section 5.1, Air Quality, respectively.

5.9.5.2 Agencies Involved and Agency Contacts

Table 5.9-10 provides contact information for agencies involved with Public Health.

Table 5.9-10 **Summary of Agency Contacts for Public Health**

Public Health Concern	Primary Regulatory Agency	Regulatory Contact
Public exposure to air pollutants	EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974
	CARB	Mike Tollstrup 1001 1 Street, 19th Floor Sacramento, CA 95814 (916) 322-6026
	VCAPCD	Kerby Zozula Manager, Eng. Division VCAPCD 669 County Square Dr. Ventura, CA. 93003 (805) 645-1421
Public exposure to chemicals known to cause cancer or reproductive toxicity	OEHHA	Cynthia Oshita or Susan Long P.O. Box 4010 Sacramento, CA 95812-4010 (916) 445-6900
Public exposure to acutely hazardous materials	EPA Region 9	Gerardo Rios Chief, Permits Section EPA Region 9 75 Hawthorne St. San Francisco, CA 94105 (415) 947-3974
	Ventura County EHD-CUPA Hazmat Division	David Wadsworth 800 S. Victoria Ave. Ventura, CA. 93009 (805)654-3523

Source: MREC Team, 2015.

5.9.6 References

California Air Resources Board. (CARB). 2015. Consolidated table of OEHHA/ARB approved risk assessment health values. http://arbis.arb.ca.gov/toxics/healthval/contable.pdf

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Office of Environmental Health Hazard Assessment/California Air Resources Board. (OEHHA/CARB). 2003. Air Toxics Hot Spots Program Risk Assessment Guidelines, Cal-EPA, August. HARP Model, Version 1.4f and 2.0.3 ADMRT #16217, Updated February 2015. Section 8.2.1, Table 8.3.

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Bay Area Air Quality Management District. (BAAQMD). Air Toxics NSR Program HRSA Guidelines, January 2010. Section 2.3.

Mission Rock Energy Center Team. 2015. Fieldwork, observations, and research.

APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Appendix 5.1B, Modeling Support

Modeling Support Data

Tables presented in this Appendix are as follows:

In addition, this appendix contains the following figures:

Modeling input/output files are included in CD’s provided separately to the agencies.

VENTURA, CALIFORNIA (049285)

Period of Record Monthly Climate Summary

Period of Record : 01/01/1900 to 08/31/2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.9	65.3	68.2	68.0	67.7	70.9	73.0	74.3	74.3	73.7	71.2	69.9	70.3
Average Min. Temperature (F)	45.0	43.2	45.8	47.0	48.7	53.0	55.1	54.3	52.8	51.6	48.1	45.1	49.1
Average Total Precipitation (in.)	3.05	3.26	2.55	0.98	0.23	0.04	0.01	0.02	0.22	0.49	1.46	2.37	14.67
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 0.1% Min. Temp.: 0.1% Precipitation: 87.1% Snowfall: 87% Snow Depth: 86.8%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Table 5.1B-1 Climate Summaries (11 Pages)

OJAI, CALIFORNIA (046399)

Period of Record Monthly Climate Summary

Period of Record : 5/ 1/1905 to 3/31/2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.6	67.9	70.1	74.0	77.4	83.4	90.9	91.5	88.7	82.1	74.7	67.9	77.9
Average Min. Temperature (F)	35.9	38.0	39.9	43.1	46.9	50.3	54.5	54.3	52.1	46.7	40.3	36.4	44.9
Average Total Precipitation (in.)	4.92	4.94	3.53	1.42	0.40	0.07	0.02	0.04	0.27	0.66	1.82	3.13	21.21
Average Total SnowFall (in.)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 99% Min. Temp.: 98.7% Precipitation: 99.7% Snowfall: 99.8% Snow Depth: 99.7%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

OJAI, CALIFORNIA

NCDC 1981-2010 Monthly Normals

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max. Temperature (F)	67.2	67.5	70.3	74.1	77.7	82.6	88.8	90.5	87.3	80.1	72.6	66.3	77.1
Highest Mean Max. Temperature (F)													
Year Highest Occurred													
Lowest Mean Max. Temperature (F)													
Year Lowest Occurred													
Mean Temperature (F)	51.6	52.9	55.5	58.6	62.8	67.0	72.2	72.8	70.0	63.6	56.2	50.9	61.2
Highest Mean Temperature (F)													
Year Highest Occurred													
Lowest Mean Temperature (F)													
Year Lowest Occurred													
Mean Min. Temperature (F)	36.1	38.3	40.6	43.2	48.0	51.5	55.7	55.1	52.7	47.2	39.8	35.4	45.3
Highest Mean Min. Temperature (F)													
Year Highest Occurred													
Lowest Mean Min. Temperature (F)													
Year Lowest Occurred													
Mean Precipitation (in.)	5.02	5.22	3.33	1.22	0.47	0.10	0.03	0.05	0.20	0.98	1.70	2.94	21.26
Highest Precipitation (in.)													

Year Highest Occurred													
Lowest Precipitation (in.)													
Year Lowest Occurred													
Heating Degree Days (F)	414.	340.	298.	206.	108.	35.	3.	3.	19.	93.	269.	439.	2226.
Cooling Degree Days (F)	0.	1.	2.	15.	41.	97.	227.	245.	169.	51.	5.	0.	854.

Western Regional Climate Center, wrcc@dri.edu

OJAI, CALIFORNIA

NCDC 1961-1990 Monthly Normals

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max. Temperature (F)	67.3	68.8	69.8	74.0	76.8	82.6	89.7	90.0	86.8	81.6	73.0	67.5	77.3
Highest Mean Max. Temperature (F)	75.8	77.4	76.5	80.6	86.3	90.7	94.2	96.5	93.8	88.7	81.2	74.9	80.4
Year Highest Occurred	1976	1977	1988	1987	1984	1981	1977	1967	1979	1965	1977	1989	1961
Lowest Mean Max. Temperature (F)	60.2	59.0	64.3	64.3	70.7	72.4	82.4	84.5	78.1	76.1	68.5	59.8	73.9
Year Lowest Occurred	1979	1969	1975	1967	1980	1969	1987	1989	1986	1972	1985	1971	1969
Mean Temperature (F)	52.0	53.8	55.3	58.8	62.3	67.1	72.4	72.9	70.2	64.8	57.2	52.1	61.6
Highest Mean Temperature (F)	56.8	59.9	61.1	63.1	67.4	73.5	75.9	79.4	77.9	69.4	62.4	57.7	62.8
Year Highest Occurred	1986	1963	1972	1962	1984	1981	1984	1967	1984	1964	1977	1977	1984
Lowest Mean Temperature (F)	48.7	48.7	51.8	51.3	58.5	61.1	66.8	69.4	64.6	59.9	53.6	47.2	59.9
Year Lowest Occurred	1979	1969	1973	1967	1980	1982	1987	1989	1985	1981	1978	1971	1982
Mean Min. Temperature (F)	36.6	38.8	40.8	43.4	47.7	51.5	55.1	55.7	53.5	48.0	41.3	36.5	45.7
Highest Mean Min. Temperature (F)	43.1	44.9	47.3	47.9	50.7	56.3	60.0	62.3	62.4	53.9	47.7	44.7	47.3
Year Highest Occurred	1980	1963	1978	1990	1969	1981	1984	1967	1984	1987	1967	1977	1983
Lowest Mean Min. Temperature (F)	31.5	32.5	35.3	38.3	43.5	46.2	49.7	50.4	48.9	42.4	37.2	28.7	43.7
Year Lowest Occurred	1989	1964	1977	1967	1989	1989	1986	1985	1985	1979	1980	1990	1989
Mean Precipitation (in.)	4.26	4.67	3.47	1.32	0.27	0.05	0.01	0.08	0.47	0.45	2.67	2.98	20.70
Highest Precipitation (in.)	25.76	19.56	14.50	6.32	3.45	0.49	0.13	1.22	5.57	2.92	13.78	10.03	47.30

Year Highest Occurred	1969	1962	1978	1965	1977	1963	1969	1983	1976	1983	1965	1966	1978
Lowest Precipitation (in.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.32
Year Lowest Occurred	1976	1984	1972	1985	1988	1989	1990	1989	1987	1990	1980	1989	1972
Heating Degree Days (F)	403.	317.	305.	212.	113.	60.	6.	9.	26.	81.	241.	400.	2173.
Cooling Degree Days (F)	0.	0.	0.	26.	29.	123.	235.	254.	182.	75.	7.	0.	931.

Western Regional Climate Center, wrcc@dri.edu

SANTA PAULA, CALIFORNIA (047957)

Period of Record Monthly Climate Summary

Period of Record : 5/ 1/1894 to 10/31/2008

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.7	68.4	70.5	73.5	75.2	77.8	81.5	82.1	81.7	78.5	73.5	68.3	74.8
Average Min. Temperature (F)	41.6	42.2	43.8	45.6	49.2	52.3	55.1	55.0	53.7	49.6	44.8	42.0	47.9
Average Total Precipitation (in.)	4.29	4.19	3.06	1.13	0.33	0.04	0.01	0.05	0.23	0.51	1.68	2.42	17.93
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 91.7% Min. Temp.: 91.6% Precipitation: 96.6% Snowfall: 96.8% Snow Depth: 96.4%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

SANTA PAULA, CALIFORNIA

NCDC 1961-1990 Monthly Normals

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max. Temperature (F)	67.9	69.2	69.4	72.6	73.6	76.7	80.8	81.5	80.6	78.0	72.0	67.6	74.2
Highest Mean Max. Temperature (F)	74.8	75.4	75.2	77.7	80.8	84.6	86.5	89.2	89.0	83.9	79.2	75.2	77.0
Year Highest Occurred	1961	1977	1984	1989	1984	1981	1972	1971	1984	1965	1976	1989	1984
Lowest Mean Max. Temperature (F)	61.7	61.3	64.7	64.7	69.7	71.2	74.8	76.5	74.1	72.0	64.8	60.1	71.3
Year Lowest Occurred	1979	1962	1962	1967	1980	1965	1987	1987	1961	1975	1962	1987	1987
Mean Temperature (F)	54.6	55.7	56.1	58.9	61.2	64.5	67.8	68.7	67.6	64.1	58.2	54.3	61.0
Highest Mean Temperature (F)	60.0	60.4	60.3	64.1	66.0	70.6	72.1	73.9	75.0	68.8	63.9	58.8	63.0
Year Highest Occurred	1986	1963	1988	1989	1978	1981	1984	1971	1984	1983	1976	1980	1983
Lowest Mean Temperature (F)	50.4	51.2	52.4	51.8	57.1	60.0	63.2	64.2	63.4	59.2	53.3	48.7	58.5
Year Lowest Occurred	1973	1969	1962	1967	1964	1965	1987	1976	1986	1975	1975	1971	1975
Mean Min. Temperature (F)	41.2	42.2	42.8	45.2	48.7	52.3	54.7	55.9	54.5	50.0	44.2	41.0	47.7
Highest Mean Min. Temperature (F)	48.6	48.8	50.7	50.7	53.1	56.5	59.7	60.9	61.0	56.1	50.0	45.3	50.7
Year Highest Occurred	1980	1980	1978	1990	1979	1981	1988	1983	1984	1987	1967	1980	1983
Lowest Mean Min. Temperature (F)	36.1	37.2	38.6	38.8	43.5	48.7	50.6	47.8	49.0	44.3	38.7	36.5	45.3
Year Lowest Occurred	1972	1966	1964	1967	1964	1965	1965	1976	1970	1976	1975	1971	1964
Mean Precipitation (in.)	3.72	3.63	2.91	1.07	0.14	0.03	0.01	0.09	0.38	0.39	2.45	2.57	17.39
Highest Precipitation (in.)	18.63	18.10	11.79	5.22	2.08	0.52	0.10	1.11	4.06	3.60	10.37	8.20	38.60
	1969	1962	1978	1967	1977	1963	1969	1983	1976	1983	1965	1971	1978

Year Highest Occurred													
Lowest Precipitation (in.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.02
Year Lowest Occurred	1976	1984	1990	1990	1988	1990	1990	1990	1990	1990	1980	1990	1989
Heating Degree Days (F)	327.	266.	280.	199.	139.	77.	35.	30.	52.	82.	217.	335.	2039.
Cooling Degree Days (F)	0.	6.	0.	16.	21.	62.	122.	145.	130.	54.	13.	0.	569.

Western Regional Climate Center, wrcc@dri.edu

SANTA PAULA, CALIFORNIA

NCDC 1981-2010 Monthly Normals

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max. Temperature (F)	69.3	69.2	71.0	74.0	75.1	77.2	80.7	82.7	81.6	78.5	73.8	69.2	75.2
Highest Mean Max. Temperature (F)													
Year Highest Occurred													
Lowest Mean Max. Temperature (F)													
Year Lowest Occurred													
Mean Temperature (F)	55.2	55.9	57.5	60.0	62.5	65.1	68.8	69.4	68.1	64.4	59.1	55.2	61.8
Highest Mean Temperature (F)													
Year Highest Occurred													
Lowest Mean Temperature (F)													
Year Lowest Occurred													
Mean Min. Temperature (F)	41.1	42.5	43.9	45.9	50.0	53.1	56.9	56.1	54.7	50.2	44.4	41.1	48.4
Highest Mean Min. Temperature (F)													
Year Highest Occurred													
Lowest Mean Min. Temperature (F)													
Year Lowest Occurred													
Mean Precipitation (in.)	3.72	4.85	2.69	0.83	0.35	0.07	0.01	0.04	0.16	0.69	1.44	2.53	17.38
Highest Precipitation (in.)													

Year Highest Occurred													
Lowest Precipitation (in.)													
Year Lowest Occurred													
Heating Degree Days (F)	309.	262.	239.	165.	98.	40.	6.	5.	15.	65.	190.	309.	1701.
Cooling Degree Days (F)	5.	6.	5.	13.	22.	44.	124.	141.	109.	44.	13.	4.	531.

Western Regional Climate Center, wrcc@dri.edu

Table 5.1B-2 Mission Rock Background Air Quality Values for 2013-2015 (3 Pages)

Historical Monitored Air Quality Values

Pollutant	Units	Avg Time	Station	2013	2014	2015
Ozone	ppm	1-Hr State	El Rio	0.067	0.112	0.070
			Piru	0.092	0.097	0.085
			1000 Oaks	0.099	0.092	0.078
		8-Hr State	El Rio	0.063	0.077	0.066
			Piru	0.082	0.082	0.074
			1000 Oaks	0.081	0.082	0.069
		8-Hr Federal	El Rio	0.059	0.067	0.060
			Piru	0.069	0.079	0.072
			1000 Oaks	0.062	0.074	0.066

Data Sources: EPA Air Data website, monitor values (exclude exceptional events), 9/22/15 & 6/24/16
CARB ADAM website, 9/22/15 & 6/24/16

1. CAAQS background is the highest value in the 3 year period at El Rio.
2. NAAQS background is the 3 year avg of the 4th high 8 hr values at El Rio.

Background Values:	*ppm*	*ug/m3*
1-Hr State	*0.112*	*219.9*
8-Hr State	*0.077*	*151.2*
8-Hr Fed	*0.062*	*121.7*

AAM = annual arithmetic mean.

24-Sep-15

Pollutant	Units	Avg Time	Station	2013	2014	2015
NO2	ppm	1-Hr State	El Rio	0.040	0.039	0.036
			Simi Valley	0.043	0.047	0.041
		AAM-State & Federal	El Rio	0.007	0.006	0.006
			Simi Valley	0.009	0.009	0.008
		1-Hr Federal	El Rio	0.033	0.030	0.028
			Simi Valley	0.037	0.041	0.036

1. CAAQS background is the highest value in the 3 year period at El Rio.
2. NAAQS 1-hour background is the 3 year avg of the 1 hr 98th percentile values at El Rio.
3. NAAQS annual background is the highest AAM value at El Rio.

Background Values:	*ppm*	*ug/m3*
1-Hr State	*0.040*	*75.3*
AAM-State	*0.007*	*13.2*
1-Hr Fed	*0.030*	*56.4*
AAM Fed	*0.007*	*13.2*

Historical Monitored Air Quality Values

Pollutant	Units	Avg Time	Station	2013	2014	2015
CO	ppm	1-Hr State	Santa Maria	2.5	2.7	2.9
			Santa Barb	2.5	4.0	2.1
		8-Hr State	Santa Maria	0.9	1.0	1.2
			Santa Barb	1.1	1.1	0.8
		1-Hr Federal	Santa Maria	1.6	1.6	2.4
			Santa Barb	2.4	2.5	1.8
		8-Hr Federal	Santa Maria	0.6	0.6	0.7
			Santa Barb	1.0	1.0	0.8

1. CAAQS background is the highest value in the 3 year period at Santa Barbara.
2. NAAQS background is the highest, second high 1 and 8 hr values at Santa Barbara.

Background Values:	*ppm*	*ug/m3*
1-Hr State	*4.0*	*4,581*
8-Hr State	*1.1*	*1,260*
1-Hr Fed	*2.5*	*2,863*
8-Hr Fed	*1.0*	*1,145*

Pollutant	Units	Avg Time	Station	2013	2014	2015
SO2	ppm	1-Hr State	Lompoc	0.004	0.001	0.001
			Exxon UCSB	0.002	0.004	0.002
		24-Hr State	Lompoc	0.0023	0.0003	0.0000
			Exxon UCSB	0.0020	0.0003	0.0010
		1-Hr Federal	Lompoc	0.003	0.001	0.000
			Exxon UCSB	0.002	0.001	0.001
		Ann Federal	Lompoc	0.0014	0.0000	0.0000
			Exxon UCSB	0.0008	0.0000	0.0001

1. CAAQS and most NAAQS backgrounds are highest value in the 3 year period at Exxon UCSB.
2. NAAQS 1-hour background is the 3 year avg of the 99th percentile values at Exxon UCSB.

Background Values:	*ppm*	*ug/m3*
1-Hr State	*0.004*	*10.5*
24-Hr State	*0.0020*	*5.2*
1-Hr Fed	*0.001*	*2.6*
Ann Fed	*0.0008*	*2.1*

Historical Monitored Air Quality Values

Pollutant	Units	Avg Time	Station	2013	2014	2015
PM10	ug/m3	24-Hr State	El Rio-1	47	51	N/A
			El Rio-2	106	118	93
			Simi Valley	40	48	N/A
		AAM-State	El Rio-1	24.3	27.4	25.6
			El Rio-2	-	-	-
			Simi Valley	22.5	24.1	20.8
		24-Hr Federal	El Rio-1	40	50	N/A
			El Rio-2	60	69	61
			Simi Valley	39	35	N/A

El Rio-1 = 6-day sampling
El Rio-2 = continuous sampling

1. annual refers to "arithmetic means".
2. CAAQS background is the highest value in the 3 year period at El Rio.
3. NAAQS 24 hr background is the high 2nd high 24 hr values at El Rio.

Background Values: *ug/m3*

24-Hr State	*51*	6-day sampling
24-Hr Fed	*50*	6-day sampling
24-Hr State	*118*	continuous sampling
24-Hr Fed	*69*	continuous sampling
AAM-State	*27.4*	6-day

Pollutant	Units	Avg Time	Station	2013	2014	2015
PM2.5	ug/m3	24-Hr Federal	El Rio	18	18	22
			Piru	17	18	20
			Simi Valley	22	20	22
		AAM-Federal & State	El Rio	9.4	9.3	9.6
			Piru	7.2	9.5	7.6
			Simi Valley	9.0	9.1	8.7

1. annual refers to "arithmetic means".
2. CAAQS background is the highest value in the 3 year period.
3. NAAQS 24 hr background is the 3 year avg of the 24 hr 98th percentile values.
4. NAAQS annual background is the 3 year avg of the AAMs.

Background Values: *ug/m3*

AAM-State	*9.6*
24-Hr Fed	*19*
AAM-Fed	*9.4*

Table 5.1B-3a Mission Rock AERMOD Turbine Screening Results w/ Camarillo 2011-2015 Met

Updated Receptor Grids w/ 192.3'amsl Stack Base Elevation

60' StkHt

														Ann.Avg				
Emissions Case	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Inlet Conditioning	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**
Load %	**100**	**75**	**50**	**25**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**
Number of Turbines	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ambient Rel.Humidy, %	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Ambient Temp, °F	30.0	30.0	30.0	30.0	39.4	39.4	39.4	39.4	59.0	59.0	59.0	59.0	59.0	61.0	61.0	61.0	61.0	61.0
Stack Exit Temp (deg.F)	867	837	808	757	868	846	826	774	869	867	863	861	812	870	868	862	865	815
Volumetric Flowrate ACFM	693,778	571,410	462,029	358,002	695,543	572,146	461,727	357,837	696,775	690,079	572,987	459,718	357,342	697,007	688,467	572,215	459,133	357,019
Stack Velocity (ft/sec)	102.6	84.5	68.3	53.0	102.9	84.6	68.3	52.9	103.1	102.1	84.8	68.0	52.9	103.1	101.8	84.6	67.9	52.8
Stack Inside Diameter (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Stack Height (m)	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29
Stack Exit Temp (deg.K)	736.9	720.6	704.3	676.1	737.7	725.6	714.0	685.5	738.2	737.1	734.8	734.0	706.3	738.7	737.5	734.0	736.0	708.3
Stack Exit Velocity (m/s)	31.28	25.76	20.83	16.14	31.36	25.79	20.82	16.13	31.41	31.11	25.83	20.73	16.11	31.42	31.04	25.80	20.70	16.10
Stack Inside Diameter (m)	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576
Normal Operations - Short-term Screening Emissions (lb/hr/turbine) and Unitized Screening Impacts (for 1.0 g/s/turbine)																		
NOx (lb/hr/turbine)	5.10	3.96	2.93	1.98	5.07	3.94	2.93	1.97	5.05	4.96	3.88	2.89	1.95	5.05	4.94	3.86	2.88	1.95
CO (lb/hr/turbine)	4.97	3.85	2.86	1.92	4.94	3.84	2.85	1.92	4.92	4.83	3.78	2.81	1.90	4.92	4.81	3.76	2.81	1.90
SO2 (lb/hr/turbine)	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
PM10 (lb/hr/turbine)	2.00	2.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00
1-Hr Unitized Conc (ug/m3)	104.89614	116.51448	126.48362	146.26721	104.70322	116.22772	126.00226	145.71352	104.58227	105.20562	115.73101	125.22233	144.50322	104.53711	105.31632	115.82878	125.20535	144.42095
X(m)	306900.0	306900.0	307000.0	307200.0	306900.0	306900.0	307000.0	307200.0	306900.0	306900.0	306900.0	307000.0	307200.0	306900.0	306900.0	306900.0	307000.0	307200.0
Y(m)	3797300.0	3797300.0	3797400.0	3797600.0	3797300.0	3797300.0	3797400.0	3797600.0	3797300.0	3797300.0	3797300.0	3797400.0	3797600.0	3797300.0	3797300.0	3797300.0	3797400.0	3797600.0
Z(m)	200.1	200.1	184.3	172.7	200.1	200.1	184.3	172.7	200.1	200.1	200.1	184.3	172.7	200.1	200.1	200.1	184.3	172.7
YYMMDDHH	14052602	15010401	14031323	15111424	14052602	15010401	14031323	15111424	14052602	14052602	15010401	14031323	15111424	14052602	14052602	15010401	14031323	15111424
3-Hr Unitized Conc (ug/m3)	63.96061	76.15015	87.12440	93.48085	63.76544	75.84451	86.78514	93.44820	63.64369	64.28072	75.32270	86.24472	93.34061	63.59927	64.39701	75.42488	86.23519	93.33178
X(m)	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0
Y(m)	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0
Z(m)	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3
YYMMDDHH	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106
8-Hr Unitized Conc (ug/m3)	44.62533	50.99295	62.07512	72.66755	44.63180	50.71027	61.67783	72.41696	44.63541	44.61287	50.23033	61.05244	71.86655	44.63663	44.60779	50.32308	61.04009	71.82905
X(m)	306900.0	306800.0	306800.0	306800.0	306900.0	306800.0	306800.0	306800.0	306900.0	306900.0	306800.0	306800.0	306800.0	306900.0	306900.0	306800.0	306800.0	306800.0
Y(m)	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0
Z(m)	200.1	164.3	164.3	164.3	200.1	164.3	164.3	164.3	200.1	200.1	164.3	164.3	164.3	200.1	200.1	164.3	164.3	164.3
YYMMDDHH	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408
24-Hr Unitized Conc (ug/m3)	16.11990	18.60435	22.35587	25.76725	16.12666	18.50714	22.22361	25.69107	16.13073	16.10826	18.34194	22.01500	25.52227	16.13220	16.10385	18.37387	22.01087	25.51070
X(m)	306900.0	306800.0	306800.0	306800.0	306900.0	306800.0	306800.0	306800.0	306900.0	306900.0	306800.0	306800.0	306800.0	306900.0	306900.0	306800.0	306800.0	306800.0
Y(m)	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0
Z(m)	200.1	164.3	164.3	164.3	200.1	164.3	164.3	164.3	200.1	200.1	164.3	164.3	164.3	200.1	200.1	164.3	164.3	164.3
YYMMDDHH	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424
Ann** Unitized Conc (ug/m3)	1.01383	1.08741	1.25233	1.47077	1.01234	1.08601	1.24457	1.46470	1.01141	1.01621	1.08346	1.23230	1.45168	1.01107	1.01706	1.08395	1.23203	1.45079
X(m)	306800.0	306800.0	307200.0	307200.0	306800.0	306800.0	307200.0	307200.0	306800.0	306800.0	306800.0	307200.0	307200.0	306800.0	306800.0	306800.0	307200.0	307200.0
Y(m)	3797200.0	3797200.0	3797600.0	3797600.0	3797200.0	3797200.0	3797600.0	3797600.0	3797200.0	3797200.0	3797200.0	3797600.0	3797600.0	3797200.0	3797200.0	3797200.0	3797600.0	3797600.0
Z(m)	201.5	201.5	172.7	172.7	201.5	201.5	172.7	172.7	201.5	201.5	201.5	172.7	172.7	201.5	201.5	201.5	172.7	172.7
Normal Operations - Short-term Pollutant Emissions (g/s/turbine) and Pollutant Screening Impacts																		
NOx (g/s/turbine)	0.643	0.499	0.369	0.249	0.639	0.496	0.369	0.248	0.636	0.625	0.489	0.364	0.246	0.636	0.622	0.486	0.363	0.246
CO (g/s/turbine)	0.626	0.485	0.360	0.242	0.622	0.484	0.359	0.242	0.620	0.609	0.476	0.354	0.239	0.620	0.606	0.474	0.354	0.239
SO2 (g/s/turbine)	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
PM10 (g/s/turbine)	0.252	0.252	0.126	0.126	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126
1-Hour NOx*** (ug/m3)	**67.448**	58.141	**46.672**	36.421	66.905	57.649	46.495	36.137	66.514	65.754	56.592	45.581	35.548	66.486	65.507	56.293	45.450	35.528
Annual NOx*** (ug/m3)	**0.652**	0.543	0.462	0.366	0.647	0.539	0.459	0.363	0.643	0.635	0.530	0.449	0.357	**0.643**	0.633	0.527	0.447	0.357
1-Hour CO (ug/m3)	**65.665**	56.510	**45.534**	35.397	65.125	56.254	45.235	35.263	64.841	64.070	55.088	44.329	34.536	64.813	63.822	54.903	44.323	34.517
8-Hour CO (ug/m3)	**27.935**	24.732	22.347	17.586	27.761	24.544	22.142	17.525	27.674	27.169	23.910	21.613	17.176	27.675	27.032	23.853	21.608	17.167
1-Hour SO2 (ug/m3)	7.762	8.622	9.360	**10.824**	7.748	8.601	9.324	10.783	7.739	7.785	8.564	9.266	10.693	7.736	7.793	8.571	9.265	10.687
3-Hour SO2 (ug/m3)	4.733	5.635	6.447	**6.918**	4.719	5.612	6.422	6.915	4.710	4.757	5.574	6.382	6.907	4.706	4.765	5.581	6.381	6.907
24-Hour SO2 (ug/m3)	1.193	1.377	1.654	**1.907**	1.193	1.370	1.645	1.901	1.194	1.192	1.357	1.629	1.889	1.194	1.192	1.360	1.629	1.888
24-Hour PM10 (ug/m3)	4.062	4.688	2.817	3.247	4.064	4.664	2.800	3.237	4.065	4.059	4.622	2.774	3.216	4.065	4.058	4.630	2.773	3.214
Annual PM10 (ug/m3)	0.255	0.274	0.158	0.185	0.255	0.274	0.157	0.185	0.255	0.256	0.273	0.155	0.183	**0.255**	0.256	0.273	0.155	0.183

Worst-Case Operating Scenarios are **bolded/highlighted**. Worst-Case 50% load condition (Case 3) is also **bolded/highlighted** - used for startup and commissioning analyses.

**Annual unitized/pollutant concentrations are the 5-year average of annual impacts, appropriate for PM2.5 NAAQS. Annual NO2/PM10 impacts (for NAAQS) and PSD increments would be slightly higher.

NOx impacts shown do ***NOT yet reflect the NO2 Ambient Ratio Method (ARM) USEPA-default values of 0.80 (80%) for 1-hour and 0.75 (75%) for annual averages.

Table 5.1B-3a Mission Rock AERMOD Turbine Screening Results w/ Camarillo 2011-2015 Met
Updated Receptor Grids w/ 192.3'amsl Stack Base Elevation
60' StkHt

Emissions Case	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
Inlet Conditioning	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**
Load %	**100**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**
Number of Turbines	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ambient Rel.Humidy, %	43.2	43.2	43.2	43.2	43.2	50.0	50.0	50.0	50.0	50.0	30.0	30.0	30.0	30.0	30.0
Ambient Temp, °F	79.2	79.2	79.2	79.2	79.2	76.0	76.0	76.0	76.0	76.0	96.0	96.0	96.0	96.0	96.0
Stack Exit Temp (deg.F)	870	868	868	866	845	869	870	870	863	841	869	853	869	868	858
Volumetric Flowrate ACFM	701,869	665,994	564,626	457,804	352,269	701,464	670,838	564,705	460,044	353,410	711,444	630,000	534,197	441,997	342,493
Stack Velocity (ft/sec)	103.8	98.5	83.5	67.7	52.1	103.8	99.2	83.5	68.0	52.3	105.2	93.2	79.0	65.4	50.7
Stack Inside Diameter (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Stack Height (m)	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29
Stack Exit Temp (deg.K)	738.6	737.8	737.8	736.4	724.9	738.1	738.5	738.6	734.7	722.5	738.0	729.3	738.4	737.5	732.2
Stack Exit Velocity (m/s)	31.64	30.03	25.46	20.64	15.88	31.62	30.24	25.46	20.74	15.93	32.07	28.40	24.08	19.93	15.44
Stack Inside Diameter (m)	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576
Normal Operations - Short-terr															
NOx (lb/hr/turbine)	5.05	4.67	3.70	2.78	1.90	5.05	4.72	3.73	2.80	1.91	5.05	4.23	3.39	2.59	1.80
CO (lb/hr/turbine)	4.92	4.55	3.61	2.71	1.85	4.92	4.60	3.63	2.73	1.86	4.92	4.12	3.30	2.52	1.75
SO2 (lb/hr/turbine)	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
PM10 (lb/hr/turbine)	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00
1-Hr Unitized Conc (ug/m3)	104.12284	107.15630	116.35656	125.35209	144.32368	104.18759	106.74341	116.32214	125.15926	144.25953	103.34263	110.58202	118.97791	127.43875	145.67842
X(m)	306900.0	306900.0	306900.0	307000.0	307200.0	306900.0	306900.0	306900.0	307000.0	307200.0	306900.0	306900.0	306900.0	307000.0	307200.0
Y(m)	3797300.0	3797300.0	3797300.0	3797400.0	3797600.0	3797300.0	3797300.0	3797300.0	3797400.0	3797600.0	3797300.0	3797300.0	3797300.0	3797400.0	3797600.0
Z(m)	200.1	200.1	200.1	184.3	172.7	200.1	200.1	200.1	184.3	172.7	200.1	200.1	200.1	184.3	172.7
YYMMDDHH	14052602	14052602	15010401	14031323	15111424	14052602	14052602	15010401	14031323	15111424	15041705	15041106	15010401	14122903	15111424
3-Hr Unitized Conc (ug/m3)	63.18102	66.37999	75.98424	86.34252	93.32422	63.24453	65.92509	75.94763	86.19984	93.31619	62.62982	70.13632	78.95290	87.70364	93.45286
X(m)	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0	307000.0
Y(m)	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797400.0	3797300.0	3797400.0	3797400.0	3797400.0	3797400.0
Z(m)	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	184.3	216.4	184.3	184.3	184.3	184.3
YYMMDDHH	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106
8-Hr Unitized Conc (ug/m3)	44.64625	44.47520	50.82602	61.15927	71.78555	44.64506	44.51337	50.79204	61.00198	71.75606	44.65415	45.74793	53.59189	62.72021	72.40340
X(m)	306900.0	306900.0	306800.0	306800.0	306800.0	306900.0	306900.0	306800.0	306800.0	306800.0	306900.0	306800.0	306800.0	306800.0	306800.0
Y(m)	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0
Z(m)	200.1	200.1	164.3	164.3	164.3	200.1	200.1	164.3	164.3	164.3	200.1	164.3	164.3	164.3	164.3
YYMMDDHH	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408
24-Hr Unitized Conc (ug/m3)	16.14516	16.01294	18.54684	22.05065	25.49735	16.14326	16.03643	18.53515	21.99814	25.48823	16.16611	16.79097	19.49433	22.57010	25.68720
X(m)	306900.0	306900.0	306800.0	306800.0	306800.0	306900.0	306900.0	306800.0	306800.0	306800.0	306900.0	306800.0	306800.0	306800.0	306800.0
Y(m)	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0	3797300.0
Z(m)	200.1	200.1	164.3	164.3	164.3	200.1	200.1	164.3	164.3	164.3	200.1	164.3	164.3	164.3	164.3
YYMMDDHH	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424
Ann** Unitized Conc (ug/m3)	1.00791	1.03119	1.08649	1.23428	1.44956	1.00840	1.02802	1.08631	1.23133	1.44893	1.00182	1.05582	1.10584	1.26405	1.46369
X(m)	306800.0	306800.0	306800.0	307200.0	307200.0	306800.0	306800.0	306800.0	307200.0	307200.0	306800.0	306800.0	306700.0	307200.0	307200.0
Y(m)	3797200.0	3797200.0	3797200.0	3797600.0	3797600.0	3797200.0	3797200.0	3797200.0	3797600.0	3797600.0	3797200.0	3797200.0	3797200.0	3797600.0	3797600.0
Z(m)	201.5	201.5	201.5	172.7	172.7	201.5	201.5	201.5	172.7	172.7	201.5	201.5	177.7	172.7	172.7
Normal Operations - Short-terr															
NOx (g/s/turbine)	0.636	0.588	0.466	0.350	0.239	0.636	0.595	0.470	0.353	0.241	0.636	0.533	0.427	0.326	0.227
CO (g/s/turbine)	0.620	0.573	0.455	0.341	0.233	0.620	0.580	0.457	0.344	0.234	0.620	0.519	0.416	0.318	0.221
SO2 (g/s/turbine)	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
PM10 (g/s/turbine)	0.252	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126
1-Hour NOx*** (ug/m3)	66.222	63.008	54.222	43.873	34.493	66.263	63.512	54.671	44.181	34.767	65.726	58.940	50.804	41.545	33.069
Annual NOx*** (ug/m3)	0.641	0.606	0.506	0.432	0.346	0.641	0.612	0.511	0.435	0.349	0.637	0.563	0.472	0.412	0.332
1-Hour CO (ug/m3)	64.556	61.401	52.942	42.745	33.627	64.596	61.911	53.159	43.055	33.757	64.072	57.392	49.495	40.526	32.195
8-Hour CO (ug/m3)	27.681	25.484	23.126	20.855	16.726	27.680	25.818	23.212	20.985	16.791	27.686	23.743	22.294	19.945	16.001
1-Hour SO2 (ug/m3)	7.705	7.930	8.610	9.276	10.680	7.710	7.899	8.608	9.262	10.675	7.647	8.183	8.804	9.430	10.780
3-Hour SO2 (ug/m3)	4.675	4.912	5.623	6.389	6.906	4.680	4.878	5.620	6.379	6.905	4.635	5.190	5.843	6.490	6.916
24-Hour SO2 (ug/m3)	1.195	1.185	1.372	1.632	1.887	1.195	1.187	1.372	1.628	1.886	1.196	1.243	1.443	1.670	1.901
24-Hour PM10 (ug/m3)	4.069	4.035	4.674	2.778	3.213	4.068	4.041	4.671	2.772	3.212	4.074	4.231	**4.913**	2.844	3.237
Annual PM10 (ug/m3)	0.254	0.260	0.274	0.156	0.183	0.254	0.259	0.274	0.155	0.183	0.252	0.266	0.279	0.159	0.184

Worst-Case Operating Scenarios are bolded/highlighted. Worst-Case 50% load condition (Case 3) is also **bolded/highlighted** - used for startup and commissioning analyses.

**Annual unitized/pollutant concentrations are the 5-year average of annual impacts, appropriate for PM2.5 NAAQS. Annual NO2/PM10 impacts (for NAAQS) and PSD increments would be slightly higher.

***NOx impacts shown do NOT yet reflect the NO2 Ambient Ratio Method (ARM) USEPA-default values of 0.80 (80%) for 1-hour and 0.75 (75%) for annual averages.

Table 5.1B-3b Mission Rock AERMOD Turbine Screening Results w/ Camarillo 2011-2015 Met

Revised ***REFINED*** Receptor Grids w/ 192.3'amsl Stack Base Elevation

60' StkHt

															Ann.Avg				
Emissions Case	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Inlet Conditioning	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**
Load %	**100**	**75**	**50**	**25**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**
Number of Turbines	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ambient Rel.Humidy, %	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Ambient Temp, °F	30.0	30.0	30.0	30.0	39.4	39.4	39.4	39.4	59.0	59.0	59.0	59.0	59.0	61.0	61.0	61.0	61.0	61.0
Stack Exit Temp (deg.F)	867	837	808	757	868	846	826	774	869	867	863	861	812	870	868	862	865	815
Volumetric Flowrate ACFM	693,778	571,410	462,029	358,002	695,543	572,146	461,727	357,837	696,775	690,079	572,987	459,718	357,342	697,007	688,467	572,215	459,133	357,019
Stack Velocity (ft/sec)	102.6	84.5	68.3	53.0	102.9	84.6	68.3	52.9	103.1	102.1	84.8	68.0	52.9	103.1	101.8	84.6	67.9	52.8
Stack Inside Diameter (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Stack Height (m)	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29
Stack Exit Temp (deg.K)	736.9	720.6	704.3	676.1	737.7	725.6	714.0	685.5	738.2	737.1	734.8	734.0	706.3	738.7	737.5	734.0	736.0	708.3
Stack Exit Velocity (m/s)	31.28	25.76	20.83	16.14	31.36	25.79	20.82	16.13	31.41	31.11	25.83	20.73	16.11	31.42	31.04	25.80	20.70	16.10
Stack Inside Diameter (m)	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576
Normal Operations - Short-term Screening Emissions (lb/hr/turbine) and Unitized Screening Impacts (for 1.0 g/s/turbine)																		
NOx (lb/hr/turbine)	5.10	3.96	2.93	1.98	5.07	3.94	2.93	1.97	5.05	4.96	3.88	2.89	1.95	5.05	4.94	3.86	2.88	1.95
CO (lb/hr/turbine)	4.97	3.85	2.86	1.92	4.94	3.84	2.85	1.92	4.92	4.83	3.78	2.81	1.90	4.92	4.81	3.76	2.81	1.90
SO2 (lb/hr/turbine)	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
PM10 (lb/hr/turbine)	2.00	2.00	1.00	1.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00
1-Hr Unitized Conc (ug/m3)	107.04984	118.36017	131.63170	150.53526	106.87140	118.00783	131.14816	150.05456	106.75941	107.33672	117.39892	130.36236	148.98859	106.71781	107.43944	117.51642	130.34496	148.91492
X(m)	306940.0	306940.0	306920.0	306920.0	306940.0	306940.0	306920.0	306920.0	306940.0	306940.0	306940.0	306920.0	306920.0	306940.0	306940.0	306940.0	306920.0	306920.0
Y(m)	3797340.0	3797360.0	3797360.0	3797380.0	3797340.0	3797360.0	3797360.0	3797380.0	3797340.0	3797340.0	3797360.0	3797360.0	3797380.0	3797340.0	3797340.0	3797360.0	3797360.0	3797380.0
Z(m)	196.4	187.7	182.2	174.0	196.4	187.7	182.2	174.0	196.4	196.4	187.7	182.2	174.0	196.4	196.4	187.7	182.2	174.0
YYMMDDHH	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821
3-Hr Unitized Conc (ug/m3)	71.14509	78.37038	87.13416	99.22606	71.04418	78.19660	86.78514	98.89600	70.98077	71.30865	77.89494	86.24472	98.17292	70.95756	71.36746	77.95453	86.23519	98.12426
X(m)	307020.0	307000.0	306980.0	306980.0	307020.0	307000.0	307000.0	306980.0	307020.0	307020.0	307000.0	307000.0	306980.0	307020.0	307020.0	307000.0	307000.0	306980.0
Y(m)	3797360.0	3797360.0	3797380.0	3797400.0	3797360.0	3797360.0	3797400.0	3797400.0	3797360.0	3797360.0	3797360.0	3797400.0	3797400.0	3797360.0	3797360.0	3797360.0	3797400.0	3797400.0
Z(m)	203.1	195.0	183.3	176.7	203.1	195.0	184.3	176.7	203.1	203.1	195.0	184.3	176.7	203.1	203.1	195.0	184.3	176.7
YYMMDDHH	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106
8-Hr Unitized Conc (ug/m3)	52.22458	58.40822	64.92014	73.80705	52.11863	58.24042	64.66906	73.43729	52.06159	52.39644	57.95073	64.26547	72.64324	52.04471	52.45835	58.00714	64.25733	72.59028
X(m)	306840.0	306840.0	306840.0	306820.0	306840.0	306840.0	306840.0	306820.0	306860.0	306840.0	306840.0	306840.0	306820.0	306860.0	306840.0	306840.0	306840.0	306820.0
Y(m)	3797280.0	3797300.0	3797320.0	3797320.0	3797280.0	3797300.0	3797320.0	3797320.0	3797300.0	3797280.0	3797300.0	3797320.0	3797320.0	3797300.0	3797280.0	3797300.0	3797320.0	3797320.0
Z(m)	182.6	178.3	172.2	161.0	182.6	178.3	172.2	161.0	188.3	182.6	178.3	172.2	161.0	188.3	182.6	178.3	172.2	161.0
YYMMDDHH	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408
24-Hr Unitized Conc (ug/m3)	19.24629	21.42239	23.90826	26.99934	19.21100	21.37093	23.81926	26.89570	19.19248	19.30348	21.28170	23.69826	26.67033	19.18758	19.32407	21.29912	23.69582	26.65508
X(m)	306860.0	306840.0	306840.0	306840.0	306860.0	306840.0	306840.0	306840.0	306860.0	306860.0	306840.0	306840.0	306840.0	306860.0	306860.0	306840.0	306840.0	306840.0
Y(m)	3797320.0	3797300.0	3797340.0	3797360.0	3797320.0	3797300.0	3797320.0	3797360.0	3797300.0	3797320.0	3797300.0	3797320.0	3797360.0	3797300.0	3797320.0	3797300.0	3797320.0	3797360.0
Z(m)	181.5	178.3	167.1	161.7	181.5	178.3	172.2	161.7	188.3	181.5	178.3	172.2	161.7	188.3	181.5	178.3	172.2	161.7
YYMMDDHH	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424
Ann** Unitized Conc (ug/m3)	1.02678	1.17118	1.32719	1.51370	1.02492	1.16677	1.32196	1.50786	1.02377	1.02978	1.15922	1.31356	1.49530	1.02334	1.03085	1.16067	1.31338	1.49444
X(m)	306760.0	307240.0	307240.0	307200.0	306760.0	307240.0	307240.0	307200.0	306760.0	306760.0	307240.0	307240.0	307200.0	306760.0	306760.0	307240.0	307240.0	307200.0
Y(m)	3797200.0	3797660.0	3797660.0	3797660.0	3797200.0	3797660.0	3797660.0	3797660.0	3797200.0	3797200.0	3797660.0	3797660.0	3797660.0	3797200.0	3797200.0	3797660.0	3797660.0	3797660.0
Z(m)	196.2	181.6	181.6	173.2	196.2	181.6	181.6	173.2	196.2	196.2	181.6	181.6	173.2	196.2	196.2	181.6	181.6	173.2
Normal Operations - Short-term Pollutant Emissions (g/s/turbine) and Pollutant Screening Impacts																		
NOx (g/s/turbine)	0.643	0.499	0.369	0.249	0.639	0.496	0.369	0.248	0.636	0.625	0.489	0.364	0.246	0.636	0.622	0.486	0.363	0.246
CO (g/s/turbine)	0.626	0.485	0.360	0.242	0.622	0.484	0.359	0.242	0.620	0.609	0.476	0.354	0.239	0.620	0.606	0.474	0.354	0.239
SO2 (g/s/turbine)	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
PM10 (g/s/turbine)	0.252	0.252	0.126	0.126	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126
1-Hour NOx*** (ug/m3)	**68.833**	59.062	**48.572**	37.483	68.291	58.532	48.394	37.214	67.899	67.085	57.408	47.452	36.651	67.873	66.827	57.113	47.315	36.633
Annual NOx*** (ug/m3)	**0.660**	0.584	0.490	0.377	0.655	0.579	0.488	0.374	0.651	0.644	0.567	0.478	0.368	**0.651**	0.641	0.564	0.477	0.368
1-Hour CO (ug/m3)	**67.013**	57.405	**47.387**	36.430	66.474	57.116	47.082	36.313	66.191	65.368	55.882	46.148	35.608	66.165	65.108	55.703	46.142	35.591
8-Hour CO (ug/m3)	**32.693**	28.328	23.371	17.861	32.418	28.188	23.216	17.772	32.278	31.909	27.585	22.750	17.362	32.268	31.790	27.495	22.747	17.349
1-Hour SO2 (ug/m3)	7.922	8.759	9.741	**11.140**	7.908	8.733	9.705	11.104	7.900	7.943	8.688	9.647	11.025	7.897	7.951	8.696	9.646	11.020
3-Hour SO2 (ug/m3)	5.265	5.799	6.448	**7.343**	5.257	5.787	6.422	7.318	5.253	5.277	5.764	6.382	7.265	5.251	5.281	5.769	6.381	7.261
24-Hour SO2 (ug/m3)	1.424	1.585	1.769	**1.998**	1.422	1.581	1.763	1.990	1.420	1.428	1.575	1.754	1.974	1.420	1.430	1.576	1.753	1.972
24-Hour PM10 (ug/m3)	4.850	5.398	3.012	3.402	4.841	5.385	3.001	3.389	4.837	4.864	5.363	2.986	3.360	4.835	4.870	5.367	2.986	3.359
Annual PM10 (ug/m3)	0.259	0.295	0.167	0.191	0.258	0.294	0.167	0.190	0.258	0.260	0.292	0.166	0.188	**0.258**	0.260	0.292	0.165	0.188

Worst-Case Operating Scenarios are **bolded/highlighted**. Worst-Case 50% load condition (Case 3) is also **bolded/highlighted** - used for startup and commissioning analyses.

**Annual unitized/pollutant concentrations are the 5-year average of annual impacts, appropriate for PM2.5 NAAQS. Annual NO2/PM10 impacts (for NAAQS) and PSD increments would be slightly higher.

NOx impacts shown do ***NOT yet reflect the NO2 Ambient Ratio Method (ARM) USEPA-default values of 0.80 (80%) for 1-hour and 0.75 (75%) for annual averages.

Table 5.1B-3b Mission Rock AERMOD Turbine Screening Results w/ Camarillo 2011-2015 Met

Revised REFINED Receptor Grids w/ 192.3'amsl Stack Base Elevation

60' StkHt

Emissions Case	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**
Inlet Conditioning	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**	**CHILL**	**NONE**	**NONE**	**NONE**	**NONE**
Load %	**100**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**	**100**	**100**	**75**	**50**	**25**
Number of Turbines	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Ambient Rel.Humidy, %	43.2	43.2	43.2	43.2	43.2	50.0	50.0	50.0	50.0	50.0	30.0	30.0	30.0	30.0	30.0
Ambient Temp, °F	79.2	79.2	79.2	79.2	79.2	76.0	76.0	76.0	76.0	76.0	96.0	96.0	96.0	96.0	96.0
Stack Exit Temp (deg.F)	870	868	868	866	845	869	870	870	863	841	869	853	869	868	858
Volumetric Flowrate ACFM	701,869	665,994	564,626	457,804	352,269	701,464	670,838	564,705	460,044	353,410	711,444	630,000	534,197	441,997	342,493
Stack Velocity (ft/sec)	103.8	98.5	83.5	67.7	52.1	103.8	99.2	83.5	68.0	52.3	105.2	93.2	79.0	65.4	50.7
Stack Inside Diameter (ft)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Stack Height (m)	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29	18.29
Stack Exit Temp (deg.K)	738.6	737.8	737.8	736.4	724.9	738.1	738.5	738.6	734.7	722.5	738.0	729.3	738.4	737.5	732.2
Stack Exit Velocity (m/s)	31.64	30.03	25.46	20.64	15.88	31.62	30.24	25.46	20.74	15.93	32.07	28.40	24.08	19.93	15.44
Stack Inside Diameter (m)	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576	3.6576
Normal Operations - Short-terr															
NOx (lb/hr/turbine)	5.05	4.67	3.70	2.78	1.90	5.05	4.72	3.73	2.80	1.91	5.05	4.23	3.39	2.59	1.80
CO (lb/hr/turbine)	4.92	4.55	3.61	2.71	1.85	4.92	4.60	3.63	2.73	1.86	4.92	4.12	3.30	2.52	1.75
SO2 (lb/hr/turbine)	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
PM10 (lb/hr/turbine)	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00
1-Hr Unitized Conc (ug/m3)	106.33224	109.13005	118.13623	130.49223	148.81512	106.39219	108.75335	118.09359	130.29890	148.76102	105.58973	111.93733	121.31769	132.34589	149.98470
X(m)	306940.0	306940.0	306940.0	306920.0	306920.0	306940.0	306940.0	306940.0	306920.0	306920.0	306940.0	306940.0	306940.0	306920.0	306920.0
Y(m)	3797340.0	3797340.0	3797360.0	3797360.0	3797380.0	3797340.0	3797340.0	3797360.0	3797360.0	3797380.0	3797340.0	3797340.0	3797360.0	3797360.0	3797380.0
Z(m)	196.4	196.4	187.7	182.2	174.0	196.4	196.4	187.7	182.2	174.0	196.4	196.4	187.7	182.2	174.0
YYMMDDHH	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821	15010821
3-Hr Unitized Conc (ug/m3)	70.73656	72.31891	78.27672	86.34252	98.08051	70.77037	72.10936	78.25589	86.19984	98.03876	70.30837	74.58890	80.50946	87.78413	98.91883
X(m)	307020.0	307020.0	307000.0	307000.0	306980.0	307020.0	307020.0	307000.0	307000.0	306980.0	307020.0	307000.0	307000.0	306980.0	306980.0
Y(m)	3797360.0	3797360.0	3797360.0	3797400.0	3797400.0	3797360.0	3797360.0	3797360.0	3797400.0	3797400.0	3797360.0	3797360.0	3797380.0	3797380.0	3797400.0
Z(m)	203.1	203.1	195.0	184.3	176.7	203.1	203.1	195.0	184.3	176.7	203.1	195.0	189.3	183.3	176.7
YYMMDDHH	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106	13121106
8-Hr Unitized Conc (ug/m3)	51.88639	53.49156	58.30871	64.33483	72.52952	51.91073	53.25862	58.28850	64.23252	72.48788	51.58128	55.30549	59.86024	65.32040	73.41944
X(m)	306860.0	306840.0	306840.0	306840.0	306820.0	306860.0	306840.0	306840.0	306840.0	306820.0	306860.0	306840.0	306840.0	306820.0	306820.0
Y(m)	3797300.0	3797280.0	3797300.0	3797320.0	3797320.0	3797300.0	3797280.0	3797300.0	3797320.0	3797320.0	3797300.0	3797280.0	3797300.0	3797300.0	3797320.0
Z(m)	188.3	182.6	178.3	172.2	161.0	188.3	182.6	178.3	172.2	161.0	188.3	182.6	178.3	169.5	161.0
YYMMDDHH	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408	13122408
24-Hr Unitized Conc (ug/m3)	19.14145	19.66637	21.39199	23.71919	26.63762	19.14855	19.58942	21.38579	23.68832	26.62559	19.05185	20.33618	21.98702	24.09382	26.89090
X(m)	306860.0	306860.0	306840.0	306840.0	306840.0	306860.0	306860.0	306840.0	306840.0	306840.0	306860.0	306840.0	306840.0	306840.0	306840.0
Y(m)	3797300.0	3797320.0	3797300.0	3797320.0	3797360.0	3797300.0	3797320.0	3797300.0	3797320.0	3797360.0	3797300.0	3797300.0	3797320.0	3797340.0	3797360.0
Z(m)	188.3	181.5	178.3	172.2	161.7	188.3	181.5	178.3	172.2	161.7	188.3	178.3	172.2	167.1	161.7
YYMMDDHH	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424	13122424
Ann** Unitized Conc (ug/m3)	1.01938	1.04889	1.16834	1.31492	1.49325	1.01999	1.04480	1.16780	1.31290	1.49264	1.01183	1.08742	1.20987	1.33553	1.50688
X(m)	306760.0	306760.0	307240.0	307240.0	307200.0	306760.0	306760.0	307240.0	307240.0	307200.0	306760.0	307240.0	307240.0	307220.0	307200.0
Y(m)	3797200.0	3797200.0	3797660.0	3797660.0	3797660.0	3797200.0	3797200.0	3797660.0	3797660.0	3797660.0	3797200.0	3797660.0	3797660.0	3797660.0	3797660.0
Z(m)	196.2	196.2	181.6	181.6	173.2	196.2	196.2	181.6	181.6	173.2	196.2	181.6	181.6	177.9	173.2
Normal Operations - Short-terr															
NOx (g/s/turbine)	0.636	0.588	0.466	0.350	0.239	0.636	0.595	0.470	0.353	0.241	0.636	0.533	0.427	0.326	0.227
CO (g/s/turbine)	0.620	0.573	0.455	0.341	0.233	0.620	0.580	0.457	0.344	0.234	0.620	0.519	0.416	0.318	0.221
SO2 (g/s/turbine)	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
PM10 (g/s/turbine)	0.252	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126	0.252	0.252	0.252	0.126	0.126
1-Hour NOx*** (ug/m3)	67.627	64.168	55.051	45.672	35.567	67.665	64.708	55.504	45.996	35.851	67.155	59.663	51.803	43.145	34.047
Annual NOx*** (ug/m3)	0.648	0.617	0.544	0.460	0.357	0.649	0.622	0.549	0.463	0.360	0.644	0.580	0.517	0.435	0.342
1-Hour CO (ug/m3)	65.926	62.532	53.752	44.498	34.674	65.963	63.077	53.969	44.823	34.810	65.466	58.095	50.468	42.086	33.147
8-Hour CO (ug/m3)	32.170	30.651	26.530	21.938	16.899	32.185	30.890	26.638	22.096	16.962	31.980	28.704	24.902	20.772	16.226
1-Hour SO2 (ug/m3)	7.869	8.076	8.742	9.656	11.012	7.873	8.048	8.739	9.642	11.008	7.814	8.283	8.978	9.794	11.099
3-Hour SO2 (ug/m3)	5.235	5.352	5.792	6.389	7.258	5.237	5.336	5.791	6.379	7.255	5.203	5.520	5.958	6.496	7.320
24-Hour SO2 (ug/m3)	1.416	1.455	1.583	1.755	1.971	1.417	1.450	1.583	1.753	1.970	1.410	1.505	1.627	1.783	1.990
24-Hour PM10 (ug/m3)	4.824	4.956	5.391	2.989	3.356	4.825	4.937	5.389	2.985	3.355	4.801	5.125	**5.541**	3.036	3.388
Annual PM10 (ug/m3)	0.257	0.264	0.294	0.166	0.188	0.257	0.263	0.294	0.165	0.188	0.255	0.274	0.305	0.168	0.190

Worst-Case Operating Scenarios are bolded/highlighted. Worst-Case 50% load condition (Case 3) is also **bolded/highlighted** - used for startup and commissioning analyses.

**Annual unitized/pollutant concentrations are the 5-year average of annual impacts, appropriate for PM2.5 NAAQS. Annual NO2/PM10 impacts (for NAAQS) and PSD increments would be slightly higher.

***NOx impacts shown do NOT yet reflect the NO2 Ambient Ratio Method (ARM) USEPA-default values of 0.80 (80%) for 1-hour and 0.75 (75%) for annual averages.

Table 5.1B-3c
Mission Rock Emission Rates and Stack Parameters for Refined Modeling

	Stack Height meters	Temp, deg K	Exhaust Velocity, m/s	Stack Diam, m	Emission Rates, g/s NOx	SO2	CO	PM10/ PM2.5	Emission Rates, lb/hr NOx	SO2	CO	PM10/ PM2.5
Averaging Period: One hour for Normal Operations												
Each Turbine (NOx/CO) - Case 1	18.29	736.9	31.28	3.6576	0.643	-	0.626	-	5.10	-	4.97	-
Each Turbine (SO2) - Case 4	18.29	676.1	16.14	3.6576	-	0.074	-	-	-	0.59	-	-
Fire Pump	7.62	803.2	44.30	0.1270	0.086(a)	1.454E-4(a)	0.079	4.583E-3	0.679	1.154E-3	0.631	-
Averaging Period: Three hours for Normal Operations												
Each Turbine (SO2) - Case 4	18.29	676.1	16.14	3.6576	-	0.074	-	-	-	0.59	-	-
Fire Pump	7.62	803.2	44.30	0.1270	-	4.847E-5	-	-	-	3.847E-4	-	-
Averaging Period: Eight hours for Normal Operations												
Each Turbine (CO) - Case 1	18.29	736.9	31.28	3.6576	-	-	0.626	-	-	-	4.97	-
Fire Pump	7.62	803.2	44.30	0.1270	-	-	9.931E-3	-	-	-	7.881E-2	-
Averaging Period: 24 hours for Normal Operations												
Each Turbine (PM10/2.5) - Case 31	18.29	738.4	24.08	3.6576	-	-	-	0.252	-	-	-	2.00
Each Turbine (SO2) - Case 4	18.29	676.1	16.14	3.6576	-	0.074	-	-	-	0.59	-	-
Fire Pump	7.62	803.2	44.30	0.1270	-	6.059E-6	-	1.910E-4	-	4.809E-5	-	1.516E-3
Each Wet-SAC Cell	12.95	Amb+2.22	7.82	4.1148	-	-	-	0.0096	-	-	-	0.0762
Averaging Period: Annual Periods (includes all Startups/Shutdowns)												
Each Turbine - Case 14	18.29	738.7	31.42	3.6576	0.161	-	-	0.072	1.28	-	-	0.57
Fire Pump	7.62	803.2	44.30	0.1270	1.016E-3(a)	1.726E-6(a)	-	5.441E-5	8.061E-3	1.370E-5	-	4.319E-4
Each Wet-SAC Cell	12.95	Amb+5.0	7.82	4.1148	-	-	-	0.0027	-	-	-	0.0214
Averaging Period: One hour for Startup Periods												
Each Turbine (NOx/CO) - Case 3	18.29	704.3	20.83	3.6576	1.468	-	1.007	-	11.65	-	7.99	-
Averaging Period: Eight hours for Startup Periods												
Each Turbine (NOx/CO) - Case 3	18.29	704.3	20.83	3.6576	-	-	0.755	-	-	-	5.99	-
Fire Pump	7.62	803.2	44.30	0.1270	-	-	9.931E-3	-	-	-	7.881E-2	-

Assumptions:

Turbine operates 24 hours per day for all cases and pollutants
Fire Pump operates up to 0.5 hours per day 52 hours per year
Fire pump not tested during 1 hour startup cycle
Annual SO2 & PM: Case 14 for all 2500 hours/year (SO2 revised for maximum short-term grain loading)
Annual NO2: 150 Startups + 150 Shutdowns + Case 14 @ 2 ppm for balance of 2500 hours/year
CO and NOx 1-hour Startup Impacts: Startup is 30 minutes, plus 30 minutes of maximum base load emissions - modeled at worst-case 50% load stack characteristics.
CO 8-hour Startup Impacts: Calculated as two startups (30 mins each) + two shutdowns (9 mins each) + balance at maximum base load emissions - modeled at worst-case 50% load stack characteristics.

(a) Due to intermittent use of firepump, annual average emissions used for 1-hour NO2 and SO2 NAAQS assessment per USEPA guidance.

Table 5.1B-3d EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel

Emergency Fire Pump

of Identical Engines: 1

Mfg:	Clark			Stack Data			
Engine #:	JU6H-UFADP8		Height:	25	Ft.	7.62	meters
kWe:	164		Temp:	986	deg F	803.2	Kelvins
BHP:	220		ACFM:	1189		44.30	m/s
RPM:	1760		Diameter:	0.4167	Ft.	0.1270	meters
Fuel:	#2 ULS Diesel		input the mfg ACFM or calculate per Exhaust sheet				
Fuel Use:	11.2	gal/hr	Area:	0.1364	Sq.Ft.		
FuelHHV:	139000	Btu/gal	Velocity:	145.33	Ft/Sec		
mmbtu/hr:	1.56	HHV	Max Daily Op Hrs:	0.5			
EPA Tier:	3		Max Annual Op Hrs:	52			

Fuel Wt:	6.87	lbs/gal
Fuel S:	0.0015	% wt.
Fuel S:	0.10305	lbs/1000 gal
SO2:	0.2061	lbs/1000 gal
SO2:	1.047	equiv.g/hr

If the engines will operate less than an hour for purposes of testing, correct the modeled emissions rates accordingly.

		--- for 60 mins/hour ---			Single Engine			*All Engines*			
Emissions	**g/hp-hr**	**EF(g/hr)**	**g/s**	**Lb/Hr**	**Lb/Day**	**Lbs/Yr**	**Tons/Yr**	***Lb/Hr***	***Lb/Day***	***Lbs/Yr***	***Tons/Yr***
NOx (1)	2.80	616	0.171	1.358	0.679	70.6	0.035	*1.358*	*0.679*	*70.6*	*0.035*
CO (1)	2.60	572	0.159	1.261	0.631	65.6	0.033	*1.261*	*0.631*	*65.6*	*0.033*
HC (1)	0.20	44	1.222E-2	9.700E-2	4.850E-2	5.0	0.003	*0.097*	*0.049*	*5.0*	*0.003*
PM (1,2)	0.15	33	9.167E-3	7.275E-2	3.638E-2	3.8	0.002	*0.073*	*0.036*	*3.8*	*0.002*
SOx (3)	NA	1.047	2.908E-4	2.308E-3	1.154E-3	0.12	6.001E-5	*0.0023*	*0.0012*	*0.12*	*0.0001*

Notes:

(1) NSPS values for emergency generator size/year

(2) PM10/PM2.5 equals PM, used in HRA for DPM emissions

(3) SOx g/hr equal to sulfur content of 15 ppm

~0.0015 %s

Modeled Emission Rates		**g/s**	
	1-hr NOx	0.086	
0.5 hr/test	Ann NOx	1.016E-3	*and 1-hr NO2 NAAQS*
1 test/day	1-hr CO	0.079	
	8-hr CO	9.931E-3	
	1-hr SO2	1.454E-4	
	3-hr SO2	4.847E-5	
	24-hr SO2	6.059E-6	
	Ann SO2	1.726E-6	*and 1-hr SO2 NAAQS*
	1-hr PM	4.583E-3	
	24-hr PM	1.910E-4	
	Ann PM	5.441E-5	

Table 5.1B-4 Modeling Inputs/Results for Mission Rock Construction Impacts (Combustion Sources as Point Sources) - FASTAREA/Fence+20m Recs with 2011-2015 Camarillo Meteorology from SJVAPCD

Short Term Impacts (24 hrs and less)

Table5.1E-4	NOx	CO	SOx	PM10	PM2.5
Combustion (lbs/day)	217.2	145.97	0.42	9.74	9.74
Combustion (hrs/day)	10	10	10	10	10
Combustion (lbs/hr)	21.72	14.60	0.04	0.97	0.97
Combustion (g/sec)	2.74E+0	1.84E+0	5.29E-3	1.23E-1	1.23E-1
Construction Dust (lbs/day)				2.29	0.426
Construction Dust (hrs/day)				10	10
Construction Dust (lbs/hr)				0.23	0.04
Construction Dust (g/sec)	9.6 acres			2.89E-2	5.37E-3
AERMOD Inputs	**38,887 m²**		**18 Pt.Srcs**		
Combustion (g/s/src)	*1.520E-1*	*1.022E-1*	*2.940E-4*	*6.818E-3*	*6.818E-3*
Construction Dust (g/s/m²)				*7.420E-7*	*1.380E-7*
AERMOD Results (ug/m³)					
Combustion Only					
1-hour Max	511.957	344.062	0.990	22.95791	
3-hour Max			0.330	7.65517	
8-hour Max		48.496		3.23594	
24-hour Max			0.069	1.60713	1.60713
All Particulate Sources					
24-hour Max				13.11005	2.51296
1-hour NO2 w/ ARM	409.565	based on ARM Ratio of:		80%	
1-hour NO2 w/ OLM	255.911 CAAQS 70.487 NAAQS	based on concurrent El Rio ozone data			
Background (ug/m³)	75.3	<CAAQS			
1-hour Max	56.4	4581	10.5		
3-hour Max	NAAQS^		10.5		
8-hour Max		1260			
24-hour Max			5.2	118	19
Total + Background (ug/m³)	331.2	<CAAQS			
1-hour Max	126.9	4925	11.49		
3-hour Max	NAAQS^		10.83		
8-hour Max		1308			
24-hour Max			5.27	131.1	21.5

Long Term Impacts (annual)

	NOx	CO	SOx	PM10	PM2.5
Combustion (tons/year)	19.614	14.340	0.042	0.906	0.906
Combustion (days/year)*	264	264	264	264	264
Combustion (hrs/day)	10	10	10	10	10
Combustion (lbs/hr)*	10.75	7.86	0.02	0.50	0.50
Combustion (g/sec)	1.35E+0	9.90E-1	2.90E-3	6.26E-2	6.26E-2
Construction Dust (tons/year)				0.252	0.046
Construction Dust (days/year)				264	264
Construction Dust (hrs/day)				10	10
Construction Dust (lbs/hr)*				0.138	0.025
Construction Dust (g/sec)	9.6 acres			1.74E-2	3.18E-3
	38,887 m²		**18 Pt.Srcs**		
Combustion (g/s/src)	*7.523E-2*	*5.500E-2*	*1.611E-4*	*3.475E-3*	*3.475E-3*
Construction Dust (g/s/m²)				*4.474E-7*	*8.167E-8*
Combustion Only					
Annual	7.908		0.017	0.36527	0.36527
All Particulate Sources					
Annual				1.70624	0.56449
Annual NO2 w/ ARM	5.931	based on ARM Ratio of:		75%	
Background (ug/m³)					
Annual	13.2		2.1	25.6	9.6
Total + Background (ug/m³)					
Annual	19.1		2.1	27.3	10.2

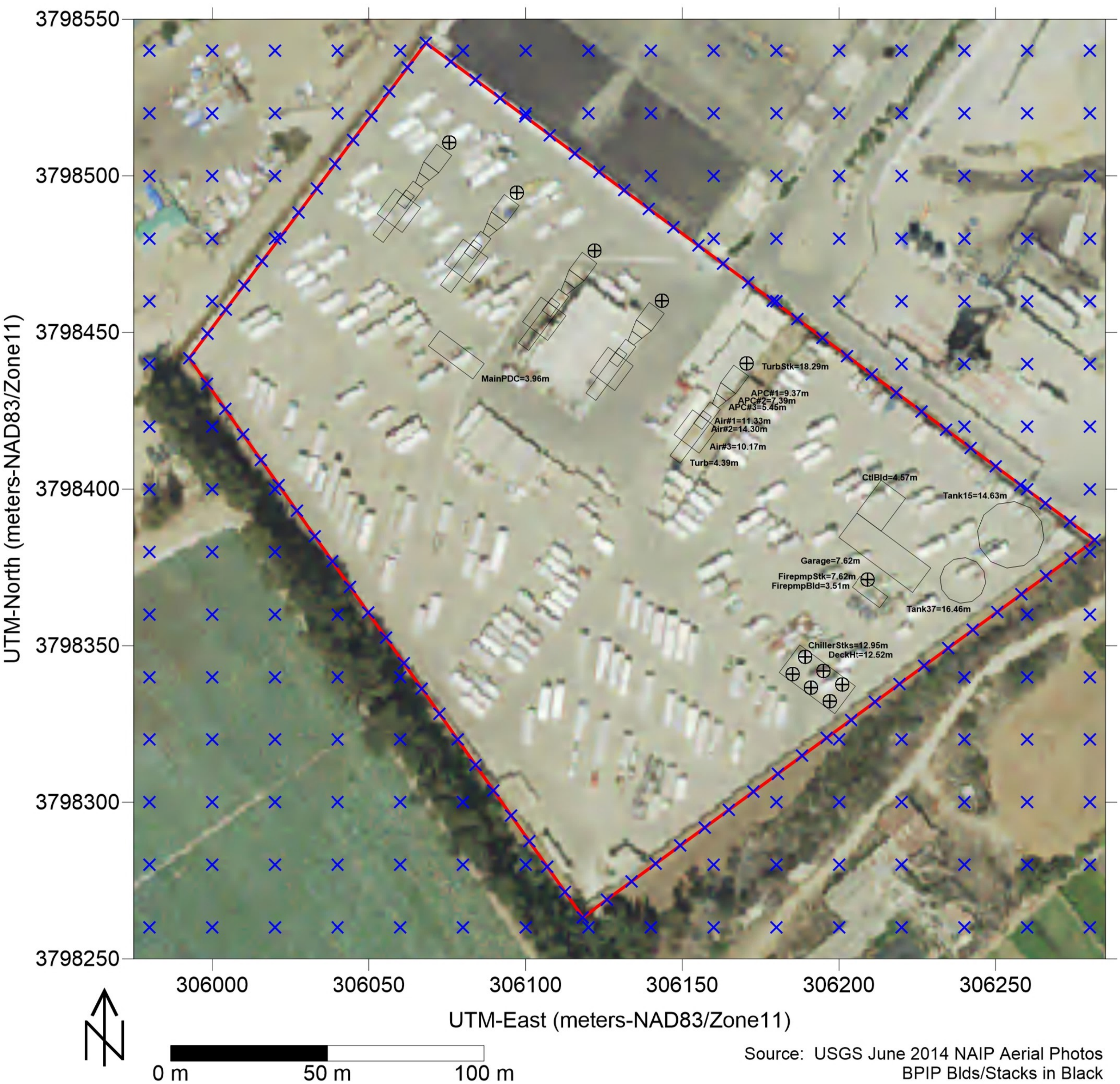
Maximum NOx/CO/SO2 impacts ratioed from PM10 combustion source impact.

*Even for construction projects taking less than 12-months or 7 days/wk, the hourly emissions for modeling are still based on total tons (projects<12 months) or tons/year (projects>12months) divided by 365 days since all days in the met dataset (i.e., all 12 months and all 365 days - i.e., 7 days/week) are modeled.

Table5.1E-2

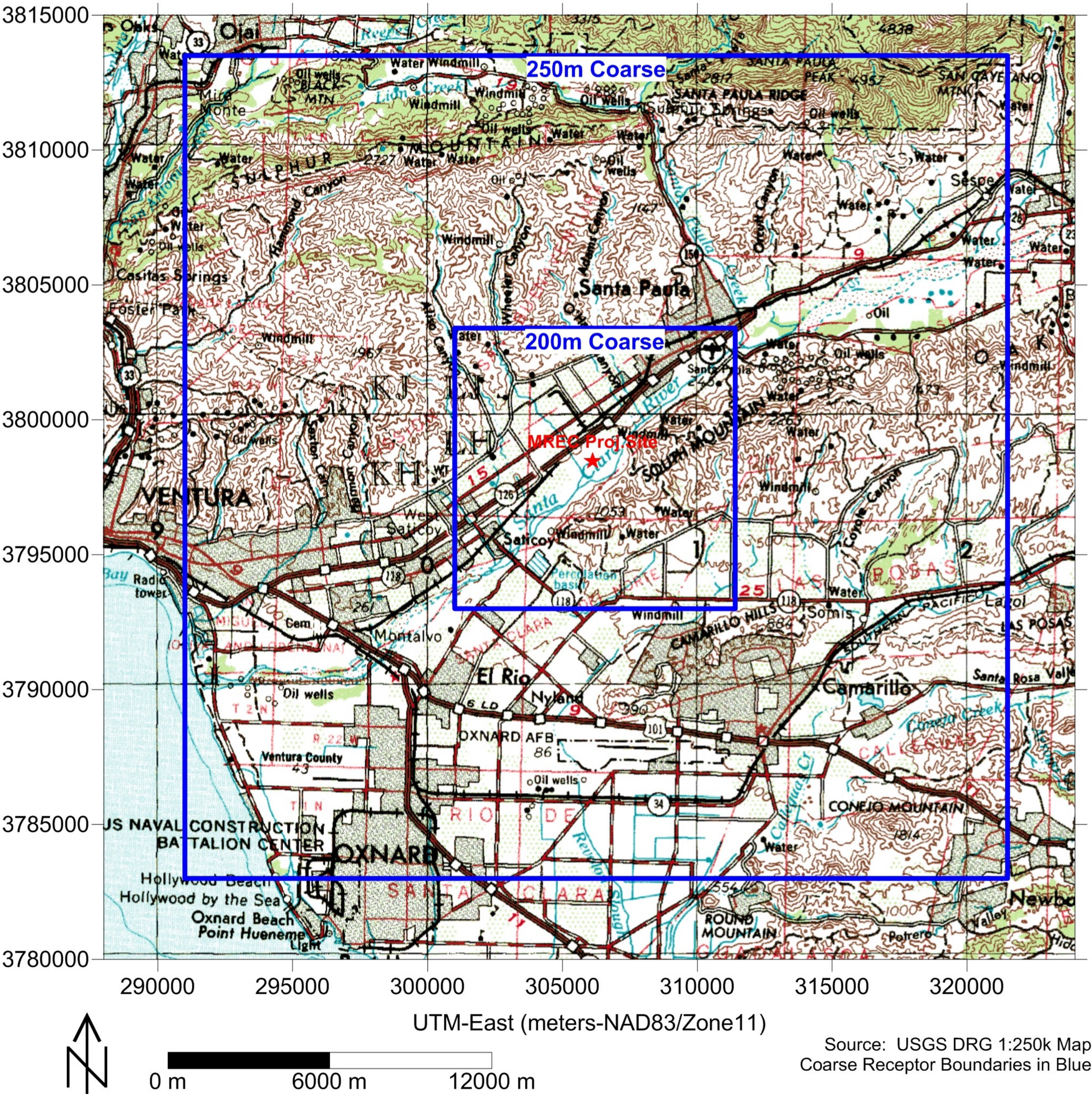
Total Construction Period	NOx	CO	SOx	PM10	PM2.5
Combustion (lbs/month)	3269	2390	7	151	151
Fugitives (lbs/month)				42	7.7

Figure 5.1B-1 (Revised)
Mission Rock Site and BPIP Structures



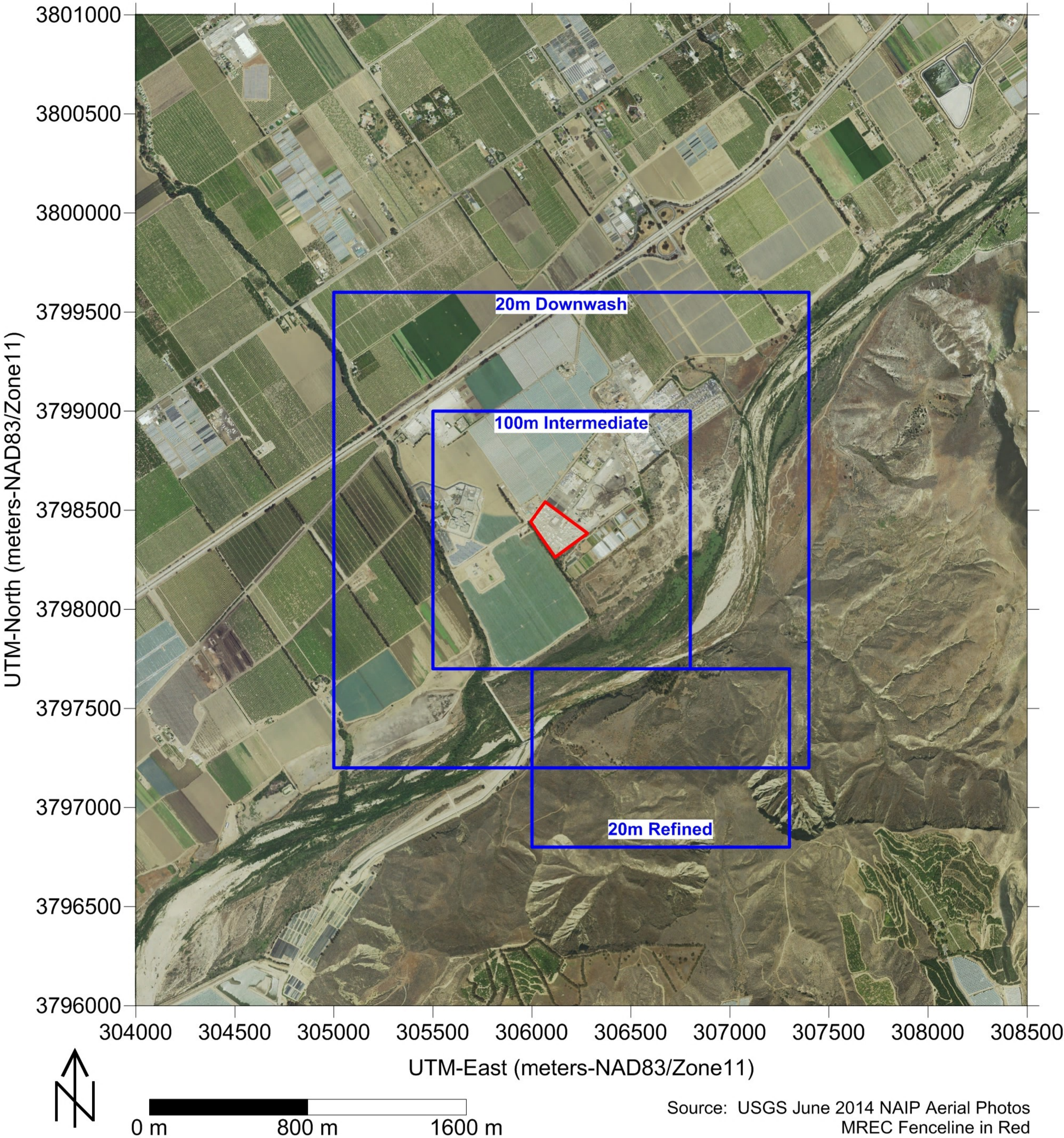
Source: USGS June 2014 NAIP Aerial Photos
BPIP Blds/Stacks in Black
Fenceline in Red
Downwash/Fenceline Recs in Blue

Figure 5.1B-2a MREC Coarse Receptor Grids



Source: USGS DRG 1:250k Map
Coarse Receptor Boundaries in Blue

Figure 5.1B-2b MREC Fine Receptor Grids



Source: USGS June 2014 NAIP Aerial Photos
MREC Fenceline in Red
Refined/Intermediate/Downwash Receptor Boundaries in Blue

Figure 5.1-3 MREC CTSCREEN Terrain Contours

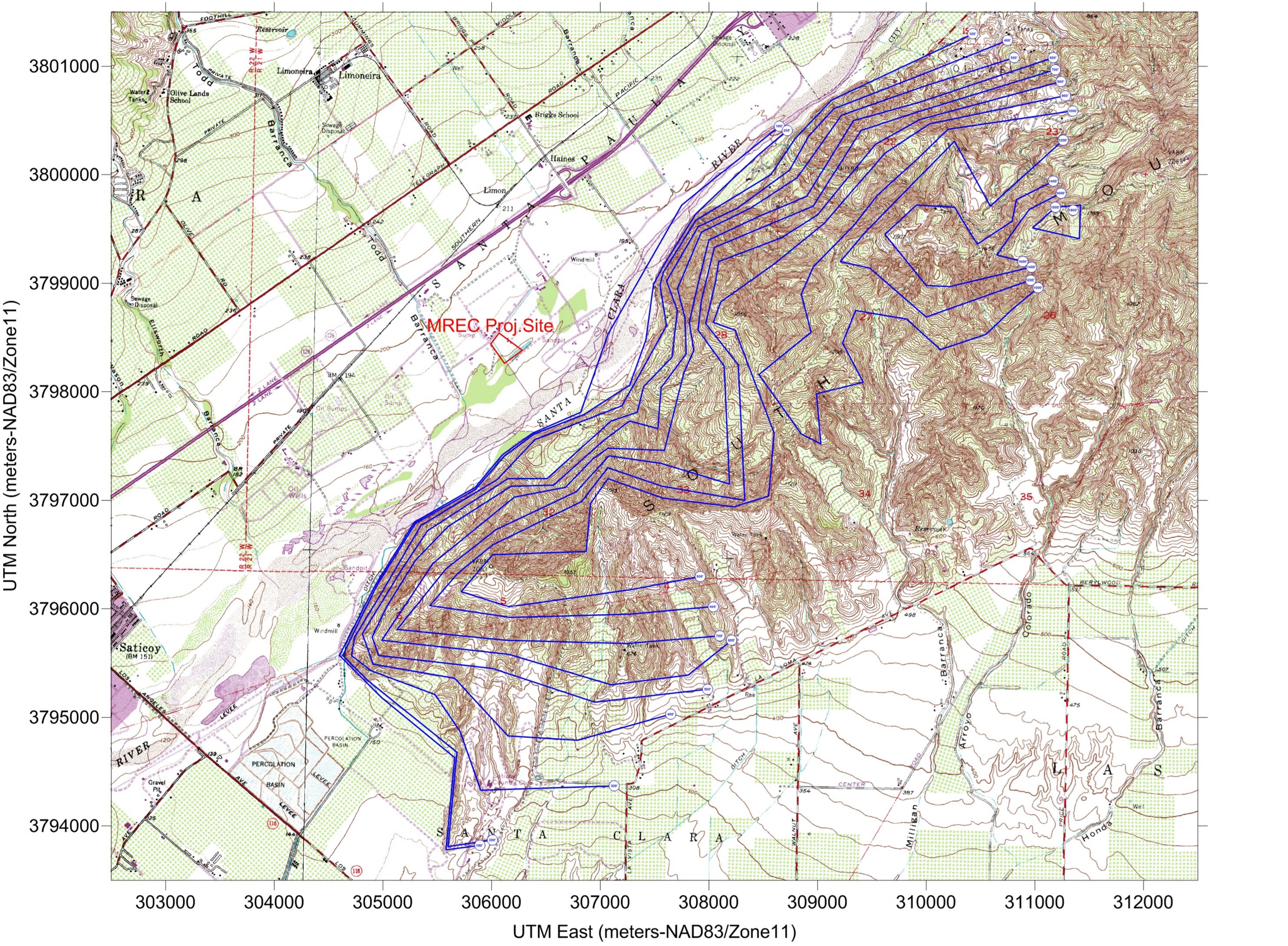


Figure 5.1-4 MREC CTSCREEN Receptors

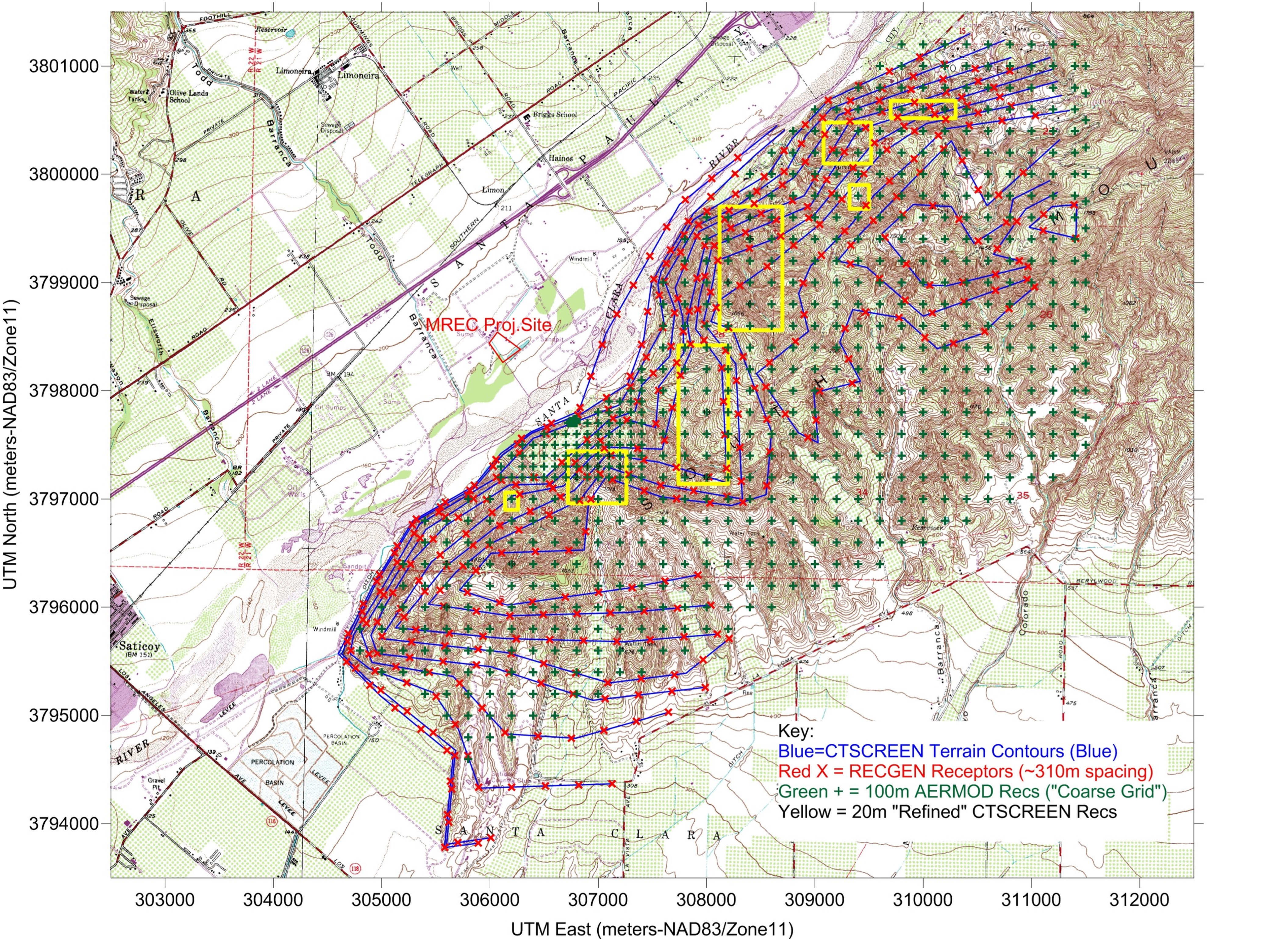


Figure 5.1B-5 South Central Coast Air Basin Monitoring Stations

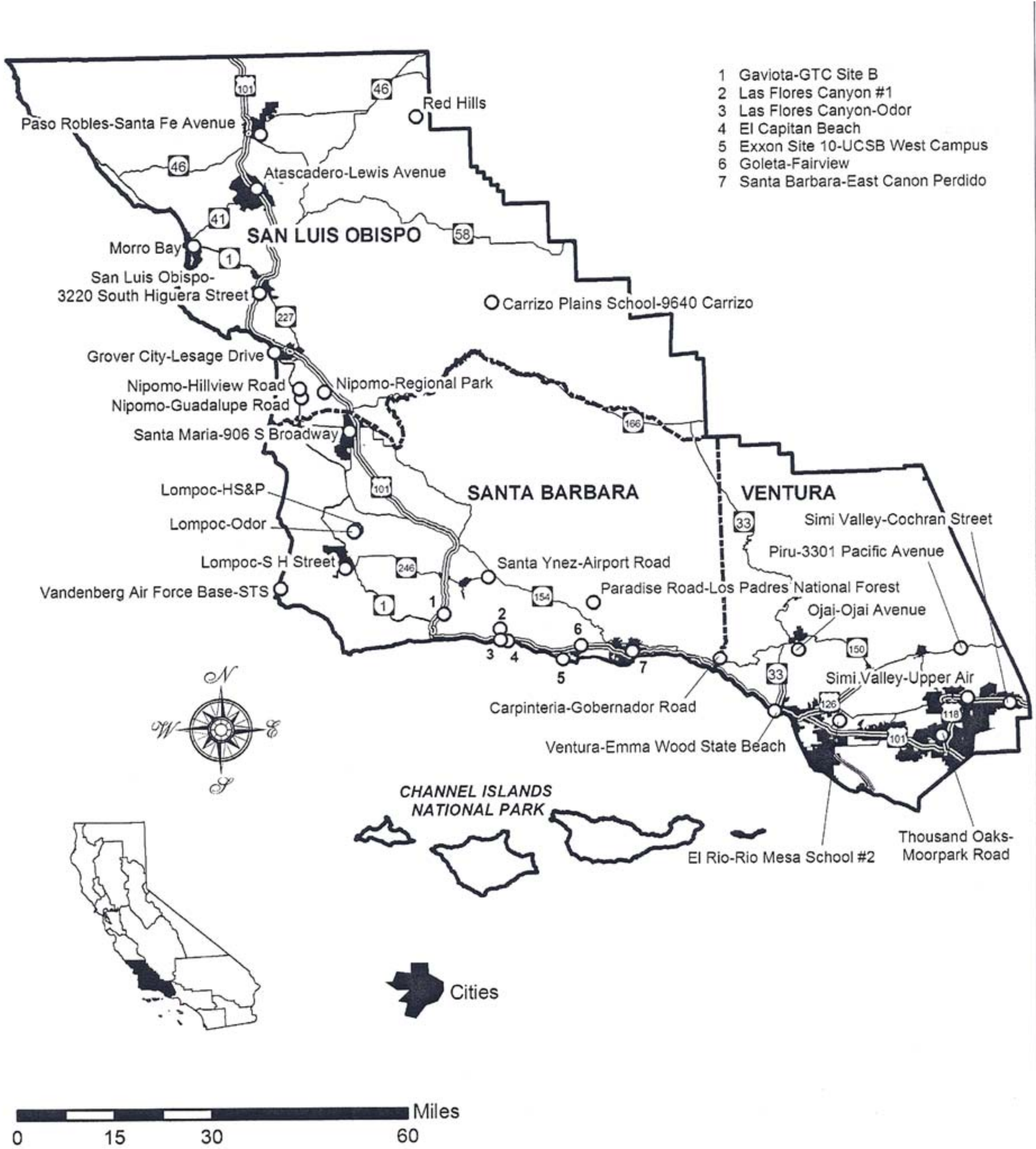
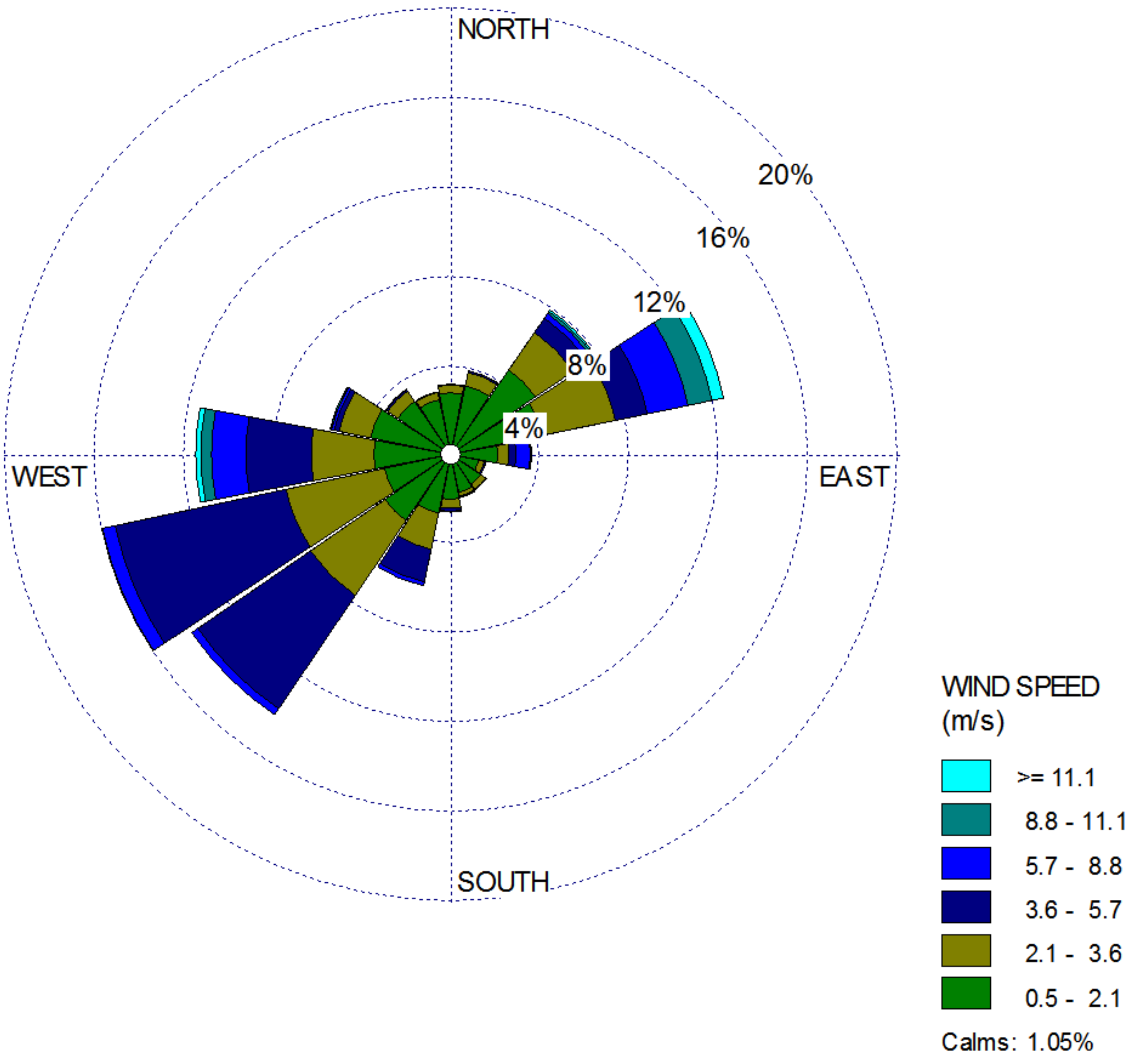


Figure 5.1B -6
Camarillo ASOS Surface Data
Annual Wind Rose (2011-2015)



APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Appendix 5.1D, Health Risk Assessment Support (CLEAN)

Appendix 5.1D

Health Risk Assessment Support Data

Health Risk Assessment Process, Goals, Assumptions, and Uses

"In recent years, the public has become increasingly aware of the presence of harmful chemicals in our environment. Many people express concerns about pesticides and other foreign substances in food, contaminants in drinking water, and toxic pollutants in the air. Others believe these concerns are exaggerated or unwarranted. How can we determine which of these potential hazards really deserve attention? How do we, as a society, decide where to focus our efforts and resources to control these hazards? When we hear about toxic threats that affect us personally, such as the discovery of industrial waste buried in our neighborhood or near our children's school, how concerned should we be?

Health risk assessment is a scientific tool designed to help answer these questions. Government agencies rely on risk assessments to help them determine which potential hazards are the most significant. Risk assessments can also guide regulators in abating environmental hazards. Members of the public who learn the basics of risk assessment can improve their understanding of both real and perceived environmental hazards, and they can work more effectively with decision makers on solutions to environmental problems.

Chemicals can be either beneficial or harmful, depending on a number of factors, such as the amounts to which we are exposed. Low levels of some substances may be necessary for good health, but higher levels may be harmful. Health risk assessments are used to determine if a particular chemical poses a significant risk to human health and, if so, under what circumstances. Could exposure to a specific chemical cause significant health problems? How much of the chemical would someone have to be exposed to before it would be dangerous? How serious could the health risks be? What activities might put people at increased risk?

If it were possible to prevent all human exposure to all hazardous chemicals, there would be no need for risk assessment. However, the total removal of harmful pollutants from the environment is often infeasible or impossible, and many naturally occurring substances also pose health risks. Risk assessment helps scientists and regulators identify serious health hazards and determine realistic goals for reducing exposure to toxics so that there is no significant health threat to the public.

Estimating the hazards posed by toxic chemicals in the environment involves the compilation and evaluation of complex sets of data. Government regulators, therefore, turn to specialists to perform or assist with risk assessments. These specialists include scientists with degrees in toxicology (the study of the toxic effects of chemicals) and epidemiology (the study of disease or illness in populations) as well as physicians, biologists, chemists, and engineers.

The term "health risk assessment" is often misinterpreted. People sometimes think that a risk assessment will tell them whether a current health problem or symptom was caused by exposure to a chemical. This is not the case. Scientists who are searching for links between chemical exposures and health problems in a community may conduct an epidemiologic study. These studies typically include a survey of health problems in a community and a comparison of health problems in that community with those in other cities, communities, or the population as a whole.

Although they are both important, health risk assessments and epidemiologic studies have different objectives. Most epidemiologic studies evaluate whether *past* chemical exposures may be responsible for documented health problems in a specific group of people. In contrast, health risk assessments are used to estimate whether *current* or *future* chemical exposures will pose health risks to a broad population, such as a city or a community. Scientific methods used in health risk assessment cannot be used to link individual illnesses to past chemical exposures, nor can health risk assessments and epidemiologic studies prove that a specific toxic substance caused an individual's illness.

The U.S. Environmental Protection Agency (U.S. EPA) is a leading risk assessment agency at the federal level. In California, the Office of Environmental Health Hazard Assessment (OEHHA) in the California Environmental Protection Agency (Cal/EPA) has the primary responsibility for developing procedures and practices for performing health risk assessments. Other agencies within Cal/EPA, such as the Department of Pesticide Regulation and the Department of Toxic Substances Control, have extensive risk assessment programs of their own but work closely with OEHHA.

The Department of Pesticide Regulation uses risk assessments to make regulatory decisions concerning safe pesticide uses. The Department of Toxic Substances Control uses risk assessments to determine requirements for the management and cleanup of hazardous wastes. OEHHA's health risk assessments are used by the Air Resources Board to develop regulations governing toxic air contaminants, and by the Department of Health Services to develop California's drinking water standards. These agencies' decisions take into account the seriousness of potential health effects along with the economic and technical feasibility of measures that can reduce the health risks.

Health risk assessment requires both sound science and professional judgment and is a constantly developing process. Cal/EPA is nationally recognized for developing new procedures that improve the accuracy of risk assessments. Cal/EPA also works closely with U.S. EPA in all phases of risk assessment.

The risk assessment process is typically described as consisting of four basic steps: hazard identification, exposure assessment, dose-response assessment, and risk characterization. Each of these steps will be explained in the following text.

Hazard Identification

In the first step, hazard identification, scientists determine the types of health problems a chemical could cause by reviewing studies of its effects in humans and laboratory animals. Depending on the chemical, these health effects may include short-term ailments, such as headaches; nausea; and eye, nose, and throat irritation; or chronic diseases, such as cancer. Effects on sensitive populations, such as pregnant women and their developing fetuses, the elderly, or those with health problems (including those with weakened immune systems), must also be considered. Responses to toxic chemicals will vary depending on the amount and length of exposure. For example, short-term exposure to low concentrations of chemicals may produce no noticeable effect, but continued exposure to the same levels of chemicals over a long period of time may eventually cause harm. An important step in hazard identification is the selection of key research studies that can provide accurate, timely information on the hazards posed to humans by a particular chemical. The selection of a study is based upon factors such as whether the study has been peer reviewed by qualified scientists, whether the study's findings have been verified by other studies, and the species tested (human studies provide the best evidence). Some studies may involve humans that have been exposed to the chemical, while others may involve studies with laboratory animals.

Human data frequently are useful in evaluating human health risks associated with chemical exposures. Human epidemiologic studies typically examine the effects of chemical exposure on a large number of people, such as employees exposed to varying concentrations of chemicals in the workplace. In many cases, these exposures took place prior to the introduction of modern worker-safety measures.

One weakness of occupational studies is that they generally measure the effects of chemicals on healthy workers and do not consider children, the elderly, those with pre-existing medical conditions, or other sensitive groups. Since occupational studies are not controlled experiments, there may be uncertainties about the amount and duration of exposure or the influence of lifestyle choices, such as smoking or alcohol use, on the health of workers in the studies. Exposure of workers to other chemicals at the same time may also influence and complicate the results.

Laboratory studies using human volunteers are better able to gauge some health effects because chemical exposures can then be measured with precision. But these studies usually involve small numbers of people and, in conformance with ethical and legal requirements, use only adults who agree to participate in the studies. Moreover, laboratory studies often use simple measurements that identify immediate responses to the chemical but might miss significant, longer-term health effects. Scientists can also use physicians' case reports of an industrial or transportation accident in which individuals were unintentionally exposed to a chemical. However, these reports may involve very small numbers of people, and the level of exposure to the chemical could be greater than exposures to the same chemical in the environment. Nevertheless, human studies are preferred for risk assessment, so OEHHA makes every effort to use them when they are available.

Because the effects of the vast majority of chemicals have not been studied in humans, scientists must often rely on animal studies to evaluate a chemical's health effects. Animal studies have the advantage of being performed under controlled laboratory conditions that reduce much of the uncertainty related to human studies. If animal studies are used, scientists must determine whether a chemical's health effects in humans are likely to be similar to those in the animals tested. Although effects seen in animals can also occur in humans, there may be subtle or even significant differences in the ways humans and experimental animals react to a chemical. Comparison of human and animal metabolism may be useful in selecting the animal species that should be studied, but it is often not possible to determine which species is most like humans in its response to a chemical exposure. However, if similar effects were found in more than one species, the results would strengthen the evidence that humans may also be at risk.

Exposure Assessment

In exposure assessment, scientists attempt to determine how long people were exposed to a chemical; how much of the chemical they were exposed to; whether the exposure was continuous or intermittent; and how people were exposed—through eating, drinking water and other liquids, breathing, or skin contact. All of this information is combined with factors such as breathing rates, water consumption, and daily activity patterns to estimate how much of the chemical was taken into the bodies of those exposed.

People can be exposed to toxic chemicals in various ways. These substances can be present in the air we breathe, the food we eat, or the water we drink. Some chemicals, due to their particular characteristics, may be both inhaled and ingested. For example, airborne chemicals can settle on the surface of water, soil, leaves, fruits, vegetables, and forage crops used as animal feed. Cows, chickens, or other livestock can become contaminated when eating, drinking, or breathing the chemicals present in the air, water, feed, and soil. Fish can absorb the chemicals as they swim in contaminated water or ingest contaminated food. Chemicals can be absorbed through the skin, so infants and children can be exposed simply by crawling or playing in contaminated dirt. They can also ingest chemicals if they put their fingers or toys in their mouths after playing in contaminated dirt. Chemicals can also be passed on from nursing mothers to their children through breast milk.

To estimate exposure levels, scientists rely on air, water, and soil monitoring; human blood and urine samples; or computer modeling. Although monitoring of a pollutant provides excellent data, it is time consuming, costly, and typically limited to only a few locations. For those reasons, scientists often rely on computer modeling, which uses mathematical equations to describe how a chemical is released and to estimate the speed and direction of its movement through the surrounding environment. Modeling has the advantage of being relatively inexpensive and less time consuming, provided all necessary information is available and the accuracy of the model can be verified through testing.

Computer modeling is often used to assess chemical releases from industrial facilities. Such models require information on the type of chemicals released, facilities' hours of operation, industrial processes that release the chemicals, smokestack height and temperature, any pollution-control equipment that is used, surrounding land type (urban or rural), local topography and meteorology, and census data regarding the exposed population.

In all health risk assessments, scientists must make assumptions in order to estimate human exposure to a chemical. For example, scientists assessing the effects of air pollution may need to make assumptions about the time people spend outdoors, where they are more directly exposed to pollutants in the ambient air, or the time they spend in an area where the pollution is greatest. An assessment of soil contamination may require scientists to make assumptions about people's consumption of fruits and vegetables that may absorb soil contaminants.

To avoid underestimating actual human exposure to a chemical, scientists often look at the range of possible exposures. For example, people who jog in the afternoon, when urban air pollution levels are highest, would have much higher exposures to air pollutants than people who come home after work and relax indoors. Basing an exposure estimate on a value near the higher end of a range of exposure levels (closer to the levels experienced by the jogger than by the person remaining indoors) provides a realistic worst-case estimate of exposure. These kinds of conservative assumptions, which presume that people are exposed to the highest amounts of a chemical that can be considered credible, are referred to as “health-protective” assumptions.

The exposure estimates for the project analysis were conducted using HARP2. HARP2 (ADMRT #16217) is currently the approved model for use in assessing health risks from facilities such as the MREC project.

Dose-Response Assessment

In dose-response assessment, scientists evaluate the information obtained during the hazard identification step to estimate the amount of a chemical that is likely to result in a particular health effect in humans.

An established principle in toxicology is that “the dose makes the poison.” For example, a commonplace chemical like table salt is harmless in small quantities, but it can cause illness in large doses. Similarly, hydrochloric acid, a hazardous chemical, is produced naturally in our stomachs but can be quite harmful if taken in large doses.

Scientists perform a dose-response assessment to estimate how different levels of exposure to a chemical can impact the likelihood and severity of health effects. The dose-response relationship is often different for many chemicals that cause cancer than it is for those that cause other kinds of health problems.

The dose-response estimates for the project analysis were conducted using HARP2 (ADMRT #16217).

Cancer Effects

For chemicals that cause cancer, the general assumption in risk assessment has been that there are no exposures that have “zero risk” unless there is clear evidence otherwise. In other words, even a very low exposure to a cancer-causing chemical may result in cancer if the chemical happens to alter cellular functions in a way that causes cancer to develop. Thus, even very low exposures to carcinogens might increase the risk of cancer, if only by a very small amount.

Several factors make it difficult to estimate the risk of cancer. Cancer appears to be a progressive disease because a series of cellular transformations is thought to occur before cancer develops. In addition, cancer in humans often develops many years after exposure to a chemical. Also, the best information available on the ability of chemicals to cause cancer often comes from studies in which a limited number of laboratory animals are exposed to levels of chemicals that are much higher than the levels humans would normally be exposed to in the environment. As a result, scientists use mathematical models based on studies of animals exposed to high levels of a chemical to estimate the probability of cancer developing in a diverse population of humans exposed to much lower levels. The uncertainty in these estimates may be rather large. To reduce these uncertainties, risk assessors must stay informed of new scientific research. Data from new studies can be used to improve estimates of cancer risks.

Non-cancer Effects

Non-cancer health effects (such as asthma, nervous system disorders, birth defects, and developmental problems in children) typically become more severe as exposure to a chemical increases. One goal of dose-response assessment is to estimate levels of exposure that pose only a low or negligible risk for non-cancer health effects. Scientists analyze studies of the health effects of a chemical to develop this estimate. They take into account such factors as the quality of the scientific studies, whether humans or laboratory animals were studied, and the degree to which some people may be more sensitive to the chemical than others. The estimated level of exposure that poses no significant health risks can be reduced to reflect these factors.

Risk Characterization

The last step in risk assessment brings together the information developed in the previous three steps to estimate the risk of health effects in an exposed population. In the risk characterization step, scientists analyze the information developed during the exposure and dose-response assessments to describe the resulting health risks that are expected to occur in the exposed population. This information is presented in different ways for cancer and non-cancer health effects, as explained below.

Cancer Risk

Cancer risk is often expressed as the maximum number of new cases of cancer projected to occur in a population of one million people due to exposure to the cancer-causing substance over a 70-year lifetime. For example, a cancer risk of one in one million means that in a population of one million people, not more than one additional person would be expected to develop cancer as the result of the exposure to the substance causing that risk.

An individual’s actual risk of contracting cancer from exposure to a chemical is often less than the theoretical risk to the entire population calculated in the risk assessment. For example, the risk estimate for a drinking-water contaminant may be based on the health-protective assumption that the individual drinks two liters of water from a contaminated source daily over a 70-year lifetime. However, an individual’s actual exposure to that contaminant would likely be lower due to a shorter time of residence in the area. Moreover, an individual’s risk not only depends on the individual’s exposure to a specific chemical but also on his or her genetic background (i.e., a family history of certain types of cancer); health; diet; and lifestyle choices, such as smoking or alcohol consumption.

Cancer risks presented in risk assessments are often compared to the overall risk of cancer in the general U.S. population (about 250,000 cases for every one million people) or to the risk posed by all harmful chemicals in a particular medium, such as the air. The cancer risk from breathing current levels of pollutants in California’s ambient air over a 70-year lifetime is estimated to be ~760 in one million.

Non-cancer Risk

Non-cancer risk is usually determined by comparing the actual level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects, even in the most susceptible people. Levels of exposure at which no adverse health effects are expected are called “health reference levels,” and they generally are based on the results of animal studies. However, scientists usually set health reference levels much lower than the levels of exposure that were found to have no adverse effects in the animals tested. This approach helps to ensure that real health risks are not underestimated by adjusting for possible differences in a chemical's effects on laboratory animals and humans; the possibility that some humans, such as children and the elderly, may be particularly sensitive to a chemical; and possible deficiencies in data from the animal studies.

Depending on the amount of uncertainty in the data, scientists may set a health reference level 100 to 10,000 times lower than the levels of exposure observed to have no adverse effects in animal studies. Exposures above the health reference level are not necessarily hazardous, but the risk of toxic effects increases as the dose increases. If an assessment determines that human exposure to a chemical exceeds the health reference level, further investigation is warranted.

Risk managers rely on risk assessments when making regulatory decisions, such as setting drinking water standards, or developing plans to clean up hazardous waste sites. Risk managers are responsible for protecting human health, but they must also consider public acceptance, as well as technological, economic, social, and political factors, when arriving at their decisions. For example, they may need to consider how much it would cost to remove a contaminant from drinking water supplies or how seriously the loss of jobs would affect a community if a factory were to close due to the challenge of meeting regulatory requirements that are set at the most stringent level.

Health risk assessments can help risk managers weigh the benefits and costs of various alternatives for reducing exposure to chemicals. For example, a health risk assessment of a hazardous waste site could help determine whether placing a clay cap over the waste to prevent exposure would offer the same health protection as the more costly option of removing the waste from the site.

One of the most difficult questions of risk management is: How much risk is acceptable? While it would be ideal to completely eliminate all exposure to hazardous chemicals, it is usually not possible or feasible to remove all traces of a chemical once it has been released into the environment. The goal of most regulators is to reduce the health risks associated with exposure to hazardous pollutants to a negligibly low level.

Regulators generally presume that a one-in-one million risk of cancer from life-long exposure to a hazardous chemical is an "acceptable risk" level because the risk is extremely low compared to the overall cancer rate. If a drinking water standard for a cancer-causing chemical were set at the level posing a "one-in-one million" risk, it would mean that not more than one additional cancer case (beyond what would normally occur in the population) would potentially occur in a population of one million people drinking water meeting that standard over a 70-year lifetime.

Actual regulatory standards for chemicals or hazardous waste cleanups may be set at less stringent risk levels, such as one in 100,000 (not more than one additional cancer case per 100,000 people) or one in 10,000 (not more than one additional cancer case per 10,000 people). These less stringent risk levels are often due to economic or technological considerations. Regulatory agencies generally view these higher risk levels to be acceptable if there is no feasible way to reduce the risks further."[1]

[1] A Guide to Health Risk Assessment, CalEPA-Office of Environmental Health Hazard Assessment, 1001 I Street, Sacramento, Ca. 95812, (est. 2001).

The following tables summarize the results of the HRA performed by the proposed MREC facility.

TABLE 5.1D-1 CRITERIA AND AIR TOXIC POLLUTANTS EMITTED FROM MREC FACILITY	
NOx	1-3 Butadiene
CO	Ethylbenzene
VOC*	Formaldehyde
SOx	Hexane (n-Hexane)
PM10/PM2.5	Naphthalene
Ammonia	Propylene
PAHs	Propylene Oxide
Acetaldehyde	Toluene
Acrolein	Xylene
Benzene	Diesel PM

TABLE 5.1D-2 HEALTH EFFECTS SIGNIFICANT THRESHOLD LEVELS		
	Significance Thresholds	
Agency	VCAPCD	State of California
Cancer Risk per million	<= 10.0	<= 1.0 without T-BACT <= 10.0 with T-BACT
Acute HI	1.0	1.0
Chronic HI	1.0	1.0
Cancer Burden	n/a	1.0

The other assumptions used in running the HARP program were as follows:

- Emission rates for non-criteria pollutants are taken from AFC Section 5.1, and from Appendix 5.1A.
- Number of residents affected is based upon the updated 2010 population data for those census tracts or portions of census tracts which lie within the maximum impact receptor radius of the proposed facility.
- All receptors were treated as residential receptors, which allows for the assumption that the MIR, if assumed residential, will represent the highest risk and no other receptor will show risks higher than the MIR. This deletes the need for running worker risks. Worker values were scaled directly from the 30-year cancer risk values based on the OEHHA recommended 25 year exposure period.
- Deposition velocity is taken to be 0.02 m/s, as recommended by ARB for controlled emission sources.
- Fraction of residents with home/gardens is the HARP2 default value which is likely conservatively high for the semi-rural area near the project site.

The HARP2 program is a tool that assists with the programmatic requirements of the Air Toxics Hot Spots Program, and it can be used for preparing health risk assessments for other related programs such as air toxic control measure development or facility permitting applications. HARP2 is a computer based risk assessment program which combines the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. Use of HARP2 promotes statewide consistency in the area of risk assessment, increases the efficiency of evaluating potential health impacts, and provides a cost effective tool for developing facility health risk assessments. HARP2 may be used on single sources, facilities with multiple sources, or multiple facilities in close proximity to each other.
The receptor grid used in HARP2 was a combination of the following:

1. All identified grid receptors as input from the AERMOD analysis,
2. All identified sensitive receptors within the primary impact area as defined by the AERMOD analysis.

The HARP2 program results for acute and chronic inhalation and chronic non-inhalation exposures, cancer burden and individual cancer risk (workplace and residential) for the combustion sources are included in the CD with this Appendix. The results of the HARP2 calculations are summarized below.

The modeling results show that the maximum modeled cancer risk from MREC operations is expected to be 5.17 x E^{-6}. This risk is well below the VCAPCD significance value of 10 per million. T-BACT for simple cycle combustion turbines is the use of clean fuels (natural gas) and the operation of a CO catalyst. These T-BACT technologies are proposed for MREC, and as such, the significant risk threshold for MREC is 10 in a million. The chronic and acute non-cancer hazard indices are 0.00982 and 0.00124, respectively at the cancer MIR. Both are well below the significant impact level of 1.0. Detailed calculations and results for each significant receptor are included in the modeling results, which are being submitted electronically.

TABLE 5.1D-3 HEALTH RISK ASSESSMENT SUMMARY-OPERATIONS		
Turbines and Fire Pump Engine		
Risk Category	Facility Values	Applicable Significance Thresholds*
Cancer Risk at MIR	5.17 E-6	See Table 5.1D-2 above.
Chronic Hazard Index at Cancer MIR	0.00982	
Chronic Hazard Index at Max Chronic Receptor	0.0135	
Acute Hazard Index at Cancer MIR	0.00124	
Acute Hazard Index at Max Acute Receptor	0.0676	
Cancer MIR – (Receptor #30, 306266, 3798372) Max Acute non-MIR (Receptor #4224, 306900, 3797300) Max Chronic non-MIR (Receptor #2728, 30632-, 3798380)		

Table 5.1D-4 presents a summary of risk and health data for the nearest residential, worker, and sensitive receptors.

Table 5.1D-4 Health Risk Assessment Summary for Sensitive Receptors (Operations Scenario)						
Recp Type*	Recp #	UTM E	UTM N	Cancer Risk	Chronic HI	Acute HI
MIR	30	306266	3798372	5.17E-6	0.00982	0.00124
MEIR-North	20859	306264	3799566	1.94E-8	0.000226	0.00329
MEIR-South	20860	306144	3795267	1.42E-8	0.000116	0.00721
MEIR-East	20861	306531	3798541	3.71E-7	0.00617	0.00333
MEIR-West	20862	304929	3797623	6.16E-8	0.000524	0.00396
MEIR-R1a	20866	306551	3798554	3.43E-7	0.00564	0.00316
MEIR-R1b	20865	306529	3798630	2.79E-7	0.00480	0.00293
MEIR-R2	20864	306325	3798714	2.10E-7	0.00242	0.00335
MEIW	20863	306257	3798462	4.66E-7	0.00498	0.00147
Nearest School	20845	306381	3800656	1.58E-8	0.000093	0.00348
Nearest Health Facility	20808	297887	3789325	5.59E-9	0.000064	0.00158
NearestDaycare	None Identified	-	-	-	-	-
Nearest Convalescent Home	20805	295842	3793169	1.12E-8	0.000159	0.00176
MEIW risk is simply the 30 year risk adjusted for an exposure period of 25 years per OEHHA (2015). The impact area cancer burden remains <=0.0018. *UTM coordinates for some receptors adjusted in final modeling file versus AFC Table 4.5-1.						

The calculated health effects as summarized above do not exceed the district significance threshold values, therefore the health effects would be considered "not significant" and may even be "zero".

Risk Assessment input and output files are included on the modeling CD. Due to the length of the HRA input and output files, hard copies are not provided in this appendix.

Construction HRA

A construction screening HRA was performed using the following assumptions as follows:

- The first three highest impacted receptors were chosen to represent the potential risks posed by construction related DPM emissions.
- Cancer risk and chronic hazard indices were computed using HARP2.
- A cancer inhalation unit risk value of 0.0003 $(ug/m^3)^{-1}$ was used.
- A cancer chronic inhalation REL of 5.0 $(ug/m^3)^{-1}$ was used.
- No acute inhalation REL exists for diesel PM.

HARP was run for an exposure period of 2 years to simulate the 1.92 year construction period. (OEHHA, 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines, Chapter 8, Section 8.2.10).

The following table presents the results of the screening level assessment of health risks from the construction phase for the three (3) highest values evaluated on the construction receptor grid as well as the nearest residential, worker, and sensitive receptor locations.

Table 5.1D-5 Construction Screening HRA Summary

Receptor Type*	Receptor #	UTM E	UTM N	Cancer Risk**	Chronic HI
PMI 1	2469	396240	3798460	1.36E-6	0.000794
PMI 2	4429	306257	3798462	1.35E-6	0.000791
PMI 3	2534	306260	3798460	1.35E-6	0.000788
MEIR-North	4425	306264	3799566	1.17E-8	0.0000068
MEIR-South	4426	306144	3795267	1.96E-9	0.0000011
MEIR-East	4427	306531	3798541	3.73E-7	0.000218
MEIR-West	4428	304929	3797623	1.84E-8	0.000011
MEIR-R1a	4432	306551	3798554	3.43E-7	0.000201
MEIR-R1b	4431	306529	3798630	3.46E-7	0.000213
MEIR-R2	4430	306325	3798714	3.46E-7	0.000202
MEIW	4429	306257	3798462	1.35E-6	0.000791
Nearest School	4411	306381	3800656	6.08E-9	0.0000036
Nearest Health Facility	4374	297887	3789325	1.17E-9	0.00000068
Nearest Daycare	None Identified	-	-	-	-
Nearest Convalescent Home	4371	295842	3793169	2.01E-9	0.0000012

*UTM coordinates for some receptors adjusted in final modeling file versus AFC Table 4.5-1.
**Based on Tier 2 procedure using a construction/exposure period of 2 years.

With respect to emissions from diesel fueled engines, use of the diesel PM exposure factors noted above are approved by CARB for the characterization of diesel engine exhaust and subsequent risk exposures. The diesel PM factor includes the range of fuel bound, and potentially emitted metals, PAHs, and a wide variety of other semi-volatile substances.

CARB notes the following in the diesel exhaust risk identification documents:

- The surrogate for whole diesel exhaust is diesel PM. PM10 is the basis for the potential risk calculations.
- When conducting an HRA, the potential cancer risk from inhalation exposure to diesel PM will outweigh the potential non-cancer health effects.
- When comparing whole diesel exhaust to speciated diesel exhaust, potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multi-pathway cancer risk from the speciated compounds. For this reason, there will be few situations where an analysis of multi-pathway risk is necessary.

With respect to diesel particulate related risk values, the following should be noted:

The following comments were derived from http://www3.epa.gov/region1/eco/airtox/diesel.html, EPA Region 1 New England (2015).

EPA's National Scale Assessment uses several types of health hazard information to provide a quantitative "threshold of concern" or a health benchmark concentration at which it is expected that no adverse health effects occur at exposures to that level. Health effects information on carcinogenic, short and long term noncarcinogenic end points are used to establish selective protective health levels to compare to the modeled exposures levels. Unfortunately the exposure response data for diesel exhaust in human studies are considered too uncertain to develop a carcinogenic unit risk for EPA's use. There is a Reference Concentration (RFC) that is used as a health benchmark protective of chronic noncarcinogenic health effects but it is for diesel exhaust and not specifically set for diesel particulate matter which is what was modeled in NATA. The RFC for diesel exhaust, which includes diesel particulate matter is 5 ug/m3. This value is similar to the National Ambient Air Quality Standard established for fine particulate matter which is 15ug/m3.

The EPA agrees that diesel exhaust is “likely to be carcinogenic to humans by inhalation.” In their risk assessment, however, the EPA did not give a quantitative estimate of risk of lung cancer due to diesel exhaust exposures. There is some uncertainty “to definitively conclude that diesel exhaust is carcinogenic to humans.” Although rat and mice studies demonstrate mutagenic and chromosomal effects, these studies do not reflect normal human exposure, as previously explained. The EPA decided that the human data from epidemiological studies are too uncertain to derive a quantitative estimate of cancer risk.

The following comments were derived from the EPA Health Risk Assessment for Diesel Engine Exhaust (EPA 600/8-90/057F, May 2002.

Acute (Short-Term Exposure) Effects
Information is limited for characterizing the potential health effects associated with acute or short-term exposure. However, on the basis of available human and animal evidence, it is concluded that acute or short-term (e.g., episodic) exposure to DE can cause acute irritation (e.g., eye, throat, bronchial), neurophysiological symptoms (e.g., lightheadedness, nausea), and respiratory symptoms (cough, phlegm).

There also is evidence for an immunologic effect–the exacerbation of allergenic responses to known allergens and asthma-like symptoms. The lack of adequate exposure-response information in the acute health effect studies precludes the development of recommendations about levels of exposure that would be presumed safe for these effects.

Chronic (Long-Term Exposure) Noncancer Respiratory Effects
Information from the available human studies is inadequate for a definitive evaluation of possible noncancer health effects from chronic exposure to DE. However, on the basis of extensive animal evidence, DE is judged to pose a chronic respiratory hazard to humans. Chronic-exposure, animal inhalation studies show a spectrum of dose-dependent inflammation and histopathological changes in the lung in several animal species including rats, mice, hamsters, and monkeys.

This assessment provides an estimate of inhalation exposure of DE (as measured by DPM) to which humans may be exposed throughout their lifetime without being likely to experience adverse noncancer respiratory effects. This exposure level, known as the reference concentration (RfC) for DE of 5 ug/m3 of DPM was derived on the basis of dose-response data on inflammatory and histopathological changes in the lung from rat inhalation studies. In recognition of the presence of DPM in ambient PM2.5 , it also is appropriate to consider the wealth of PM2.5 human health effects data. In this regard, the 1997 National Ambient Air Quality Standard for PM2.5 of 15 ug/m3 (annual average concentration) also would be expected to provide a measure of protection from DPM, reflecting DPM's current approximate proportion to PM2.5.

Chronic (Long-Term Exposure) Carcinogenic Effects

This assessment concludes that DE is "likely to be carcinogenic to humans by inhalation" and that this hazard applies to environmental exposures. This conclusion is based on the totality of evidence from human, animal, and other supporting studies. There is considerable evidence demonstrating an association between DE exposure and increased lung cancer risk among workers in varied occupations where diesel engines historically have been used. The human evidence from occupational studies is considered strongly supportive of a finding that DE exposure is causally associated with lung cancer, though the evidence is less than that needed to definitively conclude that DE is carcinogenic to humans.

There is some uncertainty about the degree to which confounders are having an influence on the observed cancer risk in the occupational studies, and there is uncertainty evolving from the lack of actual DE exposure data for the workers. In addition to the human evidence, there is supporting evidence of DPM's carcinogenicity and associated DPM organic compound extracts in rats and mice by noninhalation routes of exposure. Other supporting evidence includes the demonstrated mutagenic and chromosomal effects of DE and its organic constituents, and the suggestive evidence for bioavailability of the DPM organics in humans and animals. Although highexposure chronic rat inhalation studies show a significant lung cancer response, this is not thought predictive of a human hazard at lower environmental exposures. The rat response is considered to result from an overload of particles in the lung resulting from the high exposure, and such an overload is not expected to occur in humans at environmental exposures. Although the available human evidence shows a lung cancer hazard to be present at occupational exposures that are generally higher than environmental levels, it is reasonable to presume that the hazard extends to environmental exposure levels. While there is an incomplete understanding of the mode of action for DE-induced lung cancer that may occur in humans, there is the potential for a nonthreshold mutagenic mode of action stemming from the organics in the DE mixture. A case for an environmental hazard also is shown by the simple observation that the estimated higher environmental exposure levels are close to, if not overlapping, the lower range of occupational exposures for which lung cancer increases are reported.

These considerations taken together support the prudent public health choice of presuming a cancer hazard for DE at environmental levels of exposure. Overall, the evidence for a potential cancer hazard to humans resulting from chronic inhalation exposure to DE is persuasive, even though assumptions and uncertainties are involved. While the hazard evidence is persuasive, this does not lead to similar confidence in understanding the exposure/dose-response relationship. Given a carcinogenicity hazard, EPA typically performs a dose-response assessment of the human or animal data to develop a cancer unit risk estimate that can be used with exposure information to characterize the potential cancer disease impact on an exposed population. The DE human exposure-response data are considered too uncertain to derive a confident quantitative estimate of cancer unit risk, and with the chronic rat inhalation studies not being predictive for environmental levels of exposure, EPA has not developed a quantitative estimate of cancer unit risk.

In the absence of a cancer unit risk, simple exploratory analyses were used to provide a perspective of the range of possible lung cancer risk from environmental exposure to DE. The analyses make use of reported lung cancer risk increases in occupational epidemiologic studies and the differences between occupational and environmental exposure. The purpose of having a risk perspective is to illustrate and have a sense of the possible significance of the lung cancer hazard from environmental exposure. The risk perspective cannot be viewed as a definitive quantitative characterization of cancer risk nor is it suitable for estimation of exposure-specific population risks.

It is concluded that environmental exposure to DE may present a lung cancer hazard to humans. The particulate phase appears to have the greatest contribution to the carcinogenic effect, both the particle core and the associated organic compounds have demonstrated carcinogenic properties, although a role for the DE gas-phase components cannot be ruled out.

Using either EPA's 1986 Guidelines for Carcinogen Risk Assessment (U.S. EPA, 1986) or the proposed revisions (U.S. EPA, 1996b, 1999), DE is judged to be a probable human carcinogen, or likely to be carcinogenic to humans by inhalation, respectively. The weight of evidence for potential human carcinogenicity for DE is considered strong, even though inferences are involved in the overall assessment.

Even though available evidence supports a conclusion that DE is likely to be a human lung carcinogen, the conclusion of the dose-response evaluation is that the available data are not sufficient to confidently estimate a cancer unit risk or unit risk range. The absence of such a cancer unit risk for DE limits the ability to quantify, with confidence, the potential impact of the hazard on exposed populations.

In Summary….

Although OEHHA and the State of California have identified diesel exhaust (and diesel particulate matter) as carcinogens, and DPM as the risk surrogate for whole diesel exhaust, and has established a unit risk factor for DPM, it should be remembered that there is an entire body of scientific data and individuals that at this time who cannot conclude that a unit risk value for DPM can be established. The Applicant believes that this "other conclusion" should be considered when viewing and interpreting risk assessment values for DPM.

The following tables and figures are presented at the end of this appendix:

- Table 5.1D-6 Census Tract Numbers, Areas, and Population Data
- Table 5.1D-7 Sensitive Receptor Listing for the Primary Impact Radius
- Table 5.1D-8 OEHHA/CARB Risk Assessment Health Values
- Figure 5.1D-1 Sensitive Receptor Map

Figure 5.1D-1 Sensitive Receptor Map

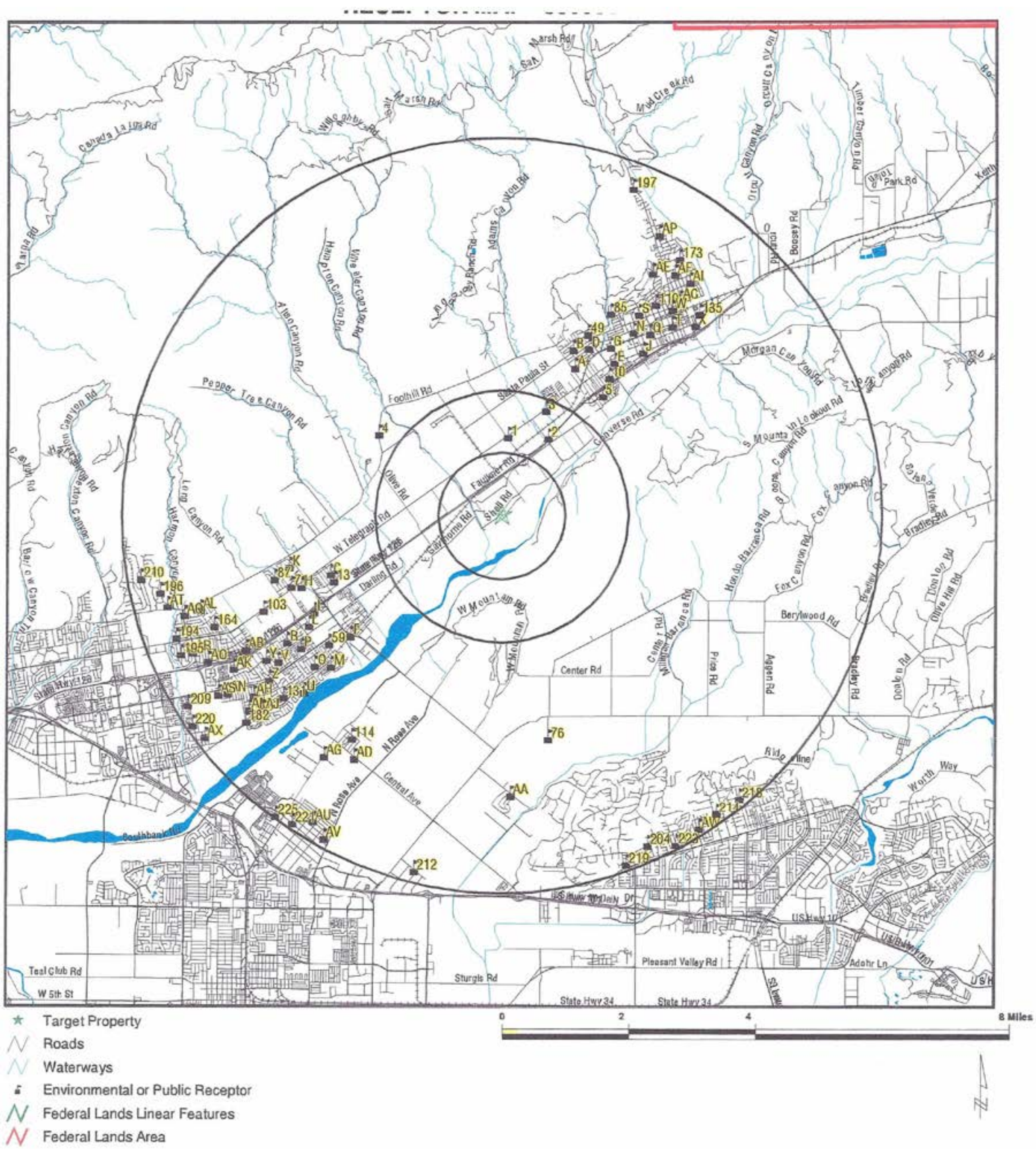


Figure 5.1D-2 Census Tracts in the Immediate Impact Area

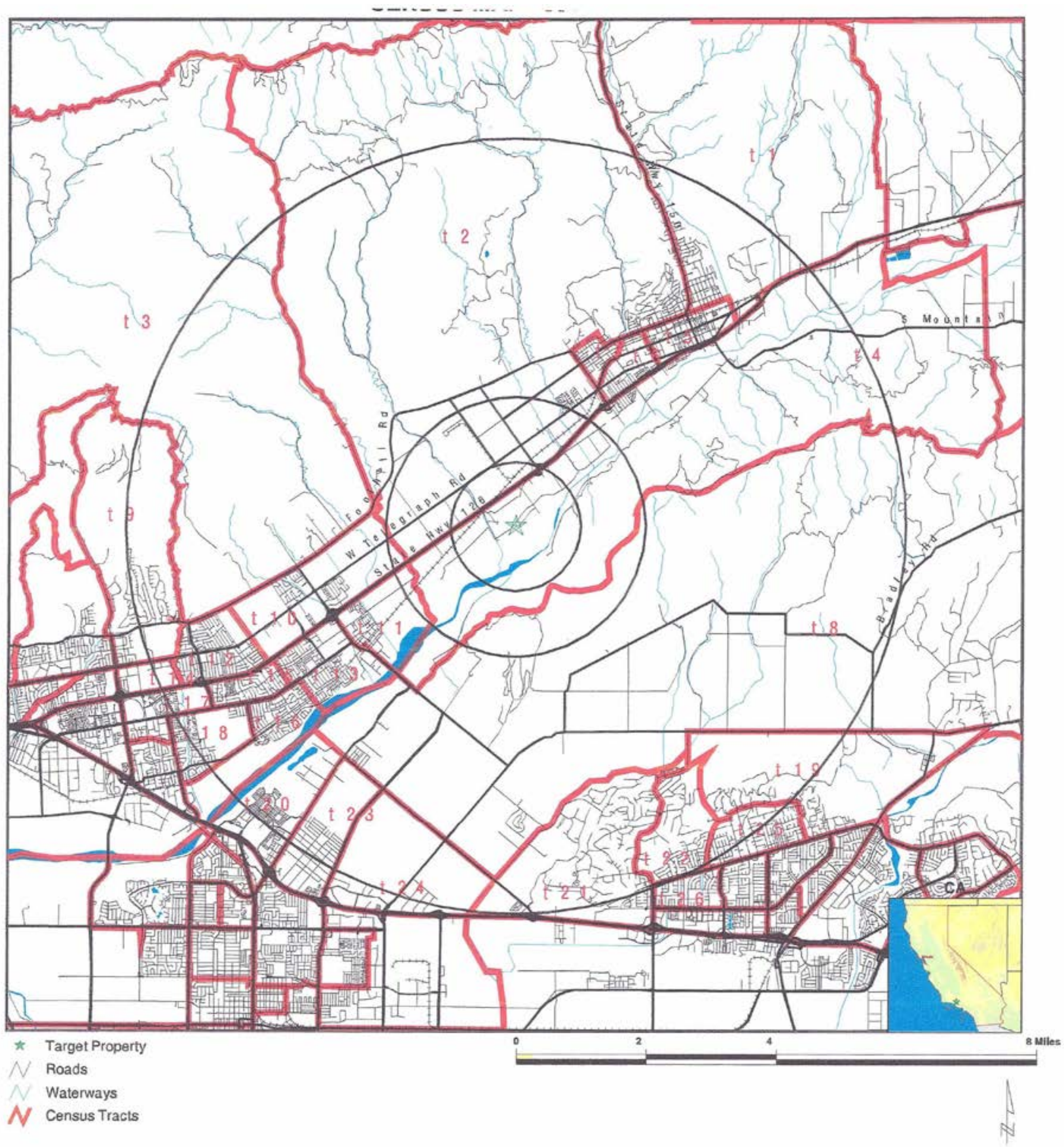
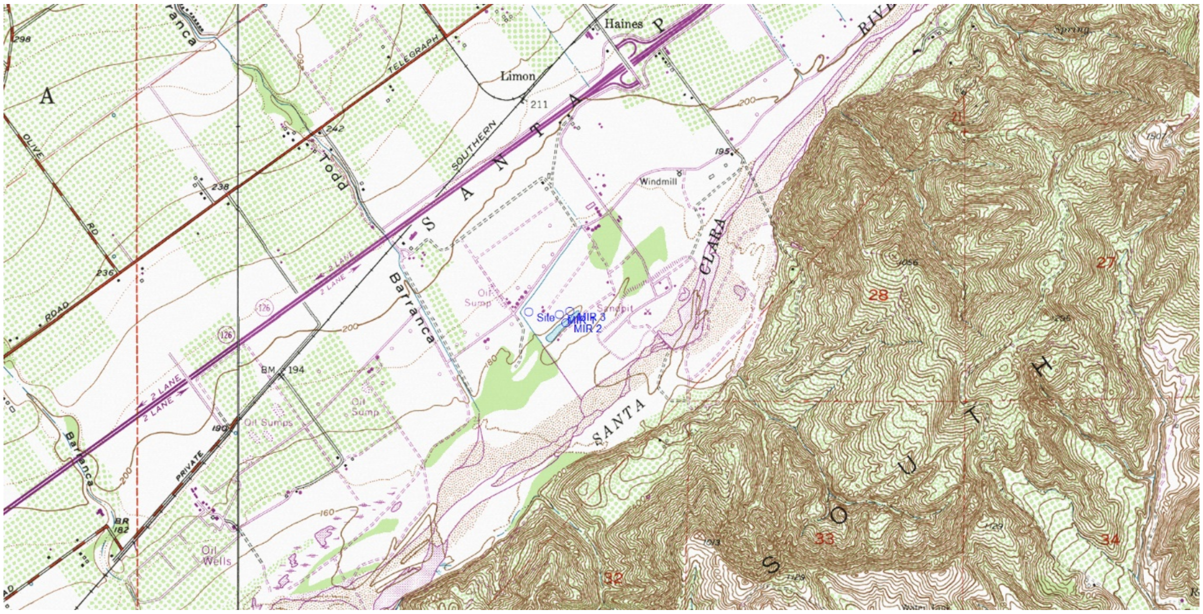


Figure 5.1D-3 Operations MIR 1, 2, and 3 Location Map



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Appendix 5.1D, Health Risk Assessment Support (REDLINED)

Appendix 5.1D

Health Risk Assessment Support Data

Health Risk Assessment Process, Goals, Assumptions, and Uses

"In recent years, the public has become increasingly aware of the presence of harmful chemicals in our environment. Many people express concerns about pesticides and other foreign substances in food, contaminants in drinking water, and toxic pollutants in the air. Others believe these concerns are exaggerated or unwarranted. How can we determine which of these potential hazards really deserve attention? How do we, as a society, decide where to focus our efforts and resources to control these hazards? When we hear about toxic threats that affect us personally, such as the discovery of industrial waste buried in our neighborhood or near our children's school, how concerned should we be?

Health risk assessment is a scientific tool designed to help answer these questions. Government agencies rely on risk assessments to help them determine which potential hazards are the most significant. Risk assessments can also guide regulators in abating environmental hazards. Members of the public who learn the basics of risk assessment can improve their understanding of both real and perceived environmental hazards, and they can work more effectively with decision makers on solutions to environmental problems.

Chemicals can be either beneficial or harmful, depending on a number of factors, such as the amounts to which we are exposed. Low levels of some substances may be necessary for good health, but higher levels may be harmful. Health risk assessments are used to determine if a particular chemical poses a significant risk to human health and, if so, under what circumstances. Could exposure to a specific chemical cause significant health problems? How much of the chemical would someone have to be exposed to before it would be dangerous? How serious could the health risks be? What activities might put people at increased risk?

If it were possible to prevent all human exposure to all hazardous chemicals, there would be no need for risk assessment. However, the total removal of harmful pollutants from the environment is often infeasible or impossible, and many naturally occurring substances also pose health risks. Risk assessment helps scientists and regulators identify serious health hazards and determine realistic goals for reducing exposure to toxics so that there is no significant health threat to the public.

Estimating the hazards posed by toxic chemicals in the environment involves the compilation and evaluation of complex sets of data. Government regulators, therefore, turn to specialists to perform or assist with risk assessments. These specialists include scientists with degrees in toxicology (the study of the toxic effects of chemicals) and epidemiology (the study of disease or illness in populations) as well as physicians, biologists, chemists, and engineers.

The term "health risk assessment" is often misinterpreted. People sometimes think that a risk assessment will tell them whether a current health problem or symptom was caused by exposure to a chemical. This is not the case. Scientists who are searching for links between chemical exposures and health problems in a community may conduct an epidemiologic study. These studies typically include a survey of health problems in a community and a comparison of health problems in that community with those in other cities, communities, or the population as a whole.

Although they are both important, health risk assessments and epidemiologic studies have different objectives. Most epidemiologic studies evaluate whether *past* chemical exposures may be responsible for documented health problems in a specific group of people. In contrast, health risk assessments are used to estimate whether *current* or *future* chemical exposures will pose health risks to a broad population, such as a city or a community. Scientific methods used in health risk assessment cannot be used to link individual illnesses to past chemical exposures, nor can health risk assessments and epidemiologic studies prove that a specific toxic substance caused an individual's illness.

The U.S. Environmental Protection Agency (U.S. EPA) is a leading risk assessment agency at the federal level. In California, the Office of Environmental Health Hazard Assessment (OEHHA) in the California Environmental Protection Agency (Cal/EPA) has the primary responsibility for developing procedures and practices for performing health risk assessments. Other agencies within Cal/EPA, such as the Department of Pesticide Regulation and the Department of Toxic Substances Control, have extensive risk assessment programs of their own but work closely with OEHHA.

The Department of Pesticide Regulation uses risk assessments to make regulatory decisions concerning safe pesticide uses. The Department of Toxic Substances Control uses risk assessments to determine requirements for the management and cleanup of hazardous wastes. OEHHA's health risk assessments are used by the Air Resources Board to develop regulations governing toxic air contaminants, and by the Department of Health Services to develop California's drinking water standards. These agencies' decisions take into account the seriousness of potential health effects along with the economic and technical feasibility of measures that can reduce the health risks.

Health risk assessment requires both sound science and professional judgment and is a constantly developing process. Cal/EPA is nationally recognized for developing new procedures that improve the accuracy of risk assessments. Cal/EPA also works closely with U.S. EPA in all phases of risk assessment.

The risk assessment process is typically described as consisting of four basic steps: hazard identification, exposure assessment, dose-response assessment, and risk characterization. Each of these steps will be explained in the following text.

Hazard Identification

In the first step, hazard identification, scientists determine the types of health problems a chemical could cause by reviewing studies of its effects in humans and laboratory animals. Depending on the chemical, these health effects may include short-term ailments, such as headaches; nausea; and eye, nose, and throat irritation; or chronic diseases, such as cancer. Effects on sensitive populations, such as pregnant women and their developing fetuses, the elderly, or those with health problems (including those with weakened immune systems), must also be considered. Responses to toxic chemicals will vary depending on the amount and length of exposure. For example, short-term exposure to low concentrations of chemicals may produce no noticeable effect, but continued exposure to the same levels of chemicals over a long period of time may eventually cause harm. An important step in hazard identification is the selection of key research studies that can provide accurate, timely information on the hazards posed to humans by a particular chemical. The selection of a study is based upon factors such as whether the study has been peer reviewed by qualified scientists, whether the study's findings have been verified by other studies, and the species tested (human studies provide the best evidence). Some studies may involve humans that have been exposed to the chemical, while others may involve studies with laboratory animals.

Human data frequently are useful in evaluating human health risks associated with chemical exposures. Human epidemiologic studies typically examine the effects of chemical exposure on a large number of people, such as employees exposed to varying concentrations of chemicals in the workplace. In many cases, these exposures took place prior to the introduction of modern worker-safety measures.

One weakness of occupational studies is that they generally measure the effects of chemicals on healthy workers and do not consider children, the elderly, those with pre-existing medical conditions, or other sensitive groups. Since occupational studies are not controlled experiments, there may be uncertainties about the amount and duration of exposure or the influence of lifestyle choices, such as smoking or alcohol use, on the health of workers in the studies. Exposure of workers to other chemicals at the same time may also influence and complicate the results.

Laboratory studies using human volunteers are better able to gauge some health effects because chemical exposures can then be measured with precision. But these studies usually involve small numbers of people and, in conformance with ethical and legal requirements, use only adults who agree to participate in the studies. Moreover, laboratory studies often use simple measurements that identify immediate responses to the chemical but might miss significant, longer-term health effects. Scientists can also use physicians' case reports of an industrial or transportation accident in which individuals were unintentionally exposed to a chemical. However, these reports may involve very small numbers of people, and the level of exposure to the chemical could be greater than exposures to the same chemical in the environment. Nevertheless, human studies are preferred for risk assessment, so OEHHA makes every effort to use them when they are available.

Because the effects of the vast majority of chemicals have not been studied in humans, scientists must often rely on animal studies to evaluate a chemical's health effects. Animal studies have the advantage of being performed under controlled laboratory conditions that reduce much of the uncertainty related to human studies. If animal studies are used, scientists must determine whether a chemical's health effects in humans are likely to be similar to those in the animals tested. Although effects seen in animals can also occur in humans, there may be subtle or even significant differences in the ways humans and experimental animals react to a chemical. Comparison of human and animal metabolism may be useful in selecting the animal species that should be studied, but it is often not possible to determine which species is most like humans in its response to a chemical exposure. However, if similar effects were found in more than one species, the results would strengthen the evidence that humans may also be at risk.

Exposure Assessment

In exposure assessment, scientists attempt to determine how long people were exposed to a chemical; how much of the chemical they were exposed to; whether the exposure was continuous or intermittent; and how people were exposed—through eating, drinking water and other liquids, breathing, or skin contact. All of this information is combined with factors such as breathing rates, water consumption, and daily activity patterns to estimate how much of the chemical was taken into the bodies of those exposed.

People can be exposed to toxic chemicals in various ways. These substances can be present in the air we breathe, the food we eat, or the water we drink. Some chemicals, due to their particular characteristics, may be both inhaled and ingested. For example, airborne chemicals can settle on the surface of water, soil, leaves, fruits, vegetables, and forage crops used as animal feed. Cows, chickens, or other livestock can become contaminated when eating, drinking, or breathing the chemicals present in the air, water, feed, and soil. Fish can absorb the chemicals as they swim in contaminated water or ingest contaminated food. Chemicals can be absorbed through the skin, so infants and children can be exposed simply by crawling or playing in contaminated dirt. They can also ingest chemicals if they put their fingers or toys in their mouths after playing in contaminated dirt. Chemicals can also be passed on from nursing mothers to their children through breast milk.

To estimate exposure levels, scientists rely on air, water, and soil monitoring; human blood and urine samples; or computer modeling. Although monitoring of a pollutant provides excellent data, it is time consuming, costly, and typically limited to only a few locations. For those reasons, scientists often rely on computer modeling, which uses mathematical equations to describe how a chemical is released and to estimate the speed and direction of its movement through the surrounding environment. Modeling has the advantage of being relatively inexpensive and less time consuming, provided all necessary information is available and the accuracy of the model can be verified through testing.

Computer modeling is often used to assess chemical releases from industrial facilities. Such models require information on the type of chemicals released, facilities' hours of operation, industrial processes that release the chemicals, smokestack height and temperature, any pollution-control equipment that is used, surrounding land type (urban or rural), local topography and meteorology, and census data regarding the exposed population.

In all health risk assessments, scientists must make assumptions in order to estimate human exposure to a chemical. For example, scientists assessing the effects of air pollution may need to make assumptions about the time people spend outdoors, where they are more directly exposed to pollutants in the ambient air, or the time they spend in an area where the pollution is greatest. An assessment of soil contamination may require scientists to make assumptions about people's consumption of fruits and vegetables that may absorb soil contaminants.

To avoid underestimating actual human exposure to a chemical, scientists often look at the range of possible exposures. For example, people who jog in the afternoon, when urban air pollution levels are highest, would have much higher exposures to air pollutants than people who come home after work and relax indoors. Basing an exposure estimate on a value near the higher end of a range of exposure levels (closer to the levels experienced by the jogger than by the person remaining indoors) provides a realistic worst-case estimate of exposure. These kinds of conservative assumptions, which presume that people are exposed to the highest amounts of a chemical that can be considered credible, are referred to as "health-protective" assumptions.

The exposure estimates for the project analysis were conducted using HARP2. HARP2 (~~version 2.0.3~~ADMRT #16217) is currently the approved model for use in assessing health risks from facilities such as the MREC project.

Dose-Response Assessment

In dose-response assessment, scientists evaluate the information obtained during the hazard identification step to estimate the amount of a chemical that is likely to result in a particular health effect in humans.

An established principle in toxicology is that "the dose makes the poison." For example, a commonplace chemical like table salt is harmless in small quantities, but it can cause illness in large doses. Similarly, hydrochloric acid, a hazardous chemical, is produced naturally in our stomachs but can be quite harmful if taken in large doses.

Scientists perform a dose-response assessment to estimate how different levels of exposure to a chemical can impact the likelihood and severity of health effects. The dose-response relationship is often different for many chemicals that cause cancer than it is for those that cause other kinds of health problems.

The dose-response estimates for the project analysis were conducted using HARP2 (~~version 2.0.3~~ADMRT #16217).

Cancer Effects

For chemicals that cause cancer, the general assumption in risk assessment has been that there are no exposures that have "zero risk" unless there is clear evidence otherwise. In other words, even a very low exposure to a cancer-causing chemical may result in cancer if the chemical happens to alter cellular functions in a way that causes cancer to develop. Thus, even very low exposures to carcinogens might increase the risk of cancer, if only by a very small amount.

Several factors make it difficult to estimate the risk of cancer. Cancer appears to be a progressive disease because a series of cellular transformations is thought to occur before cancer develops. In addition, cancer in humans often develops many years after exposure to a chemical. Also, the best information available on the ability of chemicals to cause cancer often comes from studies in which a limited number of laboratory animals are exposed to levels of chemicals that are much higher than the levels humans would normally be exposed to in the environment. As a result, scientists use mathematical models based on studies of animals exposed to high levels of a chemical to estimate the probability of cancer developing in a diverse population of humans exposed to much lower levels. The uncertainty in these estimates may be rather large. To reduce these uncertainties, risk assessors must stay informed of new scientific research. Data from new studies can be used to improve estimates of cancer risks.

Non-cancer Effects

Non-cancer health effects (such as asthma, nervous system disorders, birth defects, and developmental problems in children) typically become more severe as exposure to a chemical increases. One goal of dose-response assessment is to estimate levels of exposure that pose only a low or negligible risk for non-cancer health effects. Scientists analyze studies of the health effects of a chemical to develop this estimate. They take into account such factors as the quality of the scientific studies, whether humans or laboratory animals were studied, and the degree to which some people may be more sensitive to the chemical than others. The estimated level of exposure that poses no significant health risks can be reduced to reflect these factors.

Risk Characterization

The last step in risk assessment brings together the information developed in the previous three steps to estimate the risk of health effects in an exposed population. In the risk characterization step, scientists analyze the information developed during the exposure and dose-response assessments to describe the resulting health risks that are expected to occur in the exposed population. This information is presented in different ways for cancer and non-cancer health effects, as explained below.

Cancer Risk

Cancer risk is often expressed as the maximum number of new cases of cancer projected to occur in a population of one million people due to exposure to the cancer-causing substance over a 70-year lifetime. For example, a cancer risk of one in one million means that in a population of one million people, not more than one additional person would be expected to develop cancer as the result of the exposure to the substance causing that risk.

An individual's actual risk of contracting cancer from exposure to a chemical is often less than the theoretical risk to the entire population calculated in the risk assessment. For example, the risk estimate for a drinking-water contaminant may be based on the health-protective assumption that the individual drinks two liters of water from a contaminated source daily over a 70-year lifetime. However, an individual's actual exposure to that contaminant would likely be lower due to a shorter time of residence in the area. Moreover, an individual's risk not only depends on the individual's exposure to a specific chemical but also on his or her genetic background (i.e., a family history of certain types of cancer); health; diet; and lifestyle choices, such as smoking or alcohol consumption.

Cancer risks presented in risk assessments are often compared to the overall risk of cancer in the general U.S. population (about 250,000 cases for every one million people) or to the risk posed by all harmful chemicals in a particular medium, such as the air. The cancer risk from breathing current levels of pollutants in California's ambient air over a 70-year lifetime is estimated to be ~760 in one million.

Non-cancer Risk

Non-cancer risk is usually determined by comparing the actual level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects, even in the most susceptible people. Levels of exposure at which no adverse health effects are expected are called "health reference levels," and they generally are based on the results of animal studies. However, scientists usually set health reference levels much lower than the levels of exposure that were found to have no adverse effects in the animals tested. This approach helps to ensure that real health risks are not underestimated by adjusting for possible differences in a chemical's effects on laboratory animals and humans; the possibility that some humans, such as children and the elderly, may be particularly sensitive to a chemical; and possible deficiencies in data from the animal studies.

Depending on the amount of uncertainty in the data, scientists may set a health reference level 100 to 10,000 times lower than the levels of exposure observed to have no adverse effects in animal studies. Exposures above the health reference level are not necessarily hazardous, but the risk of toxic effects increases as the dose increases. If an assessment determines that human exposure to a chemical exceeds the health reference level, further investigation is warranted.

Risk managers rely on risk assessments when making regulatory decisions, such as setting drinking water standards, or developing plans to clean up hazardous waste sites. Risk managers are responsible for protecting human health, but they must also consider public acceptance, as well as technological, economic, social, and political factors, when arriving at their decisions. For example, they may need to consider how much it would cost to remove a contaminant from drinking water supplies or how seriously the loss of jobs would affect a community if a factory were to close due to the challenge of meeting regulatory requirements that are set at the most stringent level.

Health risk assessments can help risk managers weigh the benefits and costs of various alternatives for reducing exposure to chemicals. For example, a health risk assessment of a hazardous waste site could help determine whether placing a clay cap over the waste to prevent exposure would offer the same health protection as the more costly option of removing the waste from the site.

One of the most difficult questions of risk management is: How much risk is acceptable? While it would be ideal to completely eliminate all exposure to hazardous chemicals, it is usually not possible or feasible to remove all traces of a chemical once it has been released into the environment. The goal of most regulators is to reduce the health risks associated with exposure to hazardous pollutants to a negligibly low level.

Regulators generally presume that a one-in-one million risk of cancer from life-long exposure to a hazardous chemical is an "acceptable risk" level because the risk is extremely low compared to the overall cancer rate. If a drinking water standard for a cancer-causing chemical were set at the level posing a "one-in-one million" risk, it would mean that not more than one additional cancer case (beyond what would normally occur in the population) would potentially occur in a population of one million people drinking water meeting that standard over a 70-year lifetime.

Actual regulatory standards for chemicals or hazardous waste cleanups may be set at less stringent risk levels, such as one in 100,000 (not more than one additional cancer case per 100,000 people) or one in 10,000 (not more than one additional cancer case per 10,000 people). These less stringent risk levels are often due to economic or technological considerations. Regulatory agencies generally view these higher risk levels to be acceptable if there is no feasible way to reduce the risks further."[1]

[1] A Guide to Health Risk Assessment, CalEPA-Office of Environmental Health Hazard Assessment, 1001 I Street, Sacramento, Ca. 95812, (est. 2001).

The following tables summarize the results of the HRA performed by the proposed MREC facility.

TABLE 5.1D-1 CRITERIA AND AIR TOXIC POLLUTANTS EMITTED FROM MREC FACILITY	
NOx	1-3 Butadiene
CO	Ethylbenzene
VOC*	Formaldehyde
SOx	Hexane (n-Hexane)
PM10/PM2.5	Naphthalene
Ammonia	Propylene
PAHs	Propylene Oxide
Acetaldehyde	Toluene
Acrolein	Xylene
Benzene	Diesel PM

TABLE 5.1D-2 HEALTH EFFECTS SIGNIFICANT THRESHOLD LEVELS		
	Significance Thresholds	
Agency	VCAPCD	State of California
Cancer Risk per million	<= 10.0	<= 1.0 without T-BACT <= 10.0 with T-BACT
Acute HI	1.0	1.0
Chronic HI	1.0	1.0
Cancer Burden	n/a	1.0

The other assumptions used in running the HARP program were as follows:

- Emission rates for non-criteria pollutants are taken from AFC Section 5.1, and from Appendix 5.1A.
- Number of residents affected is based upon the updated 2010 population data for those census tracts or portions of census tracts which lie within the maximum impact receptor radius of the proposed facility.
- All receptors were treated as residential receptors, which allows for the assumption that the MIR, if assumed residential, will represent the highest risk and no other receptor will show risks higher than the MIR. This deletes the need for running worker risks. Worker values were scaled directly from the ~~70~~30-year cancer risk values based on the OEHHA recommended 25 year exposure period.
- Deposition velocity is taken to be 0.02 m/s, as recommended by ARB for controlled emission sources.
- Fraction of residents with home/gardens is the HARP2 default value which is likely conservatively high for the semi-rural area near the project site.

The HARP2 program is a tool that assists with the programmatic requirements of the Air Toxics Hot Spots Program, and it can be used for preparing health risk assessments for other related programs such as air toxic control measure development or facility permitting applications. HARP2 is a computer based risk assessment program which combines the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. Use of HARP2 promotes statewide consistency in the area of risk assessment, increases the efficiency of evaluating potential health impacts, and provides a cost effective tool for developing facility health risk assessments. HARP2 may be used on single sources, facilities with multiple sources, or multiple facilities in close proximity to each other.
The receptor grid used in HARP2 was a combination of the following:

1. All identified grid receptors as input from the AERMOD analysis,
2. All identified sensitive receptors within the primary impact area as defined by the AERMOD analysis.

The HARP2 program results for acute and chronic inhalation and chronic non-inhalation exposures, cancer burden and individual cancer risk (workplace and residential) for the combustion sources are included in the CD with this Appendix. The results of the HARP2 calculations are summarized below.

The modeling results show that the maximum modeled cancer risk from MREC operations is expected to be 5.2417 x E^{-6}. This risk is well below the VCAPCD significance value of 10 per million. T-BACT for simple cycle combustion turbines is the use of clean fuels (natural gas) and the operation of a CO catalyst. These T-BACT technologies are proposed for MREC, and as such, the significant risk threshold for MREC is 10 in a million. The chronic and acute non-cancer hazard indices are 0.0010200982 and 0.0017900124, respectively at the cancer MIR. Both are well below the significant impact level of 1.0. Detailed calculations and results for each significant receptor are included in the modeling results, which are being submitted electronically.

TABLE 5.1D-3 HEALTH RISK ASSESSMENT SUMMARY-OPERATIONS		
Turbines and Fire Pump Engine		
Risk Category	Facility Values	Applicable Significance Thresholds*
Cancer Risk at MIR	5.24-0617 E-6	See Table 5.1D-2 above.
Chronic Hazard Index at Cancer MIR	0.0010200982	
Chronic Hazard Index at Max Chronic Receptor	0.002280135	
Acute Hazard Index at Cancer MIR	0.0017900124	
Acute Hazard Index at Max Acute Receptor	0.05660676	
Cancer MIR – (Receptor #27, 306273.8, 379839030, 306266, 3798372) Max Acute non-MIR (Receptor #6093, 306200, 37970004224, 306900, 3797300) Max Chronic non-MIR (Receptor #6011, 305800, 37966002728, 30632-, 3798380)		

Table 5.1D-4 presents a summary of risk and health data for the nearest residential, worker, and sensitive receptors.

Table 5.1D-4 Health Risk Assessment Summary for Sensitive Receptors (Operations Scenario)						
Recp Type*	Recp #	UTM E	UTM N	Cancer Risk	Chronic HI	Acute HI
MIR	~~27~~30	~~306273.8~~306266	~~3798390~~3798372	5.~~24E~~17E-6	0.~~00102~~00982	0.~~00179~~00124
MEIR-North	~~8898~~20859	306264	3799566	1.~~30E~~94E-8	0.~~000038~~000226	0.~~0047~~00329
MEIR-South	~~8899~~20860	306144	3795267	~~3.98E~~1.42E-8	0.~~00022~~000116	0.~~0054~~00721
MEIR-East	~~8900~~20861	306531	3798541	~~7.10E~~3.71E-7	0.~~00055~~00617	0.~~0052~~00333
MEIR-West	~~8901~~20862	304929	3797623	~~1.69E~~6.16E-8	0.~~000035~~000524	0.~~0047~~00396
MEIR-R1a	~~8905~~20866	306551	3798554	~~6.55E~~3.43E-7	0.~~00056~~00564	0.~~0050~~00316
MEIR-R1b	~~8904~~20865	306529	3798630	~~3.61E~~2.79E-7	0.~~00072~~00480	0.~~0054~~00293
MEIR-R2	~~8903~~20864	306325	3798714	~~1.04E~~2.10E-7	0.~~00028~~00242	0.~~0036~~00335
MEIW	~~8902~~20863	306257	3798462	~~3.79E~~4.66E-7	0.~~00018~~00498	0.~~0019~~00147
Nearest School	~~8884~~20845	306381	3800656	1.~~38E~~58E-8	0.~~000036~~000093	0.~~0037~~00348
Nearest Health Facility	~~8847~~20808	297887	3789325	~~4.42E~~5.59E-9	0.~~000013~~000064	0.~~0016~~00158
NearestDaycare	None Identified	-	-	-	-	-
Nearest Convalescent Home	~~8844~~20805	295842	3793169	~~4.40E-9~~1.12E-8	0.~~000014~~000159	0.~~0014~~00176
MEIW risk is simply the ~~70~~30 year risk adjusted for an exposure period of 25 years per OEHHA (2015). The impact area cancer burden remains <=0.~~0012~~0018. *UTM coordinates for some receptors adjusted in final modeling file versus AFC Table 4.5-1.						

The calculated health effects as summarized above do not exceed the district significance threshold values, therefore the health effects would be considered "not significant" and may even be "zero".

Risk Assessment input and output files are included on the modeling CD. Due to the length of the HRA input and output files, hard copies are not provided in this appendix.

Construction HRA

A construction screening HRA was performed using the following assumptions as follows:

- The first three highest impacted receptors were chosen to represent the potential risks posed by construction related DPM emissions.
- Cancer risk and chronic hazard indices were computed using HARP2.
- A cancer inhalation unit risk value of 0.0003 $(ug/m^3)^{-1}$ was used.
- A cancer chronic inhalation REL of 5.0 $(ug/m^3)^{-1}$ was used.
- No acute inhalation REL exists for diesel PM.

~~The adjustment factor applied to the final 70 yr risk and hazard index values was based upon a construction work schedule of 1.92 years (a value of 2 years was used) to adjust the risk values to the construction period~~HARP was run for an exposure period of 2 years to simulate the 1.92 year construction period. (OEHHA, 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines, Chapter 8, Section 8.2.10).

The following table presents the results of the screening level assessment of health risks from the construction phase for the three (3) highest values evaluated on the construction receptor grid as well as the nearest residential, worker, and sensitive receptor locations.

Table 5.1D-5 Construction Screening HRA Summary

Receptor Type*	Receptor #	UTM E	UTM N	Cancer Risk**	Chronic HI
PMI 1	2469	306240396240	3798460	4.97E1.36E-6	0.0331000794
PMI 2	25994429	306280306257	37984403798462	4.94E1.35E-6	0.0330000791
PMI 3	25332534	306260	37984403798460	4.91E1.35E-6	0.0328000788
MEIR-North	48544425	306264	3799566	2.94E1.17E-8	0.0001960000068
MEIR-South	48554426	306144	3795267	2.10E-81.96E-9	0.0001340000011
MEIR-East	48564427	306531	3798541	1.79E-63.73E-7	0.0119000218
MEIR-West	48574428	304929	3797623	1.52E84E-8	0.00010000011
MEIR-R1a	48614432	306551	3798554	1.67E-63.43E-7	0.0111000201
MEIR-R1b	48604431	306529	3798630	1.67E-63.46E-7	0.0111000213
MEIR-R2	48594430	306325	3798714	8.23E3.46E-7	0.00548000202
MEIW	48584429	306257	3798462	4.91E1.35E-6	0.0328000791
Nearest School	48404411	306381	3800656	1.38E-86.08E-9	0.0000930000036
Nearest Health Facility	48034374	297887	3789325	1.60E17E-9	0.00001100000068
Nearest Daycare	None Identified	-	-	-	-
Nearest Convalescent Home	48004371	295842	3793169	1.40E2.01E-9	0.00000950000012

*UTM coordinates for some receptors adjusted in final modeling file versus AFC Table 4.5-1.
**70 year risk values adjusted for the actual length of theBased on Tier 2 procedure using a construction/exposure period of 2 years.

With respect to emissions from diesel fueled engines, use of the diesel PM exposure factors noted above are approved by CARB for the characterization of diesel engine exhaust and subsequent risk exposures. The diesel PM factor includes the range of fuel bound, and potentially emitted metals, PAHs, and a wide variety of other semi-volatile substances.

CARB notes the following in the diesel exhaust risk identification documents:

- The surrogate for whole diesel exhaust is diesel PM. PM10 is the basis for the potential risk calculations.
- When conducting an HRA, the potential cancer risk from inhalation exposure to diesel PM will outweigh the potential non-cancer health effects.
- When comparing whole diesel exhaust to speciated diesel exhaust, potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multi-pathway cancer risk from the speciated compounds. For this reason, there will be few situations where an analysis of multi-pathway risk is necessary.

With respect to diesel particulate related risk values, the following should be noted:

The following comments were derived from http://www3.epa.gov/region1/eco/airtox/diesel.htmlhttp://www3.epa.gov/region1/eco/airtox/diesel.html, EPA Region 1 New England (2015).

EPA's National Scale Assessment uses several types of health hazard information to provide a quantitative "threshold of concern" or a health benchmark concentration at which it is expected that no adverse health effects occur at exposures to that level. Health effects information on carcinogenic, short and long term noncarcinogenic end points are used to establish selective protective health levels to compare to the modeled exposures levels. Unfortunately the exposure response data for diesel exhaust in human studies are considered too uncertain to develop a carcinogenic unit risk for EPA's use. There is a Reference Concentration (RFC) that is used as a health benchmark protective of chronic noncarcinogenic health effects but it is for diesel exhaust and not specifically set for diesel particulate matter which is what was modeled in NATA. The RFC for diesel exhaust, which includes diesel particulate matter is 5 ug/m3. This value is similar to the National Ambient Air Quality Standard established for fine particulate matter which is 15ug/m3.

The EPA agrees that diesel exhaust is "likely to be carcinogenic to humans by inhalation." In their risk assessment, however, the EPA did not give a quantitative estimate of risk of lung cancer due to diesel exhaust exposures. There is some uncertainty "to definitively conclude that diesel exhaust is carcinogenic to humans." Although rat and mice studies demonstrate mutagenic and chromosomal effects, these studies do not reflect normal human exposure, as previously explained. The EPA decided that the human data from epidemiological studies are too uncertain to derive a quantitative estimate of cancer risk.

The following comments were derived from the EPA Health Risk Assessment for Diesel Engine Exhaust (EPA 600/8-90/057F, May 2002.

Acute (Short-Term Exposure) Effects
Information is limited for characterizing the potential health effects associated with acute or short-term exposure. However, on the basis of available human and animal evidence, it is concluded that acute or short-term (e.g., episodic) exposure to DE can cause acute irritation (e.g., eye, throat, bronchial), neurophysiological symptoms (e.g., lightheadedness, nausea), and respiratory symptoms (cough, phlegm).

There also is evidence for an immunologic effect–the exacerbation of allergenic responses to known allergens and asthma-like symptoms. The lack of adequate exposure-response information in the acute health effect studies precludes the development of recommendations about levels of exposure that would be presumed safe for these effects.

Chronic (Long-Term Exposure) Noncancer Respiratory Effects
Information from the available human studies is inadequate for a definitive evaluation of possible noncancer health effects from chronic exposure to DE. However, on the basis of extensive animal evidence, DE is judged to pose a chronic respiratory hazard to humans. Chronic-exposure, animal inhalation studies show a spectrum of dose-dependent inflammation and histopathological changes in the lung in several animal species including rats, mice, hamsters, and monkeys.

This assessment provides an estimate of inhalation exposure of DE (as measured by DPM) to which humans may be exposed throughout their lifetime without being likely to experience adverse noncancer respiratory effects. This exposure level, known as the reference concentration (RfC) for DE of 5 ~~:g~~ug/m3 of DPM was derived on the basis of dose-response data on inflammatory and histopathological changes in the lung from rat inhalation studies. In recognition of the presence of DPM in ambient PM2.5 , it also is appropriate to consider the wealth of PM2.5 human health effects data. In this regard, the 1997 National Ambient Air Quality Standard for PM2.5 of 15 ~~:g~~ug/m3 (annual average concentration) also would be expected to provide a measure of protection from DPM, reflecting DPM's current approximate proportion to PM2.5.

Chronic (Long-Term Exposure) Carcinogenic Effects

This assessment concludes that DE is "likely to be carcinogenic to humans by inhalation" and that this hazard applies to environmental exposures. This conclusion is based on the totality of evidence from human, animal, and other supporting studies. There is considerable evidence demonstrating an association between DE exposure and increased lung cancer risk among workers in varied occupations where diesel engines historically have been used. The human evidence from occupational studies is considered strongly supportive of a finding that DE exposure is causally associated with lung cancer, though the evidence is less than that needed to definitively conclude that DE is carcinogenic to humans.

There is some uncertainty about the degree to which confounders are having an influence on the observed cancer risk in the occupational studies, and there is uncertainty evolving from the lack of actual DE exposure data for the workers. In addition to the human evidence, there is supporting evidence of DPM's carcinogenicity and associated DPM organic compound extracts in rats and mice by noninhalation routes of exposure. Other supporting evidence includes the demonstrated mutagenic and chromosomal effects of DE and its organic constituents, and the suggestive evidence for bioavailability of the DPM organics in humans and animals. Although highexposure chronic rat inhalation studies show a significant lung cancer response, this is not thought predictive of a human hazard at lower environmental exposures. The rat response is considered to result from an overload of particles in the lung resulting from the high exposure, and such an overload is not expected to occur in humans at environmental exposures. Although the available human evidence shows a lung cancer hazard to be present at occupational exposures that are generally higher than environmental levels, it is reasonable to presume that the hazard extends to environmental exposure levels. While there is an incomplete understanding of the mode of action for DE-induced lung cancer that may occur in humans, there is the potential for a nonthreshold mutagenic mode of action stemming from the organics in the DE mixture. A case for an environmental hazard also is shown by the simple observation that the estimated higher environmental exposure levels are close to, if not overlapping, the lower range of occupational exposures for which lung cancer increases are reported.

These considerations taken together support the prudent public health choice of presuming a cancer hazard for DE at environmental levels of exposure. Overall, the evidence for a potential cancer hazard to humans resulting from chronic inhalation exposure to DE is persuasive, even though assumptions and uncertainties are involved. While the hazard evidence is persuasive, this does not lead to similar confidence in understanding the exposure/dose-response relationship. Given a carcinogenicity hazard, EPA typically performs a dose-response assessment of the human or animal data to develop a cancer unit risk estimate that can be used with exposure information to characterize the potential cancer disease impact on an exposed population. The DE human exposure-response data are considered too uncertain to derive a confident quantitative estimate of cancer unit risk, and with the chronic rat inhalation studies not being predictive for environmental levels of exposure, EPA has not developed a quantitative estimate of cancer unit risk.

In the absence of a cancer unit risk, simple exploratory analyses were used to provide a perspective of the range of possible lung cancer risk from environmental exposure to DE. The analyses make use of reported lung cancer risk increases in occupational epidemiologic studies and the differences between occupational and environmental exposure. The purpose of having a risk perspective is to illustrate and have a sense of the possible significance of the lung cancer hazard from environmental exposure. The risk perspective cannot be viewed as a definitive quantitative characterization of cancer risk nor is it suitable for estimation of exposure-specific population risks.

It is concluded that environmental exposure to DE may present a lung cancer hazard to humans. The particulate phase appears to have the greatest contribution to the carcinogenic effect, both the particle core and the associated organic compounds have demonstrated carcinogenic properties, although a role for the DE gas-phase components cannot be ruled out.

Using either EPA's 1986 Guidelines for Carcinogen Risk Assessment (U.S. EPA, 1986) or the proposed revisions (U.S. EPA, 1996b, 1999), DE is judged to be a probable human carcinogen, or likely to be carcinogenic to humans by inhalation, respectively. The weight of evidence for potential human carcinogenicity for DE is considered strong, even though inferences are involved in the overall assessment.

Even though available evidence supports a conclusion that DE is likely to be a human lung carcinogen, the conclusion of the dose-response evaluation is that the available data are not sufficient to confidently estimate a cancer unit risk or unit risk range. The absence of such a cancer unit risk for DE limits the ability to quantify, with confidence, the potential impact of the hazard on exposed populations.

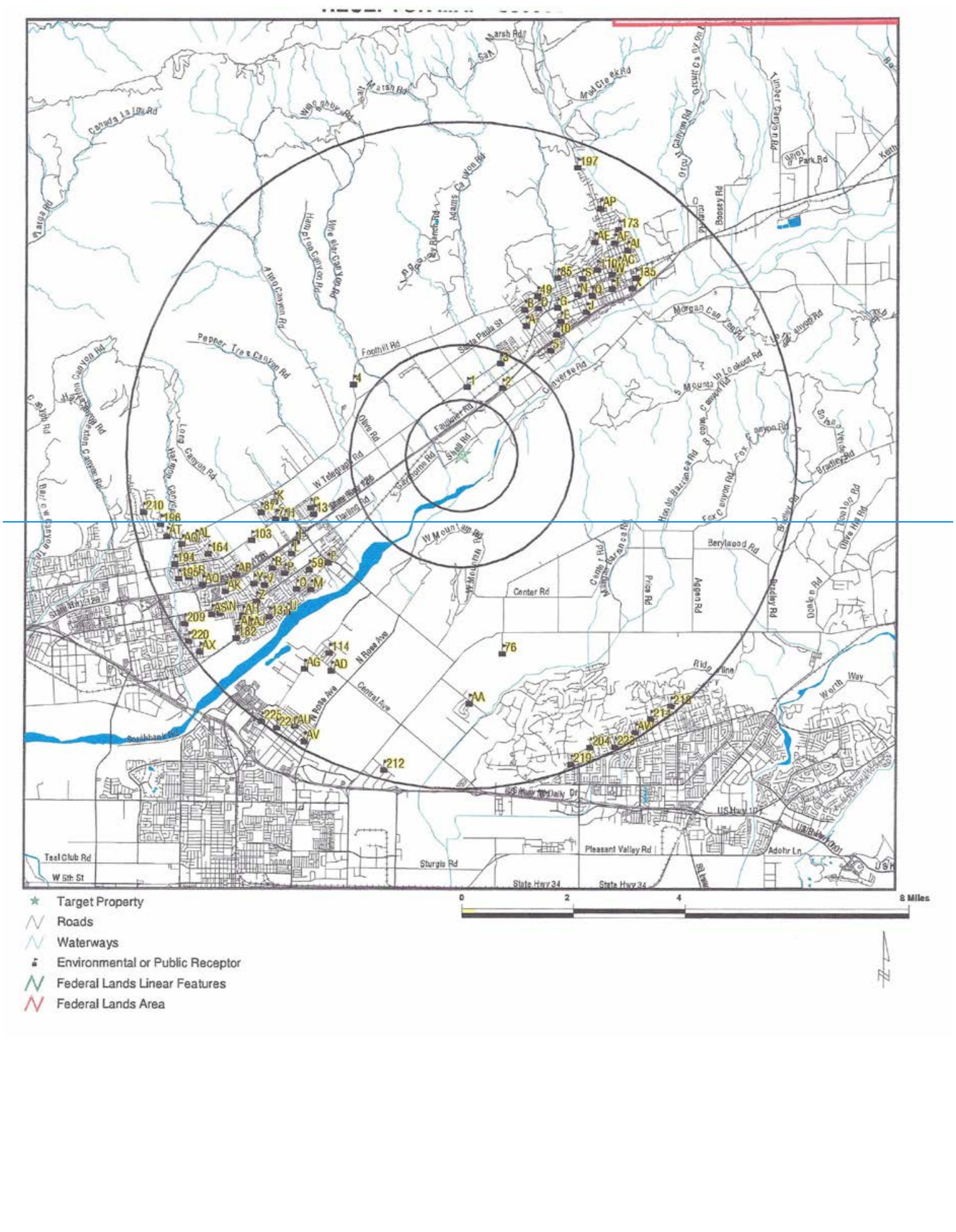
In Summary….

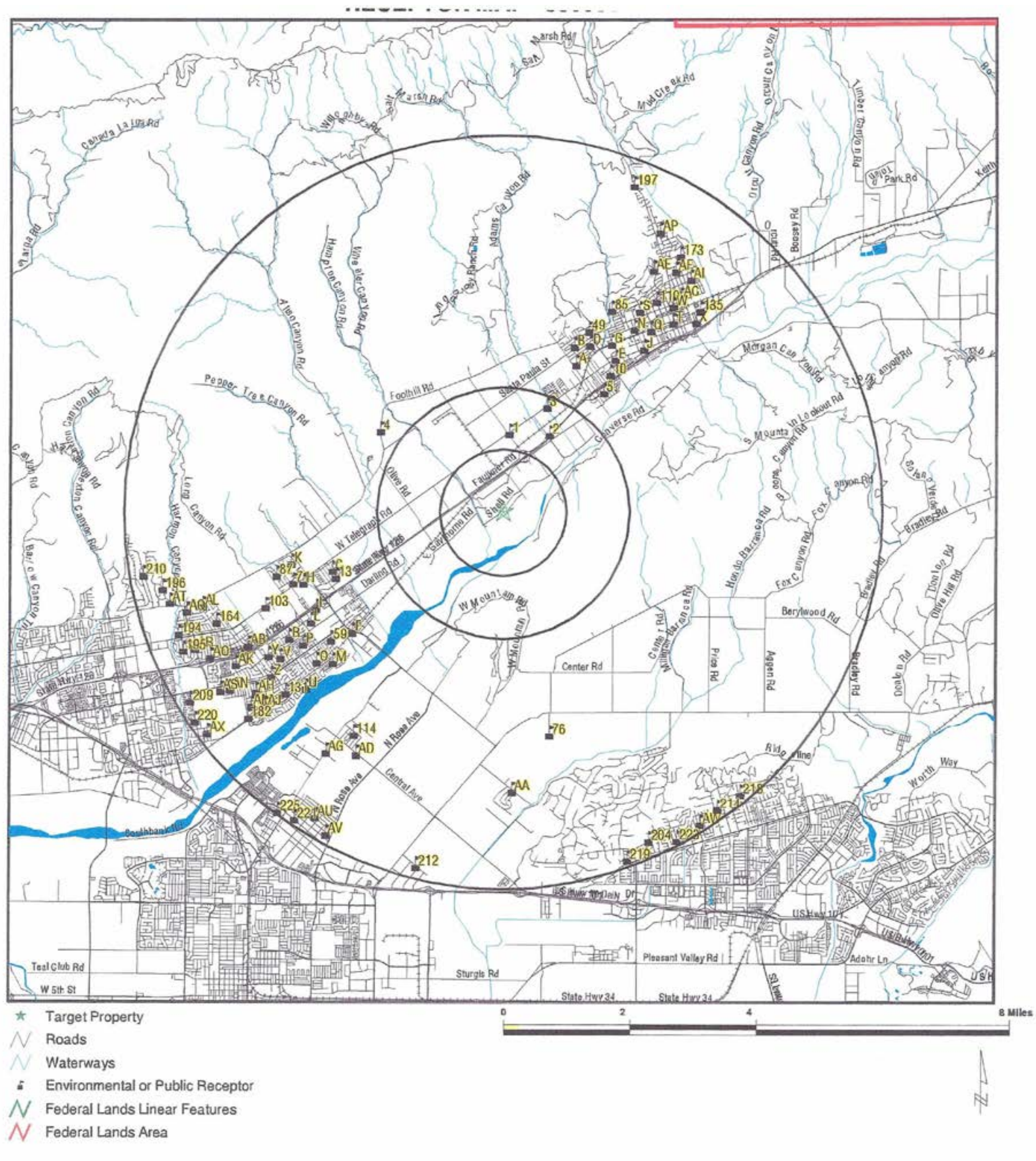
Although OEHHA and the State of California have identified diesel exhaust (and diesel particulate matter) as carcinogens, and DPM as the risk surrogate for whole diesel exhaust, and has established a unit risk factor for DPM, it should be remembered that there is an entire body of scientific data and individuals that at this time who cannot conclude that a unit risk value for DPM can be established. The Applicant believes that this "other conclusion" should be considered when viewing and interpreting risk assessment values for DPM.

The following tables and figures are presented at the end of this appendix:

- Table 5.1D-6 Census Tract Numbers, Areas, and Population Data
- Table 5.1D-7 Sensitive Receptor Listing for the Primary Impact Radius
- Table 5.1D-8 OEHHA/CARB Risk Assessment Health Values
- Figure 5.1D-1 Sensitive Receptor Map
- Figure 5.1D-2 Census Tracts in the Immediate Impact Area
- Figure 5.1D-3 Operations MIR-1, -2, -3 Location Map

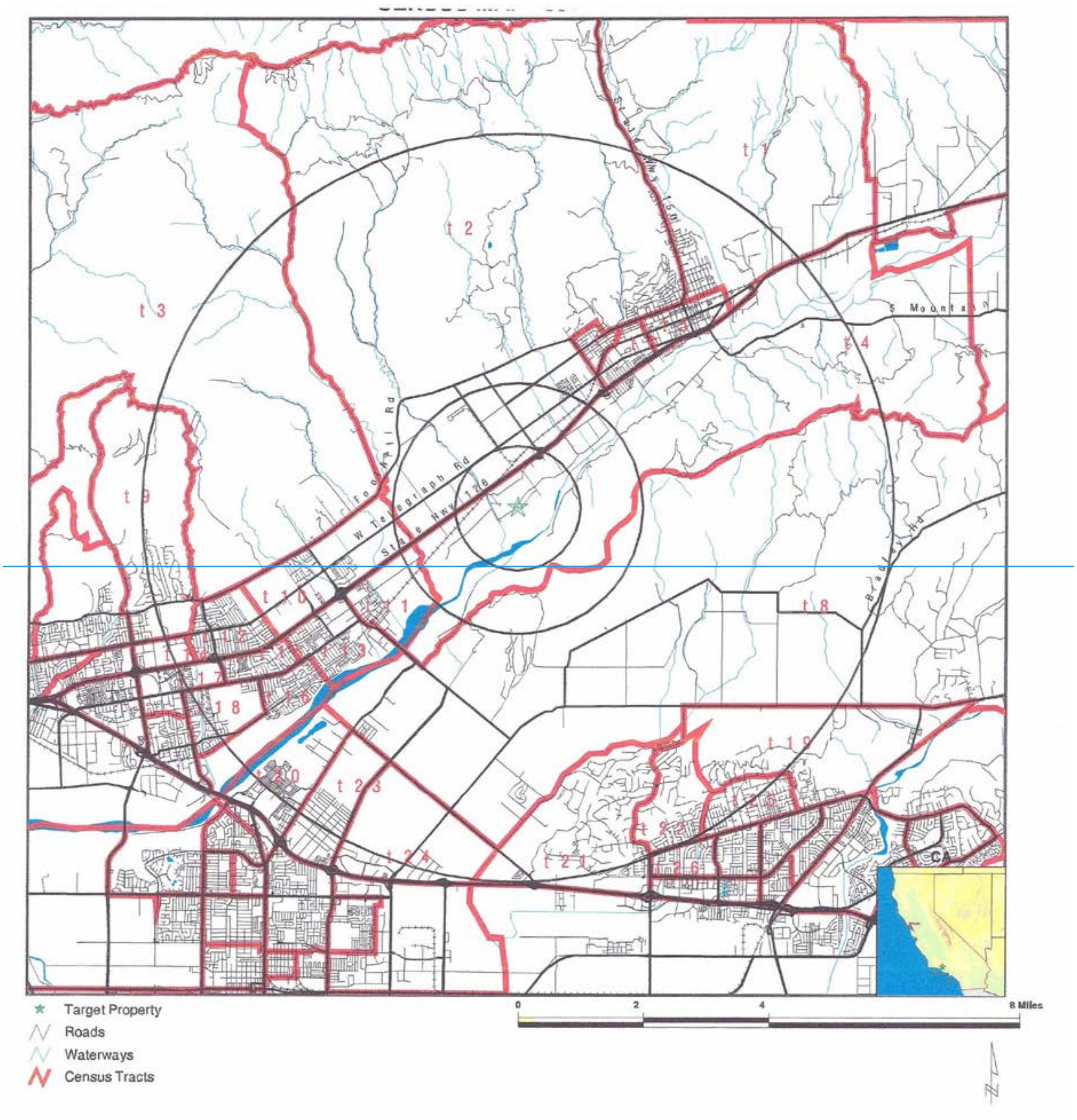
Figure 5.1D-1 Sensitive Receptor Map

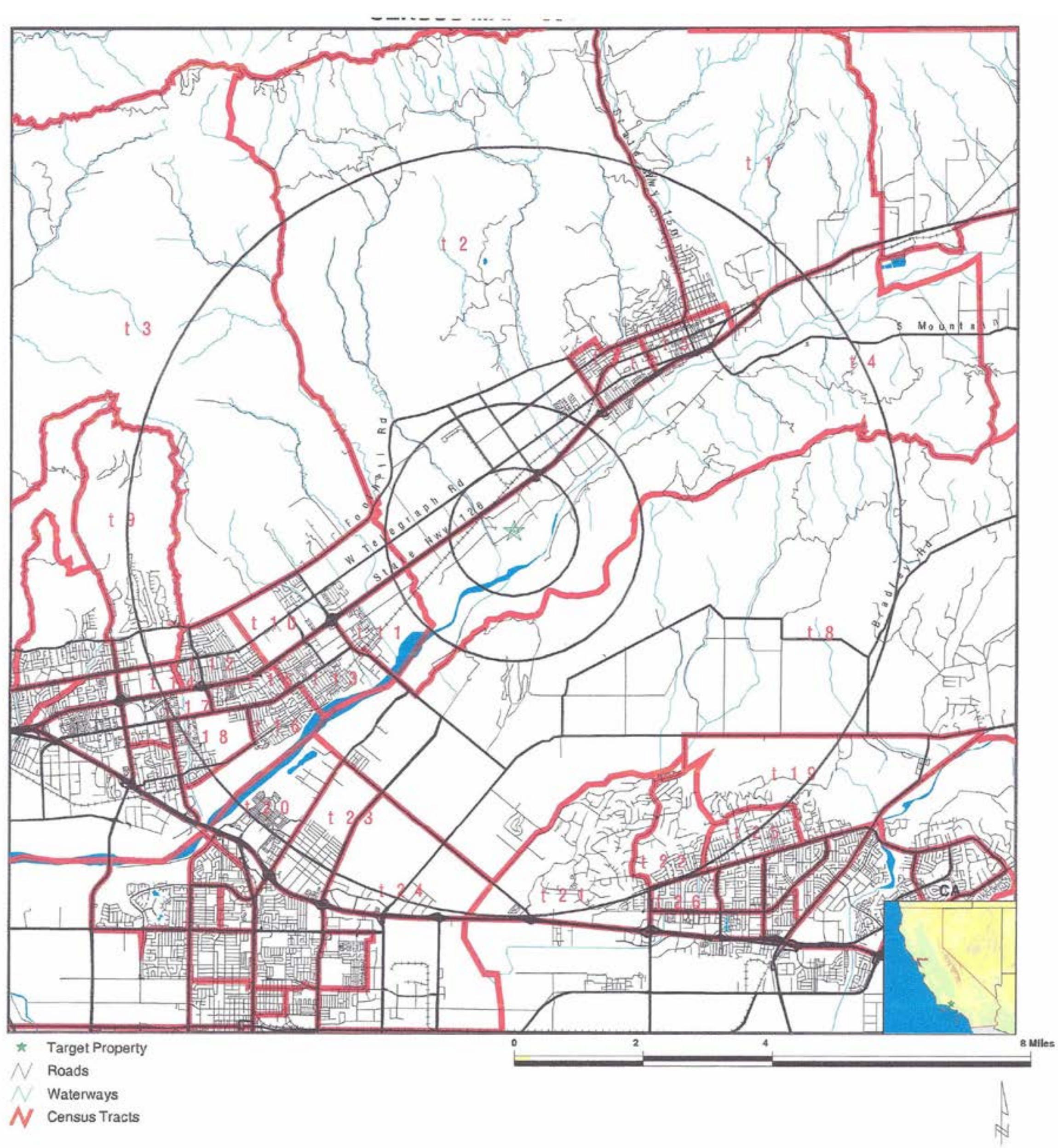




Foothill Rd
State Paula St
W Telegraph Rd
Pepper Tree Canyon Rd
Olive Rd
Center Rd
Berylwood Rd
Price Rd
Aggen Rd
Bradley Rd
Central Ave
N Rose Ave
Pleasant Valley Rd
Sturgis Rd
Teal Club Rd
W 5th St
State Hwy 34
Adohr Ln
Worth Way
Park Rd
Boosey Rd
Darling Rd
0
2
4
8 Miles
Target Property
Roads
Waterways
Environmental or Public Receptor
Federal Lands Linear Features
Federal Lands Area

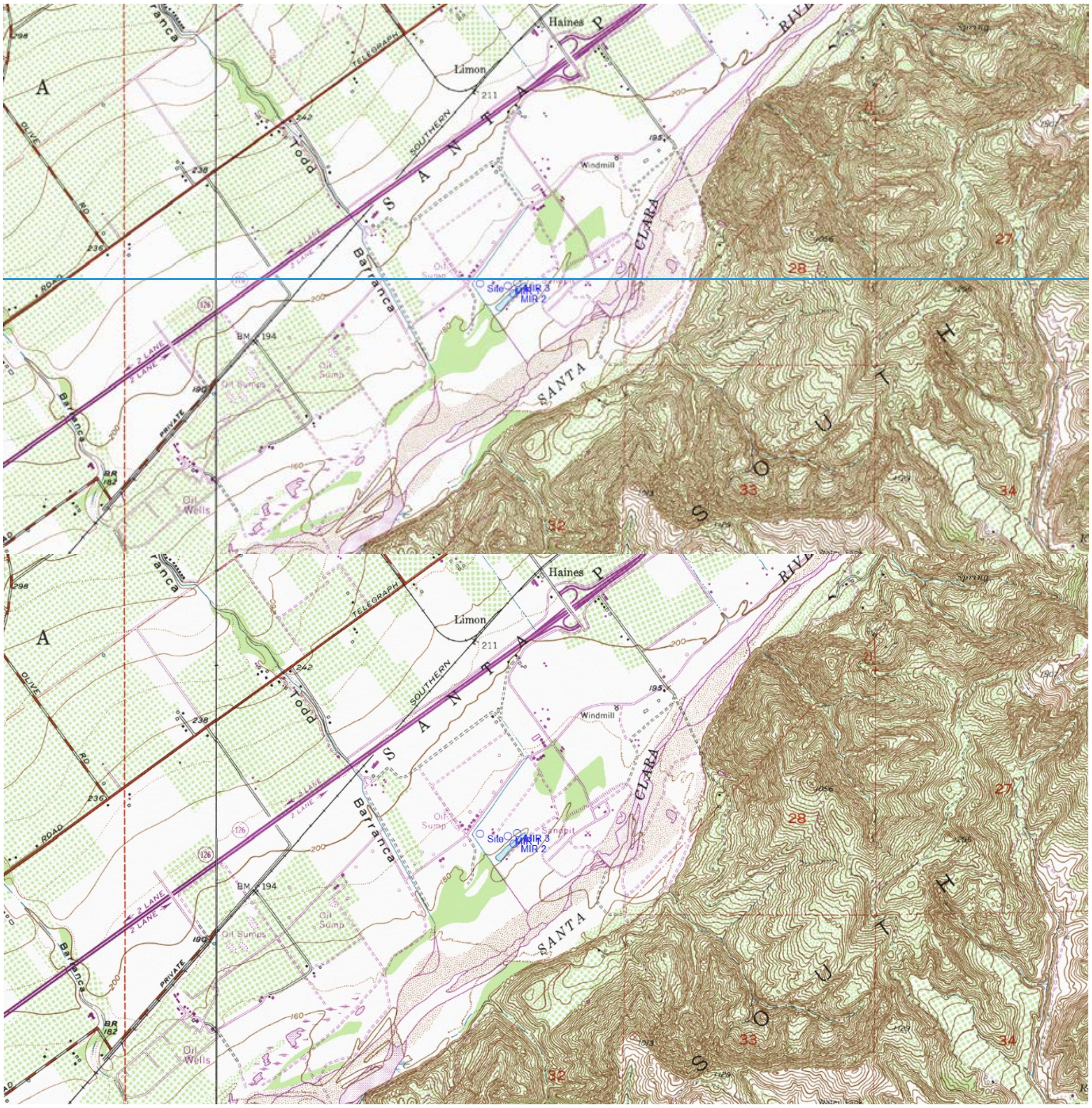
Figure 5.1D-2 Census Tracts in the Immediate Impact Area





Target Property
Roads
Waterways
Census Tracts
0
2
4
8 Miles
CA

Figure 5.1D-3 Operations MIR 1, 2, and 3 Location Map



APPLICATION FOR CERTIFICATION
MISSION ROCK ENERGY CENTER (15-AFC-02)

Appendix 5.1E, Construction Emissions Support (CLEAN)

APPENDIX 5.1E

Construction Emissions and Impact Analysis

Construction Phases

Construction of MREC is expected to last approximately 23 months. The construction will occur in the following four main phases:

- Mobilization and site preparation;
- Foundation work;
- Construction/installation of major structures; and,
- Installation of major equipment.
- Commissioning

The main site is approximately 9.8 acres in size and is essentially flat. A laydown yard will be located on the main site. The total acreage for purposes of calculating on-site emissions will be approximately 9.8 acres. The site is currently in use as a vehicle salvage/dismantling and transfer yard. The site is currently level, and as such, the site will require only minimum grading and leveling prior to construction of the power block and support systems. Site preparation includes finish grading, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations and structures is expected to begin. Once the foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

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

- Dust entrained during site preparation and finish grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction will result from:

- Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from Diesel-powered welding machines, electric generators, air compressors, and water pumps;
- Exhaust from pickup trucks and Diesel trucks used to transport workers and materials around the construction site;
- Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and,

- Exhaust from automobiles used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Worst-case daily dust emissions are expected to occur during months 2-8 of construction when site preparation occurs. The worst-case daily exhaust emissions are expected to occur during the middle of the construction schedule during the installation of the major mechanical equipment. Annual emissions are based on the average equipment mix during the 23 month construction period.

Available Mitigation Measures

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

- 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 four (4) times during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.

- Onsite vehicle speeds will be limited to 5 miles per hour 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 Storm Water Pollution Prevention Plan (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 300 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 (2) 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 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, EPA-ARB Tier 2/Tier 3 engine compliant equipment for equipment over 100 horsepower.

- Insure 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).

Estimation of Emissions with Mitigation Measures

Tables 5.1E-1 through 5.1E-5 show the estimated maximum period, monthly, and daily heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures. Detailed emission calculations are included in Table 5.1E-7, including estimates of PM2.5 and CO2e.

TABLE 5.1E-1 ONSITE CONSTRUCTION EMISSIONS SUMMARY, TONS/PERIOD

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	37.59	27.49	5.55	0.08	0.049[1]	0.0484[1]	2155
Fugitives	-	-	-	-	0.483	0.0883	-

Totals	37.59	27.49	5.55	0.08	0.532	0.137	2155

Notes: Construction period is 23 months.

[1] PM10 and PM2.5 based on revised emissions evaluation per CalEEMod2016, 10/25/16, assuming the use of Tier 4 engines on all onsite construction equipment (emissions reported are mitigated values).

Onsite const equipment exhaust, fugitive dust from earth moving activities, cut and fill activity, onsite paved road use, storage pile wind erosion, onsite unpaved road use, and track-out.

TABLE 5.1E-2 ONSITE CONSTRUCTION EMISSIONS SUMMARY, LBS/MONTH (Normalized for 23 months)

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	3269	2390	483	7	4.261[1]	4.21[1]	-
Fugitives	-	-	-	-	42	7.7	-
Totals	3269	2390	483	7	46.3	11.9	-

Notes: Construction period is 23 months.

[1] same note as Table 5.1E-1.

Onsite const equipment exhaust, fugitive dust from earth moving activities, cut and fill activity, onsite paved road use, storage pile wind erosion, onsite unpaved road use, and track-out.

TABLE 5.1E-3 ONSITE CONSTRUCTION EMISSIONS SUMMARY, LBS/DAY (Normalized for 506 workdays)

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	148.6	108.7	21.9	0.32	0.194[1]	0.191[1]	-
Fugitives	-	-	-	-	1.91	0.35	-
Totals	148.6	108.7	21.9	0.32	2.1	0.54	-

Notes: 23 months @ 22 days/month = 506 days/period

[1] same note as Table 5.1E-1.

Onsite const equipment exhaust, fugitive dust from earth moving activities, cut and fill activity, onsite paved road use, storage pile wind erosion, onsite unpaved road use, and track-out.

TABLE 5.1E-4 ONSITE CONSTRUCTION EMISSIONS SUMMARY, LBS/DAY (Estimated Maximum Day)

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	217.2	145.97	31.53	0.42	0.273[1]	0.270[1]	-
Fugitives	-	-	-	-	2.29	0.426	-
Totals	217.2	145.97	31.53	0.42	2.56	0.70	-

Notes:

Max day for onsite fugitives would be in Phase 2 (Civil Improvements), 2019.

Max day for onsite exhaust would be in Phase 2 (Civil Improvements), 2019.

[1] same note as Table 5.1E-1.

Onsite const equipment exhaust, fugitive dust from earth moving activities, cut and fill activity, onsite paved road use, storage pile wind erosion, onsite unpaved road use, and track-out.

TABLE 5.1E-5 OFFSITE CONSTRUCTION EMISSIONS SUMMARY, TONS/PERIOD

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	3.05	5.98	0.78	0.0154	0.212	0.211	1636
Fugitives	-	-	-	-	0.48	0.08	-

Totals	3.05	5.98	0.78	0.0154	0.692	0.291	1636
Notes: Construction period is 23 months. Delivery and hauling exhaust, const site support vehicle exhaust, worker travel exhaust, worker bus exhaust, offsite paved road fugitives.							

Total CO2e emissions from all construction related activities, both on and off site is estimated to be 8,524 tons per the construction period.

Analysis of Ambient Impacts from Facility Construction

Ambient air quality impacts from emissions during the construction of MREC were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

Existing Ambient Levels

As with the modeling analysis of project operating impacts (Section 5.1), monitoring stations delineated in Section 5.1 were used to establish the ambient background levels for the construction impact modeling analysis. Table 5.1-17 showed the maximum concentrations of NO_x, SO_2, CO, PM2.5, and PM10 recorded for 2012 through 2014 at those monitoring stations.

Dispersion Model

As in the analysis of project operating impacts, the USEPA-approved model AERMOD (version15181) was used to estimate ambient impacts from construction activities. A detailed discussion of the AERMOD dispersion model and the associated processing programs AERSURFACE, AERMET, and AERMAP is included in Section 5.1.6. As with the operational impact analysis, the El Rio air quality monitoring site meteorology were processed in accordance with USEPA guidance.

The emission sources for the construction site were grouped into two categories: exhaust emissions and dust emissions. Combustion equipment exhaust emissions were modeled as eighteen (18) 3.048 meter high point sources (exhaust parameters of 750 Kelvins, 64.681 m/s exit velocity, and 0.1524 meter stack diameter) placed at regular 150-foot intervals around the construction area. Construction fugitive dust emissions were modeled as an area source covering the construction area with an effective plume height of 0.5 meters. Combustion and fugitive emissions were assumed to occur for 10 hours/day (7 AM to 5 PM) consistent with the expected period of onsite construction activities generating both exhaust emissions and fugitive dust. The construction impacts modeling analysis generally used the same receptor locations and meteorological data as used for the project operating impact analysis. Exceptions were that only the 10-meter fenceline and 20-meter downwash receptor grids were modeled since maximum impacts will occur in the immediate project vicinity and the FASTALL option was utilized to minimize runtimes for the area source and the larger number of point sources modeled. A detailed discussion of the receptor locations and meteorological data is included in Section 5.1.6. To determine the construction impacts on short-term ambient standards (24 hours and less), the maximum daily onsite construction emission levels shown in Table 5.1E-4 were used. For pollutants with annual average ambient standards, the normalized monthly emission levels as shown in Table 5.1E-2 were used, multiplied by 12 months/year to derive annual emissions.

Modeling Results

Based on the emission rates of NO_x, SO_2, CO, PM2.5, and PM10, the modeling options, receptor grids, and meteorological data, AERMOD calculates short-term and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NO_x, SO_2, CO, PM2.5, and PM10 spread over the estimated daily hours of operation. The annual impacts are based on the annual emission rates of these pollutants.

The annual average concentrations of NO_2 were computed following the revised USEPA guidance for computing these concentrations (August 9, 1995 Federal Register, 60 FR 40465). The annual average was calculated using the ambient ratio method (ARM) with the national default value of 0.75 for the annual average NO_2/NO_x ratio. The 1-hour NO2 impacts were modeled using the ozone limiting method (OLM) as described in the Section 5.1.6 for the commissioning impacts.

The modeling analysis results are shown in Table 5.1E-6. Also included in the table are the maximum background levels that have occurred in the last three years and the resulting total ambient impacts. As shown in Table 5.1E-6, modeled construction impacts due to facility emissions alone for all pollutants are expected to be below the most stringent state and Federal standards.

TABLE 5.1E-6   MODELED MAXIMUM CONSTRUCTION IMPACTS

Pollutant	Averaging Time	Maximum Construction Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standards ($\mu g/m^3$)	Federal Standards ($\mu g/m^3$)
NO_2[a]	1-hour (CA) 1-hour (FD) Annual	255.91 70.49 5.93	75.3 56.4 13.2	331.2 126.9 19.1	339 - 57	- 188 100
SO_2	1-hour 3-hour 24-hour	0.99 0.33 0.069	10.5 10.5 5.2	11.49 10.83 5.27	655 - 105	196 1300 -
CO	1-hour 8-hour	344.06 48.49	4,581 1,260	4,925.0 1,308	23,000 10,000	40,000 10,000
PM10	24-hour Annual[b]	13.11 1.71	118 24.3	131.1 27.3	50 20	150 -
PM2.5	24-hour Annual	2.51 0.56	19 9.6	21.5 10.2	- 12	35 12.0

Notes:

CA California Standard
FD Federal Standard
[a] ARM applied for annual average, using national default 0.75 ratio, and OLM for 1-hour averages.
[b] Annual Arithmetic Mean.

For maximum modeled ambient concentrations when added to background concentrations, standards are only exceeded for the state PM_{10} standards since the background concentrations already exceed the CAAQS. All other maximum modeled construction impacts when added to background concentrations are less than the applicable state or Federal standards. Modeled MREC construction particulate impacts shown are not unusual in comparison to the modeling results for most construction projects; actual impacts for construction sites that use good dust suppression techniques and low-emitting vehicles typically would not be expected to cause exceedances of air quality particulate standards. The input and output modeling files are being provided electronically to the appropriate agencies.

Attachments - Detailed Emission Calculations and Support Data

Table 5.1E-7 Construction Support Data and Emissions Calculations (** Pages)

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Appendix 5.1E, Construction Emissions Support (REDLINED)

APPENDIX 5.1E

Construction Emissions and Impact Analysis

Construction Phases

Construction of MREC is expected to last approximately 23 months. The construction will occur in the following four main phases:

- Mobilization and site preparation;
- Foundation work;
- Construction/installation of major structures; and,
- Installation of major equipment.
- Commissioning

The main site is approximately 9.8 acres in size and is essentially flat. A laydown yard will be located on the main site. The total acreage for purposes of calculating on-site emissions will be approximately 9.8 acres. The site is currently in use as a vehicle salvage/dismantling and transfer yard. The site is currently level, and as such, the site will require only minimum grading and leveling prior to construction of the power block and support systems. Site preparation includes finish grading, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations and structures is expected to begin. Once the foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

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

- Dust entrained during site preparation and finish grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction will result from:

- Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from Diesel-powered welding machines, electric generators, air compressors, and water pumps;
- Exhaust from pickup trucks and Diesel trucks used to transport workers and materials around the construction site;
- Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and,

- Exhaust from automobiles used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Worst-case daily dust emissions are expected to occur during months 2-8 of construction when site preparation occurs. The worst-case daily exhaust emissions are expected to occur during the middle of the construction schedule during the installation of the major mechanical equipment. Annual emissions are based on the average equipment mix during the 23 month construction period.

Available Mitigation Measures

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

- 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 four (4) times during the daily construction activity period. Watering may be reduced or eliminated during periods of precipitation.

- Onsite vehicle speeds will be limited to 5 miles per hour 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 Storm Water Pollution Prevention Plan (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 300 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 (2) 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 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, EPA-ARB Tier 2/Tier 3 engine compliant equipment for equipment over 100 horsepower.

- Insure 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).

Estimation of Emissions with Mitigation Measures

Tables 5.1E-1 through 5.1E-5 show the estimated maximum period, monthly, and daily heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures. Detailed emission calculations are included in Table 5.1E-7, including estimates of PM2.5 and CO2e.

TABLE 5.1E-1 ONSITE CONSTRUCTION EMISSIONS SUMMARY, TONS/PERIOD							
Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	37.59	27.49	5.55	0.08	0.049[1]	0.0484[1]	2155
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Totals	37.59	27.49	5.55	0.08	0.532	0.137	2155

Notes: Construction period is 23 months.

[1] PM10 and PM2.5 based on revised emissions evaluation per CalEEMod2016, 10/25/16, assuming the use of Tier 4 engines on all onsite construction equipment (emissions reported are mitigated values).

Onsite const equipment exhaust, fugitive dust from earth moving activities, cut and fill activity, onsite paved road use, storage pile wind erosion, onsite unpaved road use, and track-out.

TABLE 5.1E-2 ONSITE CONSTRUCTION EMISSIONS SUMMARY, LBS/MONTH (Normalized for 23 months)

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
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Totals	3269	2390	483	7	46.3	11.9	-

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[1] same note as Table 5.1E-1.

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Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	148.6	108.7	21.9	0.32	0.194[1]	0.191[1]	-
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Totals	148.6	108.7	21.9	0.32	2.1	0.54	-

Notes: 23 months @ 22 days/month = 506 days/period

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Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	217.2	145.97	31.53	0.42	0.273[1]	0.270[1]	-
Fugitives	-	-	-	-	2.29	0.426	-
Totals	217.2	145.97	31.53	0.42	2.56	0.70	-

Notes:

Max day for onsite fugitives would be in Phase 2 (Civil Improvements), 2019.

Max day for onsite exhaust would be in Phase 2 (Civil Improvements), 2019.

[1] same note as Table 5.1E-1.

Onsite const equipment exhaust, fugitive dust from earth moving activities, cut and fill activity, onsite paved road use, storage pile wind erosion, onsite unpaved road use, and track-out.

TABLE 5.1E-5 OFFSITE CONSTRUCTION EMISSIONS SUMMARY, TONS/PERIOD

Category	NOx	CO	VOC	SOx	PM10	PM2.5	CO2
Exhaust	3.05	5.98	0.78	0.0154	0.212	0.211	1636
Fugitives	-	-	-	-	0.48	0.08	-

Totals	3.05	5.98	0.78	0.0154	0.692	0.291	1636
Notes: Construction period is 23 months. Delivery and hauling exhaust, const site support vehicle exhaust, worker travel exhaust, worker bus exhaust, offsite paved road fugitives.							

Total CO2e emissions from all construction related activities, both on and off site is estimated to be 8,524 tons per the construction period.

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The emission sources for the construction site were grouped into two categories: exhaust emissions and dust emissions. Combustion equipment exhaust emissions were modeled as eighteen (18) 3.048 meter high point sources (exhaust parameters of 750 Kelvins, 64.681 m/s exit velocity, and 0.1524 meter stack diameter) placed at regular 150-foot intervals around the construction area. Construction fugitive dust emissions were modeled as an area source covering the construction area with an effective plume height of 0.5 meters. Combustion and fugitive emissions were assumed to occur for 10 hours/day (7 AM to 5 PM) consistent with the expected period of onsite construction activities generating both exhaust emissions and fugitive dust. The construction impacts modeling analysis generally used the same receptor locations and meteorological data as used for the project operating impact analysis. Exceptions were that only the 10-meter fenceline and 20-meter downwash receptor grids were modeled since maximum impacts will occur in the immediate project vicinity and the FASTALL option was utilized to minimize runtimes for the area source and the larger number of point sources modeled. A detailed discussion of the receptor locations and meteorological data is included in Section 5.1.6. To determine the construction impacts on short-term ambient standards (24 hours and less), the maximum daily onsite construction emission levels shown in Table 5.1E-4 were used. For pollutants with annual average ambient standards, the normalized monthly emission levels as shown in Table 5.1E-2 were used, multiplied by 12 months/year to derive annual emissions.

Modeling Results

Based on the emission rates of NO_x, SO_2, CO, PM2.5, and PM10, the modeling options, receptor grids, and meteorological data, AERMOD calculates short-term and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NO_x, SO_2, CO, PM2.5, and PM10 spread over the estimated daily hours of operation. The annual impacts are based on the annual emission rates of these pollutants.

The annual average concentrations of NO_2 were computed following the revised USEPA guidance for computing these concentrations (August 9, 1995 Federal Register, 60 FR 40465). The annual average was calculated using the ambient ratio method (ARM) with the national default value of 0.75 for the annual average NO_2/NO_x ratio. The 1-hour NO2 impacts were modeled using the ozone limiting method (OLM) as described in the Section 5.1.6 for the commissioning impacts.

The modeling analysis results are shown in Table 5.1E-6. Also included in the table are the maximum background levels that have occurred in the last three years and the resulting total ambient impacts. As shown in Table 5.1E-6, modeled construction impacts due to facility emissions alone for all pollutants are expected to be below the most stringent state and Federal standards.

TABLE 5.1E-6   MODELED MAXIMUM CONSTRUCTION IMPACTS

Pollutant	Averaging Time	Maximum Construction Impacts (µg/m³)	Background (µg/m³)	Total Impact (µg/m³)	State Standards (µg/m³)	Federal Standards (µg/m³)
NO_2[a]	1-hour (CA) 1-hour (FD) Annual	198.0255.91 70.495.1 5.936.6	75.3107.2 60.256.4 13.2	331.205.2 126.935.3 19.18	339 - 57	- 188 100
SO_2	1-hour 3-hour 24-hour	0.9977 0.330 0.06911	10.5 10.5 5.2	11.4927 10.830 5.2731	655 - 105	196 1300 -
CO	1-hour 8-hour	268.0344.06 48.4964.7	4,581 1,260	4,925.0849 1,30825	23,000 10,000	40,000 10,000
PM10	24-hour Annual[b]	13.110.1 1.671	11857 24.3	131.167 27.36	50 20	150 -
PM2.5	24-hour Annual	2.5173 0.590.56	198 9.64	21.5 10.2	- 12	35 12.0

Notes:

CA California Standard
FD Federal Standard
[a] ARM applied for annual average, using national default 0.75 ratio, and OLM for 1-hour averages.
[b] Annual Arithmetic Mean.

For maximum modeled ambient concentrations when added to background concentrations, standards are only exceeded for the state PM_{10} standards since the background concentrations already exceed the CAAQS. All other maximum modeled construction impacts when added to background concentrations are less than the applicable state or Federal standards. Modeled MREC construction particulate impacts shown are not unusual in comparison to the modeling results for most construction projects; actual impacts for construction sites that use good dust suppression techniques and low-emitting vehicles typically would not be expected to cause exceedances of air quality particulate standards. The input and output modeling files are being provided electronically to the appropriate agencies.

Attachments - Detailed Emission Calculations and Support Data

Table 5.1E-7 Construction Support Data and Emissions Calculations (** Pages)