

4.1 Air Quality

The air quality section of this Environmental Impact Report (EIR) considers construction- and operation-related emissions, greenhouse gas emissions, and odors that could result from the Whittier Main Oil Field proposed Project (proposed Project). Emission rates were generated using standard emission factors and the urban emissions (URBEMIS version 9.2.4) modeling program as applicable. The emission calculations are included in Appendix B, Air Emissions Calculations. The proposed Project would include site grading and earth moving, construction, and oil and gas operations; some of these activities would occur daily and others would occur only once. This analysis attempts to provide a reasonable worst-case scenario of potential air emissions from construction and daily operations, and then recommends mitigation to reduce those impacts to a less than significant level.

4.1.1 Environmental Setting

The proposed Project is within the jurisdiction of the South Coast Air Quality Management District (SCAQMD), which encompasses 10,473 square miles, including the four-county South Coast Air Basin (the Basin) and the Riverside County portions of the Salton Sea Air Basin and the Mojave Desert Air Basin. The Basin, a subarea of SCAQMD jurisdiction, is bound by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The 6,745-square-mile Basin includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties.

4.1.1.1 Meteorological Conditions

The climate in the Basin is characterized by sparse winter rainfall and hot summers tempered by cool ocean breezes. During the summer months, a warm air mass frequently descends over the cool, moist marine layer produced by the interaction between the ocean's surface and the lowest layer of the atmosphere.

The warm upper layer forms a cap, or inversion, over the cool marine layer and inhibits pollutants released into the marine layer from dispersing upward. In addition, light winds during summer further limit dispersion.

Finally, sunlight triggers the photochemical reactions that produce ozone, and this region experiences more days of sunlight than many other major urban areas in the nation.

Table 4.1-1 summarizes historical meteorological conditions in the Basin. Data readings were taken at the National Oceanic and Atmospheric Administration (NOAA) weather station at Los Angeles International Airport from 2001 until 2006.

Temperature and Rainfall

Temperature affects air quality in the region in several ways. Local winds are the result of temperature differences between the relatively stable ocean air and the uneven heating and cooling in the Basin from a wide variation in topography. Mean wind speed in the Basin is 7.5 miles per hour (mph). Temperature also significantly affects vertical mixing height and chemical and photochemical reaction times. Annual average temperatures throughout the Basin range from the low 40s in degrees Fahrenheit (°F) to the high 90s in °F. The coastal areas show little variation in temperature on a year-round basis due to the moderating effect of the marine influence. On average, September is the warmest month, while December and January are the coolest months of the year. Annual rainfall varies from a low of 5 inches to a high of 19 inches.

Table 4.1-1 Historical Meteorological Data

Element	Average	Range
Highest temperature	93°F	84-101°F
Lowest temperature	40°F	36-43°F
Average temperature	58°F	55-63°F
Mean relative humidity	76%	75-77%
Days with heavy fog (visibility ≤ 0.25 miles)	25	15-35
Days with thunderstorms	3	0-10
Mean wind speed	7 mph	6.4-7.5 mph
Total precipitation	13.1 inches	5.03-18.8 inches
Snow, ice pellets, hail	None	None

Notes: F = Fahrenheit, mph = miles per hour.

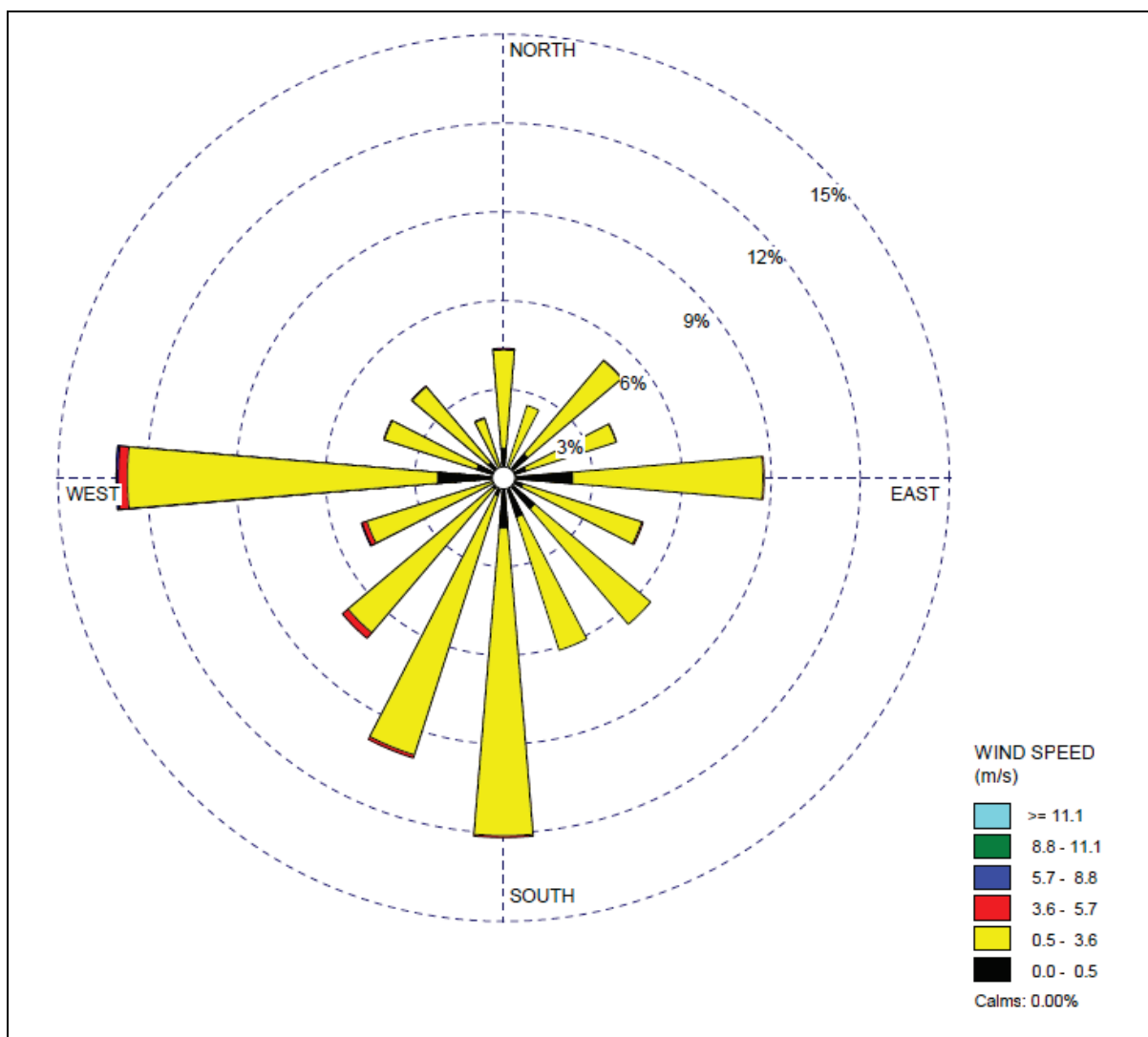
Data from 2007 and 2008 are not readily available from NOAA.

Source: NOAA 2001-2006

Wind Flow Patterns

Wind flow patterns play an important role in transporting air pollutants in the Basin. The winds flow from off shore and blow eastward during daytime hours. In summer, the sea breeze starts in mid-morning, peaking at 10 to 15 mph, and subsides after sundown. There is a calm period until approximately midnight. Then, the land breeze begins from the northwest, typically becoming calm again around sunrise. In winter, wind flows in the same general patterns except that summer wind speeds are slightly higher on average than winter wind speeds. This low wind-speed pattern is a major contributor to pollutant accumulation in the Basin. Normal wind patterns in the Basin are interrupted by unstable air accompanying passing storms during winter and infrequent strong northeasterly Santa Ana wind flows from the mountains and deserts north of the Basin. Figure 4.1-1 shows a wind rose for the Whittier meteorological station at Colima Road and Leffingwell Avenue. A wind rose is a graphic representation of wind conditions (speed and direction) at a specific location.

Figure 4.1-1 Wind Rose for Whittier Meteorological Station



Notes: Rose denotes which direction wind is blowing from.

Source: SCAQMD

4.1.1.2 Existing Air Quality

The SCAQMD is responsible for ensuring satisfaction and maintenance of state and federal ambient air quality standards within its geographical jurisdiction. California and the federal government established health-based air quality standards for the following criteria air pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter less than 10 micrometers in diameter (PM₁₀), particulate matter less than 2.5 micrometers in diameter (PM_{2.5}), sulfur dioxide (SO₂), and lead. These standards were established to protect sensitive receptors within a margin of safety from adverse health impacts due to exposure to air pollution.

In most cases, the California standards are more stringent than the federal standards. California also established standards for sulfate, visibility, hydrogen sulfide, and vinyl chloride. Table 4.1-2 summarizes state and national ambient air quality standards (NAAQS) for each of these pollutants and their effects on health. The SCAQMD monitors levels of the aforementioned criteria pollutants at 34 monitoring stations throughout the Basin. Table 4.1-3 presents air quality data from the South San Gabriel Valley (Area 11) monitoring station in the SCAQMD, which is the closest monitoring station to the Project area.

Carbon Monoxide

CO is a colorless and odorless gas formed by the incomplete combustion of fossil fuels. CO competes with oxygen, often replacing it in the blood, and reduce the blood's ability to transport oxygen to vital organs in the body. The ambient air quality standard for CO aims to protect persons whose medical condition already compromises the ability of their circulatory system to deliver oxygen.

CO was monitored at 25 locations in the district in 2008 (the most recent data available) and no location exceeded the federal or state 8-hour CO standards. The highest 8-hour average CO concentration of the year was 4.3 parts per million (ppm), measured at Source/Receptor Area Number 12, South Central Los Angeles County (Station Number 084). The maximum 1-hour CO concentration was 7 ppm in Riverside. No area within the district has exceeded the NAAQS since 2003.

There were no exceedances of the CO standards in 2008 at the monitoring station closest to the Project area (see Table 4.1-3).

Nitrogen Dioxide

NO₂ is a brownish gas that is formed in the atmosphere through a rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. NO is primarily formed by combustion. NO and NO₂ are collectively referred to as nitrogen oxides (NO_x). NO₂ can cause respiratory irritation and airway constriction, making breathing difficult.

In 2008 the SCAQMD monitored NO₂ levels at 26 stations and the maximum annual arithmetic mean measured was 0.0302 ppm in Area 10 (Pomona/Walnut Valley). The maximum 1-hour level was 0.13 ppm in South Coast Los Angeles. The 1-hour state standard (i.e., 0.18 ppm) was not exceeded in 2008. The district is classified as in attainment for both the state and national Ambient Air Quality Standards (AAQS). There were no exceedances of the NO₂ standards in 2008 at the monitoring station closest to the Project Site (see Table 4.1-3).

Sulfur Dioxide

SO₂ is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. Health effects of SO₂ inhalation include acute respiratory symptoms and breathing difficulty. In 2008, seven locations monitored SO₂ levels and neither the state nor the federal standards were exceeded.

Table 4.1-2 State and National Ambient Air Quality Standards

Air Pollutant	State Standard (concentration/averaging time)	National Primary Standard (concentration/averaging time)	Most Relevant Effects
Ozone (O ₃)	0.09 ppm, 1-hour average > 0.070 ppm, 8-hour	0.075 ppm, 8-hour average*	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage.
Carbon Monoxide (CO)	20 ppm, 1-hour average > 9.0 ppm, 8-hour average >	35 ppm, 1-hour average > 9 ppm, 8-hour average >	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses.
Nitrogen Dioxide (NO ₂)	0.18 ppm, 1-hour average, 0.03 ppm annual average >	0.053 ppm, annual arithmetic mean > 0.100 ppm hourly **	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration.
Sulfur Dioxide (SO ₂)	0.25 ppm, 1-hour average > 0.04 ppm, 24-hour average >	75 ppb 1 hour*** 0.5 ppm 3 hour 0.14 ppm, 24-hour average > 0.030 ppm, annual arithmetic mean >	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma.
Suspended Particulate Matter (PM ₁₀)	50 µg/m ³ , 24-hour average > 20 µg/m ³ , annual arithmetic mean >	150 µg/m ³ , 24-hour average >	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Excess seasonal declines in pulmonary function, especially in children.
Suspended Particulate Matter (PM _{2.5})	12 µg/m ³ , annual arithmetic mean >	35 µg/m ³ , 24-hour average > 15 µg/m ³ , annual arithmetic mean >	Decreased lung function from exposures and exacerbation of symptoms in sensitive patients with respiratory disease; elderly; children.

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Air Pollutant	State Standard (concentration/ averaging time)	National Primary Standard (concentration/ averaging time)	Most Relevant Effects
Sulfates	25 µg/m ³ , 24-hour average >=	No federal standard	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage due to corrosion..
Lead	1.5 µg/m ³ , 30-day average >=	1.5 µg/m ³ , calendar quarter > 0.15 µg/m ³ , rolling 3 month >	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction.
Visibility-Reducing Particles	In sufficient amount to give an extinction coefficient of 0.23 per kilometers (visual range of 10 miles or more) with relative humidity less than 70%, 8-hour average (10 a.m. – 6 p.m. Pacific Standard Time)	No federal standard	Nephelometry and airborne instrumentation system-internal tape sampler; instrumental measurement on days when relative humidity is less than 70%.
Hydrogen Sulfide	0.03 ppm, 1-hour average >	No federal standard	Odor annoyance.
Vinyl Chloride	0.01 ppm, 24-hour average >	No federal standard	Known carcinogen.

Note: µg/m³ = micrograms per cubic meter

* Effective May 27, 2008; previous standard was 0.08 ppm

** To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010)

*** Based on the 3-year average of the annual 99th percentile of 1-hour daily maximum. In addition, the EPA revoked both the existing 24-hour SO₂ standard of 0.14 ppm and the annual primary SO₂ standard of 0.030 ppm effective August 23, 2010.

Based on CARB listings as of 8/3/2010

Table 4.1-3 SCAQMD Air Quality Data for South San Gabriel Valley Sub-Region (Project Area)

Constituent	2004	2005	2006	2007	2008
Ozone					
1-hour (ppm) max level	0.104	0.077	0.130	0.135	0.107
Federal Standard	(0)	(0)	(1)	(2)	NA
State Standard	(7)	(0)	(9)	(6)	(7)
8-hour (ppm) max level	0.084	0.065	0.095	0.100	0.093
Federal Standard	(0)	(0)	(3)	(2)	(5)
State Standard	(7)	(0)	(5)	(9)	(13)
Carbon Monoxide					
1-hour (ppm) max level	5.0	3.0	3.0	5.0	3.0
8-hour (ppm) max level	3.6	2.4	2.7	2.9	2.1
Federal Standard	(0)	(0)	(0)	(0)	(0)
State Standard	(0)	(0)	(0)	(0)	(0)
Nitrogen Dioxide					
1-hour (ppm) max level	0.12 (0)	0.09 (0)	0.10 (0)	0.11	0.10
Annual (ppm)	0.0305	0.0308	0.06	0.0249	0.0263
PM_{2.5}					
24-hour (ug/m ³) max level	60.7	58.2	72.2	63.6	47.3
Federal Standard	(0%)	(0%)	(6%)	(5%)	(3.5%)
Annual Arithmetic Mean	19.9	17.0	16.7	16.7	15.0
Lead					
30-day (ug/m ³)	0.03 (0)	0.03 (0)	0.03 (0)	0.05	0.02
Quarter (ug/m ³)	0.02 (0)	0.03 (0)	0.02 (0)	0.02	0.02
Sulfate					
24-hour (ug/m ³) max level	12.4 (0%)	9.9 (0%)	28.6 (1.7%)	25.4 (1.7%)	10.1 (0%)

Notes: ppm = parts per million; (x) = number of days or percent of samples exceeding the standard; -- = not monitored; ug/m³ = micrograms per cubic meter; * = Less than 12 full months of data; so data may not be representative. NA = no longer applicable

* Revised federal standard for PM_{2.5} from 65 to 35 effective December 2006.

PM₁₀ and Sulfur Dioxide are not monitored at this location.

Source: SCAQMD 2004-2008

Particulate Matter 10

PM₁₀ is the coarse fraction of suspended particulate matter measuring 10 microns or less in diameter and includes a complex mixture of man-made and natural substances including sulfates, nitrates, metals, elemental carbon, sea salt, soil, organics, and other materials. Particulate matter is produced by wind-blown dust, combustion of wood or other fuels, and a range of other activities, both anthropogenic and natural, that produce dust or particulates. PM₁₀ may have adverse health impacts because these microscopic particles penetrate into the respiratory system. In some cases, the particulates themselves may cause actual damage to the alveoli of the lungs or they may contain injurious absorbed substances.

In 2008, PM₁₀ was monitored at 21 locations in the district. There were no exceedances of the federal 24-hour standard (i.e., 150 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$]), while the state 24-hour

standard (i.e., $50 \mu\text{g}/\text{m}^3$) was exceeded at all but three monitored locations. PM_{10} is not monitored at the monitoring station closest to the Project Site (see Table 4.1-3).

Particulate Matter 2.5

The $\text{PM}_{2.5}$ standard is a subset of the PM_{10} standard. In addition to the health effects of PM_{10} , $\text{PM}_{2.5}$ exposure may also cause increased respiratory symptoms, disease, and decreased lung functions.

In 2008, $\text{PM}_{2.5}$ was monitored at 20 locations in the district. The federal 24-hour standard (i.e., $35 \mu\text{g}/\text{m}^3$) was exceeded at 18 locations (the federal standard was lowered in 2006). The federal annual standard (i.e., annual arithmetic mean greater than $15 \mu\text{g}/\text{m}^3$) was exceeded at seven locations, and the state annual standard (i.e., annual arithmetic mean greater than $12 \mu\text{g}/\text{m}^3$) was exceeded at 15 locations.

In 2008, at the monitoring station closest to the Project Site, 3.5 percent of the $\text{PM}_{2.5}$ samples exceeded the federal standards (see Table 4.1-3).

Lead

In 2008, lead was monitored at 10 locations in the district. No location in the Basin exceeded the federal quarterly average ($>1.5 \mu\text{g}/\text{m}^3$) or the state monthly average ($\geq 1.5 \mu\text{g}/\text{m}^3$) standards. There have been no violations of any lead standard in the district since 1982, although there were some localized exceedances of the state standard at special monitoring stations in 1991 and 1994.

Sulfates

Sulfates, or SO_x , are a group of chemical compounds containing the sulfate group, which is a sulfur atom with four oxygen atoms attached. Combustion is the primary source of sulfates. In 2008, sulfates were monitored at 14 locations in the district. The 24-hour state sulfate standard (of $25 \mu\text{g}/\text{m}^3$) was not exceeded at any of these locations. There are no federal air quality standards for sulfates.

Volatile Organic Compounds

Since volatile organic compounds (VOC) are not classified as criteria pollutants, there are no state or national ambient air quality standards for these compounds. VOC are regulated, however, because limiting VOC emissions reduces the rate of photochemical reactions that contribute to the formation of ozone. As a precursor to ozone, VOC contribute to regional air quality impacts. In addition, VOC also transform into organic aerosols in the atmosphere, contributing to higher PM_{10} and lower visibility levels. Although health-based standards have not been established for VOC, health effects can occur from exposures to high concentrations of VOC because of interference with oxygen uptake. VOC are produced by combustion, consumer products, and leaking hydrocarbons from a range of industrial processes.

Ozone

In addition to primary criteria pollutants, the SCAQMD monitors ozone at various locations throughout the district. Unlike primary criteria pollutants emitted directly from an emissions source, ozone is a secondary pollutant. Ozone is formed in the atmosphere through the photochemical reaction of sunlight with VOC, NO_x, oxygen, and other hydrocarbon materials.

Ozone is a deep lung irritant, causing inflammation and swelling of lung passages. Exposure to ozone alters respiration, typically causing shallow, rapid breathing and decreasing pulmonary performance. Ozone reduces the respiratory system's ability to fight infection and to remove foreign particles.

Ozone levels were monitored at 29 locations in 2008. Maximum 1-hour and 8-hour average ozone concentrations in 2008 were 0.176 ppm and 0.131 ppm, respectively. Ozone concentrations exceeded the 1-hour state standard at all but four of the monitored locations.

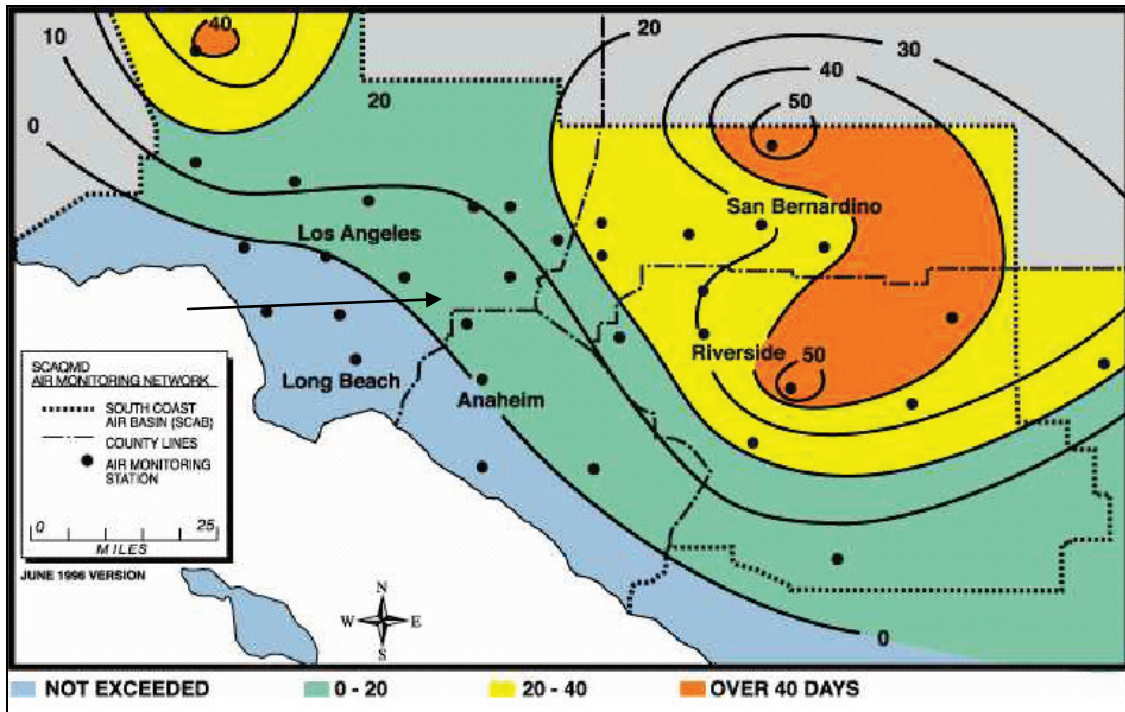
In 2008 the federal 1-hour ozone standard was phased out and only the 8-hour federal standard remained. At the monitoring station closest to the Project Site there were seven exceedances of the state 1-hour ozone standard (see Table 4.1-3). There were five exceedances of the federal 8-hour ozone standard at the monitoring station closest to the Project Site and there were 13 exceedances of the state 8-hour ozone standard in 2007 (see Table 4.1-3).

In 2006, the SCAQMD published its most recent air quality trends and compliance report, which figuratively shows air quality for selected pollutants compared to the standards. Figures 4.1-2 through 4.1-4 show the extent of ozone and particulate levels in the Basin for 2006. Note that most of the standards violations occurred inland from the Project Site. However, due to the movement of pollutants and the meteorology of the Basin, air pollution from sources within the entire Basin contributes to the air quality exceedances in the inland areas.

Toxic Emissions

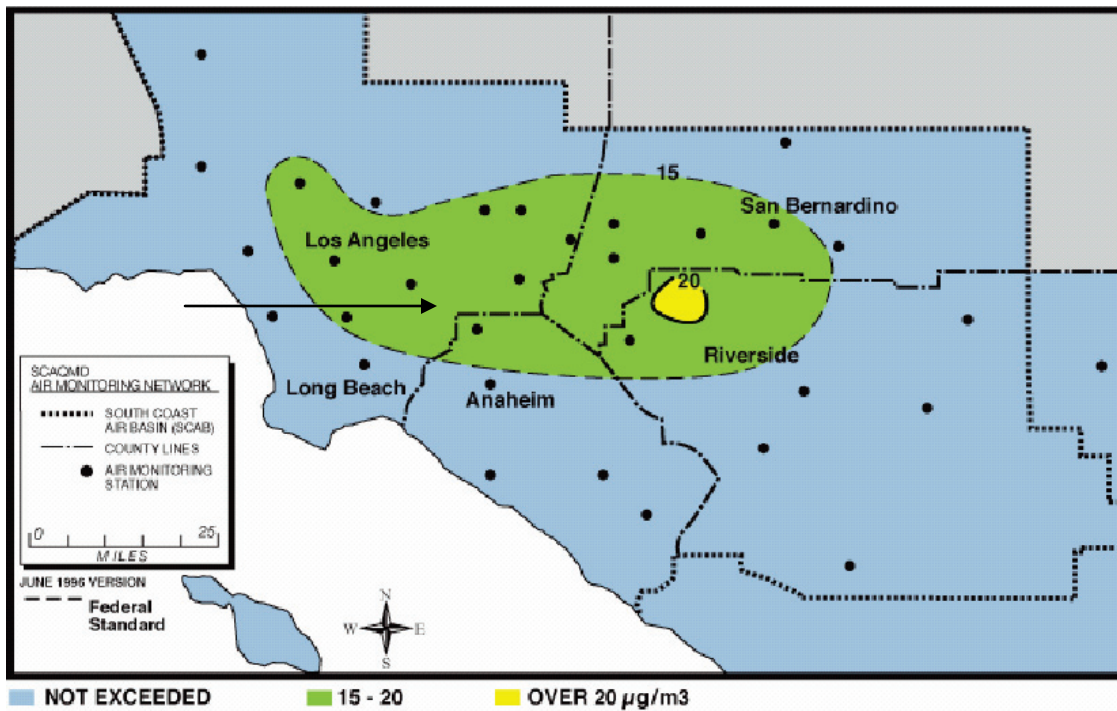
In 1998, the California Air Resources Board (CARB) identified particulate matter from diesel-fueled engines as a toxic air contaminant. Subsequent to this determination, the SCAQMD initiated an urban toxic air pollution study, Multiple Air Toxics Exposure Study (MATES). The MATES III program is a monitoring and evaluation study conducted in the Basin by the SCAQMD (2008). MATES III includes a monitoring program, utilizing both fixed and mobile monitoring stations, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize risk across the South Coast Air Basin. The study focused on the carcinogenic risk from exposure to air toxics.

Figure 4.1-2 Ozone – Number of Days Exceeding Federal 8-Hour Standard 2006

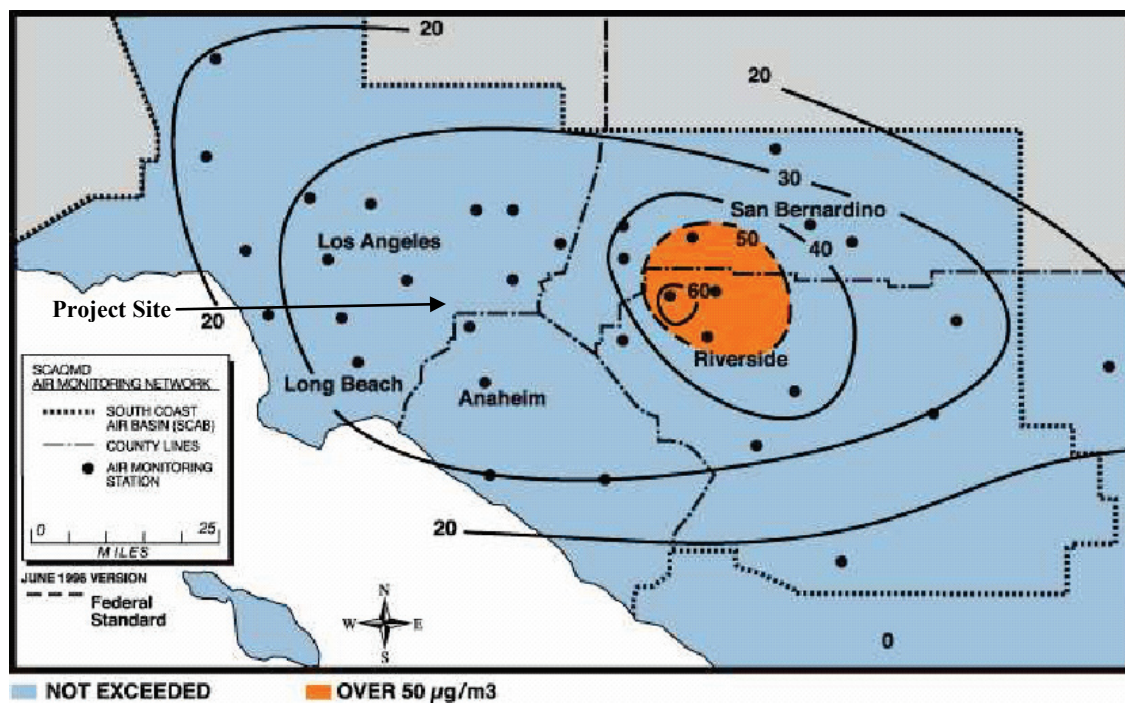


Source: SCAQMD 2006

Figure 4.1-3 PM_{2.5} – Arithmetic Mean Values 2006



Source: SCAQMD 2006

Figure 4.1-4 PM_{10} – Arithmetic Mean Values 2006

Source: SCAQMD 2006

The carcinogenic risk from air toxics in the South Coast Air Basin, based on the average concentrations at the MATES fixed-monitoring sites (the closest to Project Site is the Pico Rivera site at 3713 San Gabriel River Parkway near Interstate 605), is approximately 1,200 excess cancer cases per million. This risk refers to the expected number of additional cancer cases in a population of one million individuals exposed over a 70-year lifetime. The risk at the fixed monitoring sites ranged from 870 to 1,400 cases per million (approximately 1,200 per million at Pico Rivera). For comparison purposes, the SCAQMD considers the risk of a project to be significant if the carcinogenic risk exceeds 10 excess cancer cases per million.

Thus, the study concluded that the baseline carcinogenic risk from routine exposure to air toxics in the Basin is substantial. Diesel particulate matter (DPM) accounted for more than 70 percent of the cancer risk.

MATES III identified risks in the vicinity of the Project Site due to nearby roadways, freeways (e.g., State Route 60, Interstate 605), and fixed facilities located in the SCAQMD emissions databases. These risks are 810 cancer cases per million at the Project Site.

The SCAQMD published guidelines for the analysis of diesel emissions from various mobile source categories (SCAQMD 2003). The guidelines specify analyzing sources such as truck idling and movements associated with truck stops, warehouse distribution centers or transit centers, ship hoteling at ports, and train idling. The emphasis of the guidelines is on operational emissions of DPM.

4.1.1.3 Climate Change

This subsection discusses the baseline conditions of climate change and greenhouse gas emissions.

The California legislature concluded that global climate change poses significant adverse effects to the environment of the State and the world (Assembly Bill [AB] 32, the California Global Warming Solutions Act of 2006). In addition, the global scientific community has expressed a high confidence that climate change is anthropogenic (i.e., caused by humans) and that climate change could lead to adverse changes around the globe (IPCC 2007a). Consequently, the following sections analyze potential climate change emissions that may occur while implementing the proposed Project.

Global climate change is a change in the average weather of the earth, measured by wind patterns, storms, precipitation, and temperature. Historical records show that temperature changes have occurred in the past, such as during previous ice ages. Some data indicate that the current temperature record differs from previous climate changes in rate and magnitude (AEP 2007).

Global climate change caused by greenhouse gases (GHG) is currently one of the most widely debated scientific, economic, and political issues in the United States. Many groups agree with the conclusions of the IPCC and the CARB, but many groups feel the work is lacking. However, in terms of CEQA analysis, jurisdictions, such as the SCAQMD, have developed significance criteria and directed CEQA documents to analyze emissions of GHG.

Climate Change Background

GHG include any gas that absorbs infrared radiation in the atmosphere. GHG include, but are not limited to, water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorocarbons. The warming potential of different types of greenhouse gases varies. The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere. Since greenhouse gases absorb different amounts of heat, a common reference gas, CO₂, is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as CO₂ equivalent, or CO₂e. CO₂e is the amount of greenhouse gas emitted multiplied by the global warming potential. The global warming potential of CO₂ is therefore defined as one. Methane has a global warming potential of 21; therefore, 1 pound of methane produce 21 pounds of CO₂e.

GHG lead to the trapping and buildup of heat in the atmosphere near the earth's surface, commonly known as the greenhouse effect. The accumulation of GHG in the atmosphere regulates the earth's temperature. Without natural GHG, the earth's surface would be cooler (CARB 2006b). Emissions from human activities, such as electricity production and vehicle operation, have increased the emissions of these gases into the atmosphere. Emissions of GHG in excess of natural ambient concentrations are thought to be responsible for the enhancement of the greenhouse effect and to contribute to climate change, a trend of unnatural warming of the earth's natural climate. Unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern, GHG are global pollutants and climate change is a global issue.

Climate changes could lead to various changes in weather and rainfall patterns over time. According to CARB, potential climate change impacts in California may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CARB 2006b, 2007b). Several recent studies have explored the possible negative consequences of climate change in California. These reports acknowledge that climate scientists' understanding of the complex global climate system and the interplay of the various internal and external factors that affect climate change remain too limited to yield scientifically valid conclusions on such a localized scale. Substantial work at the national and international level has evaluated climatic impacts, but far less information is available on regional and local impacts. In addition, projecting regional impacts of climate change and variability relies on large-scale scenarios of changing climate parameters, using information that is typically at too coarse a scale to accurately assess regional impacts (Kiparsky 2003).

The following example illustrates the difficulty of analyzing climate change on a regional or local level. Climate change modeling consistently predicts increasing temperatures; however, the ways that increasing temperatures will affect precipitation is not well understood. Studies have found "considerable uncertainty about precise impacts of climate change on California hydrology and water resources will remain until we have more precise and consistent information about how precipitation patterns, timing, and intensity will change" (Kiparsky 2003).

Even assuming that climate change leads to long-term increases in precipitation, climate change impact analysis is further complicated because no studies have identified or quantified the runoff impacts in particular watersheds of an increase in precipitation. Also, little is known about the effects on groundwater recharge and water quality. Higher rainfall could lead to greater groundwater recharge, although reductions in spring runoff and higher evapotranspiration could reduce the amount of water available for recharge (Kiparsky 2003). The Department of Water Resources and the California Energy Commission have also noted the uncertain effect of climate change on water supply. In light of this dearth of accurate scientific information, analyzing the potential impacts a project would have on the regional or local environment is inherently complicated and only limited conclusions can be drawn. Therefore, the analysis conducted in this report quantifies the GHG emissions levels but does not attempt to predict actual impacts associated with these emissions.

Types of Greenhouse Gasses

Water vapor is the most abundant and variable greenhouse gas in the atmosphere. It is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Evaporation from the oceans is the main source of water vapor (approximately 85%). Other sources include evaporation from other water bodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves (AEP 2007).

Carbon dioxide is an odorless, colorless greenhouse gas. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanoes. Anthropogenic sources of carbon dioxide include burning fuels, such as coal, oil, natural gas, and wood. The interaction of anthropogenic sources and natural sources of GHG and how they contribute to the atmospheric levels of GHG is a complex issue. Current

concentrations of CO₂ in the atmosphere are approximately 379 ppm; some say that concentrations may increase to 1,130 CO₂e ppm by 2100 as a direct result of anthropogenic sources (IPCC 2007). Some predict that this will result in an average global temperature rise of at least 7.2°F (IPCC 2007).

Methane, a gas, is the main component of natural gas used in homes. It has a global warming potential of approximately 21. Decaying organic matter is a natural source of methane. Other natural sources include decaying organic material in landfills, fermentation of manure, and cattle. Geological deposits known as natural gas fields contain methane, which is extracted for fuel.

Nitrous oxide (N₂O), also known as laughing gas, is a colorless gas with a global warming potential of approximately 310. Nitrous oxide is produced by microbial processes in soil and water, including reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (e.g., nylon production, nitric acid production) also emit N₂O. Nitrous oxide is used in rocket engines, as an aerosol spray propellant, and in race cars. During combustion, NO_x (NO_x is a generic term for mono-nitrogen oxides, NO and NO₂) is produced as a criteria pollutant and is not the same as N₂O. Very small quantities of N₂O may be formed during fuel combustion by the reaction of nitrogen and oxygen (API 2004).

Chlorofluorocarbons are synthetic gases formed by replacing all hydrogen atoms in methane or ethane with chlorine or fluorine atoms. Chlorofluorocarbons are nontoxic, nonflammable, insoluble, and chemically nonreactive in the troposphere (the level of air at the earth's surface). Chlorofluorocarbons were first synthesized in 1928 as refrigerants, aerosol propellants, and cleaning solvents. However, they destroy stratospheric ozone and the Montreal Protocol stopped their production in the 1990s. Fluorocarbons have a global warming potential between 140 and 11,700, with HFC-152a at the low end and HFC-23 at the higher end.

Sulfur hexafluoride (SF₆) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. Its global warming potential of 23,900 is the highest of any gas. Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Table 4.1-4 shows a range of gasses that contribute to greenhouse gas warming with their associated global warming potential. The table also shows their estimated lifetime in the atmosphere and the range in global warming potential over 20, 100, and 500 years.

Although ozone is a GHG, unlike the other GHG, ozone in the troposphere is relatively short-lived and therefore is not global in nature. According to CARB, it is difficult to determine accurately the contribution of ozone precursors (NO_x and VOC) to global climate change (CARB 2006b).

Table 4.1-4 Global Warming Potential of Various Gasses

Gas	Life in the Atmosphere (years)	20-year GWP (average)	100-year GWP (average)	500-year GWP (average)
Carbon Dioxide	50-200	1	1	1
Methane	12	21	56	6.5
Nitrous Oxide	120	310	280	170
HFC-23	264	11,700	9,100	9,800
HFC-125	32.6	2,800	4,600	920
HFC-134a	14.6	1,300	3,400	420
HFC-143a	48.3	3,800	5,000	1,400
HFC-152a	1.5	140	460	42
HFC-227ea	36.5	2,900	4,300	950
HFC-236fa	209	6,300	5,100	4,700
HFC-4310mee	17.1	1,300	3,000	400
CF ₄	50,000	6,500	4,400	10,000
C ₂ F ₆	10,000	9,200	6,200	14,000
C ₄ F ₁₀	2,600	7,000	4,800	10,100
C ₆ F ₁₄	3,200	7,400	5,000	10,700
SF ₆	3,200	23,900	16,300	34,900

Note: GWP = global warming potential

Source: EPA 2007

Calculation of Greenhouse Gas Emissions

The quantification of GHG emissions associated with a project can be complex and relies on a number of assumptions. GHG emissions are global because emissions from one location could affect the entire planet and are not limited to local impacts. Therefore, a “lifecycle” type of analysis is necessary to evaluate fairly the greenhouse gas emissions associated with the entire raw material to end use cycle and the project’s impact on the cycle.

Greenhouse gas emissions are generally classified as direct and indirect. Direct emissions are associated with the production of greenhouse gas emissions at the facility site. These include the combustion of natural gas in heaters or stoves, the combustion of fuel in engines and construction vehicles, and fugitive emissions from valves and connections, which include methane as a component.

Indirect emissions include the emissions from vehicles (both gasoline and diesel) delivering materials and equipment to the site and the use of electricity. Electricity produces GHG emissions because fossil fuels generate some electricity.

This report utilizes the California Climate Action Registry General Reporting Protocol and the CARB Compendium of Emission Factors and Methods to Support Mandatory Reporting of

Greenhouse Gas Emissions as methods to calculate GHG emissions (CCAR 2009, CARB 2007c).

To quantify the emissions associated with electrical generation, the resource mix for a particular area must be determined. The resource mix is the proportion of electricity generated from different sources. Electricity generated from coal or oil combustion produces greater greenhouse gas emissions than electricity generated from natural gas combustion because of the higher carbon content of coal and oil. Electricity generated from wind turbines, hydroelectric dams, or nuclear power is assigned zero greenhouse gas emissions. Although these sources have some greenhouse gas emissions associated with the manufacture of the wind generators, the mining and enrichment of uranium, and the displacement of forest areas for reservoirs, these emissions are not included in the lifecycle analysis because they are assumed to be relatively small compared to the electricity generated. For example, estimates of nuclear power greenhouse gas emissions associated with uranium mining and enrichment range up to approximately 60 pounds per megawatt hour (lb/MWh), or approximately 5 percent of natural gas turbine greenhouse gas emissions (Canada 1998).

Detailed information on the power generation plants, their contribution to area electricity resource mix, and their associated emissions have been developed by the Environmental Protection Agency (EPA) in the Emissions & Generation Resource Integrated Database (eGRID). This analysis used the most recent version of eGRID, released in April 2007 (EPA 2007a). eGRID is developed from a variety of data collected by the EPA, the Energy Information Administration, and the Federal Energy Regulatory Commission.

eGRID includes electricity generated from coal, gas, oil, biomass (e.g., wood, paper, agricultural byproducts, landfill gas, digester gas), nuclear, hydroelectric, geothermal, solar, wind, and other fossil fuels (e.g., solid waste, tire-derived fuel, hydrogen, methanol, coke gas). Each of these is assigned criteria, as well as greenhouse gas emission levels, based on facility specifics. Nuclear, hydroelectric, wind, geothermal, biomass, and solar are assigned zero greenhouse gas emissions. eGRID assigns zero CO₂ emissions to generation from the combustion of all biomass because these organic materials would otherwise release CO₂ (or other greenhouse gases) into the atmosphere through natural decomposition. The other fuels are assigned greenhouse gas emissions levels based on the fuel carbon content.

This report analyzed the eGRID database to assign a greenhouse gas emissions level to electricity generated for the operations. Table 4.1-5 shows the resource mix and estimated greenhouse gas emissions for a range of areas. Approximately half of the electricity in the US is generated from coal, producing a US greenhouse gas emissions level of about 1,363 lb/MWh. The greenhouse gas emissions rate is lower in western states, primarily because of increased use of hydroelectric and gas. The California Independent Service Operator (CalISO) area (which includes some generation outside of California) has a low greenhouse gas emission rate of approximately 687 lb/MWh due to the use of hydroelectric, nuclear, and renewable energy sources (see Table 4.1-5).

Table 4.1-5 Electricity Generation Resource Mix and Greenhouse Gas Emissions

Resource Mix ^a	United States	Western States (WECC)	CalISO Service Area	SCE Service Area ^b	LA DWP Service Area ^c
Coal	50.2	34.2	1.2	1.7	62.6
Oil	3.0	0.5	1.2	0.9	0.0
Gas	17.4	26.3	51.1	41.9	33.1
Nuclear	20.0	9.9	16.8	38.0	0.0
Hydro	6.6	24.3	17.3	4.7	4.2
Biomass	1.4	1.3	3.2	2.9	0.0
Wind	0.3	0.9	2.4	3.8	0.0
Solar	0.0	0.1	0.3	0.8	0.0
Geo	0.3	2.0	5.5	4.1	0.0
Other Fossil	0.5	0.3	0.9	1.2	0.0
Other	0.1	0.0	0.0	0.0	0.0
Non-Renewables	91.3	71.3	71.3	83.7	95.8
Renewables	8.7	28.7	28.7	16.3	4.2
Non-Hydro Renewables	2.1	4.3	11.4	11.6	0.0
CO ₂ Rate, lb/MWh	1363	1107	687	613	1,844

Notes: a. Resource Mix is the percentage of total mega-watt hours.

b. The Southern California Edison (SCE) Service Area includes 75% of the power generated from the San Onofre Nuclear Generating Station and all the power generated from the geothermal plants in Nevada and hydroelectric plants in Sierra Nevada, San Bernardino, and Los Angeles.

c. Los Angeles Department of Water & Power (LA DWP) Service Area rates include the coal plant in Utah (Intermountain Power Project).

The Mohave Generating Station is not included in CalISO or SCE Service Areas because it shut down in 2005.

Source: eGRID database with modifications and updates

The Southern California Edison (SCE) greenhouse gas emission rate is lower than the CalISO average due to SCE's reliance on the San Onofre Nuclear Generating Station. The SCE Service Area includes partial use of electricity from the San Onofre Nuclear Generating Station, the use of hydroelectric plants in San Bernardino County and the Sierra Nevada, and the use of geothermal plants in Nevada. The SCE Tehachapi Renewable Transmission Project is planned to increase the amount of electricity provided by non-fossil fuel generation sources and in the future the greenhouse gas emission rate will be lower than it is today. Since the Mohave Generating Station shut down in 2005, it was removed from the eGRID database and calculations.

The greenhouse gas emission rate from CalISO electricity is approximately 45 percent less than the rate associated with direct natural gas combustion due to the electricity resource mix including resources that do not create greenhouse gas emissions (e.g., hydroelectric, nuclear, renewables).

Indirect greenhouse gas emissions are also associated with water use since electricity is required to pump and treat water that would be used at the proposed Project Site. Case studies documented by the EPA demonstrate that water treatment plants, in combination with the

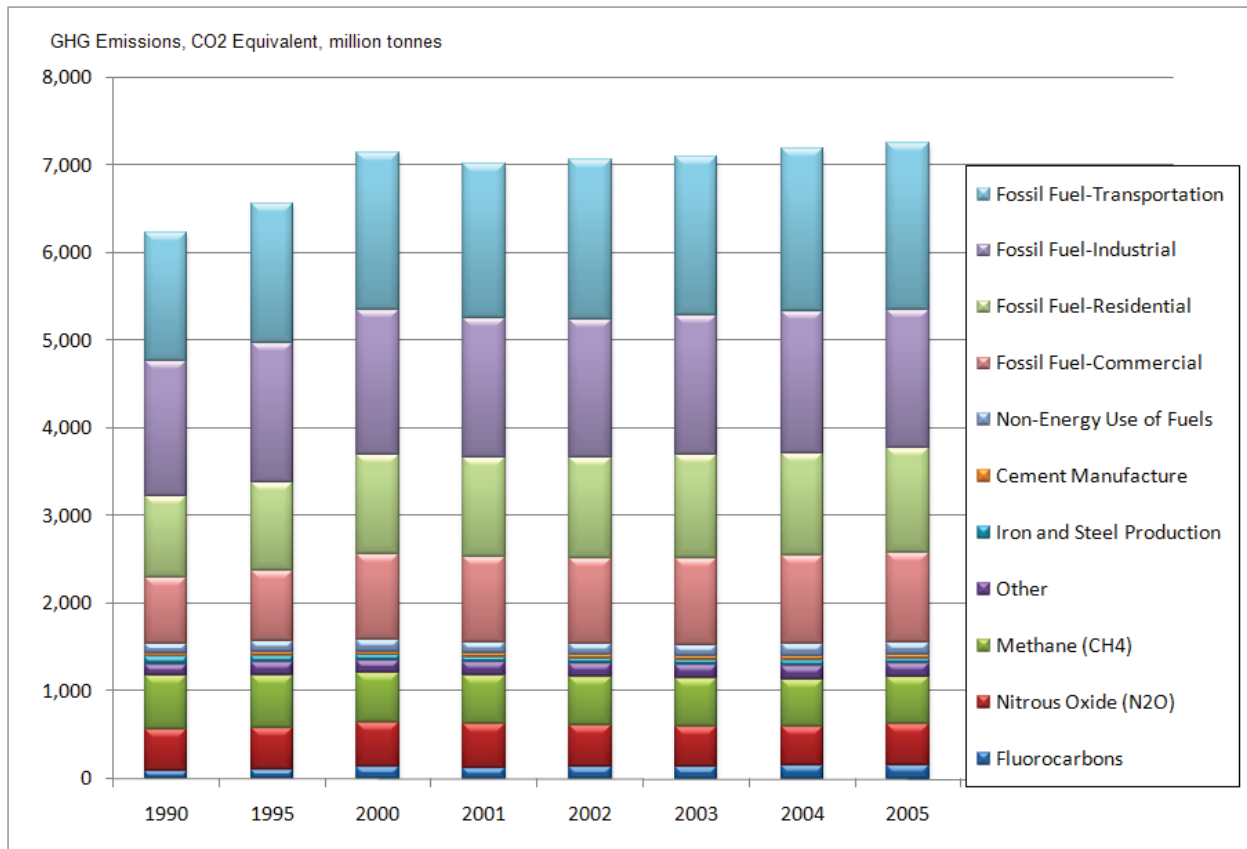
CalISO greenhouse gas emission rate, generate up to 1.2 tons of CO₂ per million gallons of water used due to electricity use (EPA 2002).

The URBEMIS calculations also include indirect greenhouse gas emissions associated with trash and other services that might serve the proposed Project Site and incorporate the travel of diesel trucks that would serve the Project Site.

National Greenhouse Gas Emissions

Fossil fuel combustion is responsible for the vast majority of the nation’s greenhouse gas emissions, and CO₂ is the primary greenhouse gas. Total US greenhouse gas emissions were 7,260 million metric tons of carbon equivalent (MMTCE) in 2005; 84 percent was CO₂ emissions (EPA 2007). Figure 4.1-5 shows the breakdown of US greenhouse gas emissions since 1990. Approximately 33 percent of greenhouse gas emissions were associated with transportation in 2005 and approximately 41 percent were associated with electricity generation.

Figure 4.1-5 US Greenhouse Gas Emissions



Notes: Fossil fuel use includes electricity generation
 Source: EPA 2007

Statewide Greenhouse Gas Emissions

With a population of 37 million, California is the most populous state in the US. In 2004, California produced 492 MMTCE of greenhouse gas emissions (CARB 2008b). Nonetheless, California ranks fourth lowest of the 50 states in carbon dioxide emissions per capita. The transportation sector is the single largest contributor of California's greenhouse gas emissions, producing 41 percent of the State's total greenhouse gas emissions in 2004. Electrical generation produced 22 percent of greenhouse gas emissions. Eighty-one percent of California's emissions are carbon dioxide from fossil fuel combustion (CARB 2008b).

4.1.1.4 Existing Operations

There are currently no operations at the proposed Project Site. However, two oil and gas operations within and near the Preserve provide insight into odor impacts and other issues, such as notices of violations. The Applicant owns both operations, Sycamore Canyon along Sycamore Canyon Road and Honolulu Terrace located along Honolulu Terrace. The Honolulu Terrace facility is immediately adjacent to residences near the edge of the Preserve northwest of the proposed Project Site. The Sycamore Canyon facility, at 5020 Workman Mill Road, is within 500 feet of residences in and at the far western edge of the Preserve.

For this analysis, records were obtained from the SCAQMD, including odor complaints, notices of violations, and breakdown reports for each facility. Table 4.1-6 lists odor complaints and notices of violation tabulated by the SCAQMD from Honolulu Terrace and Sycamore Canyon.

In addition, the City of Whittier phone logs related to complaints about Honolulu Terrace facility were obtained. The phone log for the Matrix Honolulu Terrace facility includes 169 issues between August of 2005 and February of 2009. The majority of the complaints, 118 in 2005 and 42 in 2006, were related to:

- Noise: too loud, too early in the morning, no sound barriers, pipes clanging; and
- Odors: engine exhaust, oil, gas.

Studies conducted by ARUP Acoustics in 2006 resulted in implementation of several effective noise-control measures; the number of complaints decreased substantially to only a few each year. Section 4.5, Noise and Vibration, discusses these measures and their applicability to the proposed Project.

Table 4.1-6 Odor Complaints and Notices of Violation

Date	Facility & ID	Type	Issue
Sycamore Canyon			
5/4/2010	SC P53875	SCAQMD NOV	Installing a portable thermal oxidizer to a permitted equipment, operating a portable thermal oxidizer without an AQMD permit, and exceeding permit condition of operating flare more than 58 days per year in 2008 and 2010.
1/9/2007	SC	Odor Complaint	Diesel fuel odor. Two oil wells being drilled, SCAQMD.
1/12/2007	SC	Odor Complaint	Diesel fuel odor. Two oil wells being drilled, SCAQMD.
1/17/2007	SC	Odor Complaint	Oil odor. Two oil wells being drilled, SCAQMD.
2/13/2009	SC	Odor Complaint	Natural gas odor, SCAQMD.
3/24/2009	SC	Odor Complaint	Natural gas odor, SCAQMD.
Honolulu Terrace			
City History	HT	Odor Complaints	2009 (2), 2008 (0), 2007 (1), 2006 (1), 2005 (11)
10/31/2006	HT	Odor Complaints	Gas odors. Not confirmed.
2/7/2008	HT	Odor Complaints	Gas odors. Not confirmed.
3/6/2008	HT	Odor Complaints	Gas odors. Not confirmed.
3/8/2009	HT	Odor Complaints	Gas odors. Not confirmed.
4/1/2009	HT P49536	SCAQMD NOV	Operating Crude/Oil/Water Separation System without the vapor recovery in full use/operation.
12/16/2009	HT	Odor Complaints	Crude oil odor.
1/5/2010	HT	Odor Complaints	Gas odors. Not confirmed.
10/12/2010	HT	Odor Complaints	Odors. Not confirmed.

Notes: SC=Sycamore Canyon, HT= Honolulu Terrace, NOV = notice of violation

4.1.2 Regulatory Setting

The regulatory setting includes regulations promulgated by federal, state, and the local governments for criteria pollutants. This section discusses criteria pollutants and greenhouse gas emissions.

Federal Authority – EPA: The EPA enforces the Federal Clean Air Act and the associated NAAQS for CO, NO₂, ozone, SO₂, PM₁₀, PM_{2.5}, and lead. These air quality standards are concentrations above which the pollutant is known to cause adverse health effects.

The Project Site is within the South Coast Air Basin, which is currently designated as severe nonattainment for the federal 8-hour ozone ambient air quality standard and has until 2021 to achieve the national standard. For PM₁₀ the Basin is designated as serious nonattainment and was required to meet the national standard by 2006. The Basin is also in nonattainment for PM_{2.5} and had until 2010 to achieve the national standard, but will be filing a five-year extension to 2015 (AQMD 2007). The Basin is in attainment for NO₂. The Basin has met the federal standards for CO and the SCAQMD was designated in attainment for CO in May 2007 by the EPA.

State Authority – CARB: CARB is the state agency that: (1) establishes and enforces emission standards for motor vehicles, fuels, and consumer products; (2) establishes health-based air quality standards; (3) conducts research; (4) monitors air quality; (5) identifies and promulgates control measures for toxic air contaminants; (6) provides compliance assistance for businesses; (7) produces education and outreach programs and materials; and (8) oversees and assists local air quality districts that regulate most non-vehicular sources of air pollution. CARB approves the regional Air Quality Management Plans (AQMP) for incorporation into the State Implementation Plan (SIP) and is responsible for preparing those portions of the plan related to mobile source emissions. CARB implements the California Clean Air Act (CCAA) requirements, regulating emissions from motor vehicles and setting fuel standards. The CCAA established ambient air quality standards for ozone, PM₁₀, PM_{2.5}, CO, NO₂, SO₂, lead, visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. California standards are generally stricter than national standards.

California Health and Safety Code § 44300 (AB2588) requires facilities that emit large quantities of criteria pollutants and any amount of non-criteria pollutants to provide the local air district an inventory of toxic emissions. Such facilities may also be required to prepare a quantitative health risk assessment to address the potential health risks involved. The CARB and the SCAQMD will ensure implementation of these requirements for the oil field through various permitting, rules, and regulations.

The California Health and Safety Code mandates that the California Environmental Protection Agency (Cal/EPA) establish safe exposure limits for toxic, non-criteria air pollutants and identify the best available methods for their control (Sections 39650 et seq.). These laws also require that the new source review rules for each air district include regulations establishing procedures to control the emission of these pollutants. The CARB California Toxic Emissions Factors (CATEF) database lists toxic emissions from oil field operations. Cal/EPA has developed specific cancer potency estimates for assessing their related cancer risks at specific exposure levels. For non cancer-causing toxic air pollutants, Cal/EPA established specific no-effects levels (known as reference exposure levels) for assessing the likelihood of producing health effects at specific exposure levels. Such health effects would be considered significant only when exposure exceeds these reference levels.

Local Authority – SCAQMD: The SCAQMD is the regional agency responsible for the regulation and enforcement of federal, state, and local air pollution control regulations in the Basin. The SCAQMD operates monitoring stations in the Basin, develops and enforces rules and regulations for stationary sources and equipment, prepares emissions inventory and air quality management planning documents, and conducts source testing and inspections. The SCAQMD AQMP includes control measures and strategies to be implemented to attain state and federal ambient air quality standards in the Basin. The SCAQMD then implements these control measures as regulations to control or reduce criteria pollutant emissions from stationary sources or equipment.

In addition, the SCAQMD receives and investigates odor complaints from residences.

The City of Whittier Public Works Department also logs odor complaints associated with industrial operations within the City. For example, the City logs odor and noise complaints

associated with the Matrix Honolulu Terrace Facility, which were examined as part of this analysis.

4.1.2.1 Greenhouse Gas Regulatory Setting

International Regulations

Kyoto Protocol

The U.S. participates in the United Nations Framework Convention on Climate Change, signed on March 21, 1994. The Kyoto Protocol is a treaty made under that Convention and was the first international agreement to regulate greenhouse gas emissions. It has been estimated that if the commitments outlined in the Kyoto Protocol are met, global greenhouse gas emissions would be reduced by an estimated 5 percent from 1990 levels during the first commitment period from 2008 until 2012. Notably, while the U.S. is a signatory to the Kyoto Protocol, Congress has not ratified it; therefore, the U.S. is not bound by the Protocol's commitments.

Climate Change Technology Program

The US has opted for a voluntary and incentive-based approach toward emissions reductions in lieu of the Kyoto Protocol's mandatory framework. The Climate Change Technology Program is a multi-agency research and development coordination effort, led by the Secretaries of Energy and Commerce, charged with carrying out the President's National Climate Change Technology Initiative.

Federal Regulations

Clean Air Act

In the past, the US EPA has not regulated greenhouse gases under the Clean Air Act. However, the US Supreme Court recently held that the EPA can, and should, consider regulating motor-vehicle greenhouse gas emissions. In *Massachusetts v. Environmental Protection Agency*, 12 states and cities, including California, in conjunction with several environmental organizations, sued to force the EPA to regulate greenhouse gases as a pollutant pursuant to the Clean Air Act (U.S. Supreme Court 2007). The Court ruled that greenhouse gases fit within the Clean Air Act's definition of a pollutant and that the EPA's reason for not regulating greenhouse gases was insufficiently grounded.

State Regulations and Programs

Executive Order S-3-05

The 2005 California Executive Order S-3-05 established the following greenhouse-gas-emission reduction targets for California:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels; and
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels.

The Secretary of the California Environmental Protection Agency (CalEPA) is charged with coordinating oversight of efforts to meet these targets and formed the Climate Action Team to carry out the Order. Emission reduction strategies or programs developed by the Climate Action Team to meet the emission targets are outlined in a March 2006 report (CalEPA 2006). The Climate Action Team also provided strategies and input to the CARB Scoping Plan.

Assembly Bill 1493

In 2002, the legislature declared in AB 1493 (the Pavley regulations) that global warming was a matter of increasing concern for public health and the environment in the state. It cited several risks that California faces from climate change, including reduction in the state's water supply, increased air pollution due to higher temperatures, harm to agriculture, an increase in wildfires, damage to the coastline, and economic losses caused by higher food, water, energy and insurance prices. Furthermore, the legislature stated that technological solutions for reducing greenhouse gas emissions would stimulate California's economy and provide jobs. Accordingly, AB 1493 required CARB to develop and adopt the nation's first greenhouse gas emission standards for automobiles. CARB responded by adopting CO₂-equivalent fleet average emission standards. The standards will be phased in from 2009 to 2016, reducing emissions by 22 percent in the "near term" (2009 to 2012) and 30 percent in the "mid-term" (2013 to 2016), as compared to 2002 fleets.

The legislature passed amendments to AB 1493 in September 2009. Implementation of AB 1493 requires a waiver from the EPA, which was granted in June 2009.

Assembly Bill 32

AB 32 codifies the State's greenhouse gas emissions target and requires the State to reduce global warming emissions to 1990 levels by 2020 and directs the CARB to enforce the statewide cap that would begin phasing in by 2012. AB 32 was signed and passed into law by Governor Arnold Schwarzenegger on September 27, 2006. Key AB 32 milestones are:

- June 20, 2007 – Identification of "discrete early action greenhouse gas emission reduction measures."
- January 1, 2008 – Identification of the 1990 baseline greenhouse gas emissions levels and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning greenhouse gas emissions.

- January 1, 2009 – Adoption of a scoping plan for achieving greenhouse gas emission reductions.
- January 1, 2010 – Adoption and enforcement of regulations to implement the “discrete” actions.
- January 1, 2011 – Adoption of greenhouse gas emission limits and reduction measures by regulation.

January 1, 2012 – Greenhouse gas emission limits and reduction measures adopted in 2011 become enforceable.

Since the passage of AB 32, CARB published Proposed Early Actions to Mitigate Climate Change in California (CalEPA 2007b). This publication indicated that the issue of greenhouse gas emissions in CEQA and General Plans was being deferred for later action, so the publication did not discuss any early action measures generally related to CEQA or to land use decisions.

California Senate Bill 1368

In 2006, the California legislature passed SB 1368, which requires the Public Utilities Commission (PUC) to develop and adopt a “greenhouse gases emission performance standard” by February 1, 2007, for private electric utilities under its regulation. The PUC adopted an interim standard on January 25, 2007, requiring that all new long-term commitments for base load generation to serve California consumers be with power plants that have emissions no greater than a combined cycle gas turbine plant. That level is established at 1,100 pounds of CO₂ per megawatt hour. The California Energy Commission has also adopted similar rules.

Senate Bill 97 – CEQA: Greenhouse Gas Emissions

In August 2007, Governor Schwarzenegger signed into law SB 97 – CEQA: Greenhouse Gas Emissions stating, “This bill advances a coordinated policy for reducing greenhouse gas emissions by directing the Office of Planning and Research and the Resources Agency to develop CEQA guidelines on how state and local agencies should analyze, and when necessary, mitigate greenhouse gas emissions.” Specifically, SB 97 requires the Office of Planning and Research (OPR), by July 1, 2009, to prepare, develop, and transmit to the Resources Agency guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions, as required by CEQA, including, but not limited to, effects associated with transportation or energy consumption. The Resources Agency were required to certify and adopt those guidelines by January 1, 2010. OPR would be required to periodically update the guidelines to incorporate new information or criteria established by the State Air Resources Board pursuant to the California Global Warming Solutions Act of 2006. SB 97 also identifies a limited number of types of projects that would be exempt under CEQA from analyzing GHG emissions.

On January 7, 2009, OPR issued its draft CEQA guidelines revisions pursuant to SB 97. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

Office of Planning and Research Technical Advisory and Preliminary Draft CEQA Guidelines Amendments for Greenhouse Gas Emissions

Consistent with SB 97, on March 18, 2010, the CEQA Guidelines were amended to include references to GHG emissions. The amendments offer guidance regarding the steps lead agencies should take to address climate change in their CEQA documents.

According to OPR, lead agencies should determine whether greenhouse gases may be generated by a proposed Project, and if so, quantify or estimate the GHG emissions by type and source. Second, the lead agency must assess whether those emissions are individually or cumulatively significant. When assessing whether a project's effects on climate change are cumulatively considerable, even though its greenhouse gas contribution may be individually limited, the lead agency must consider the impact of the project when viewed in connection with the effects of past, current, and probable future projects. Finally, if the lead agency determines that the greenhouse gas emissions from the proposed Project are potentially significant, it must investigate and implement ways to avoid, reduce, or otherwise mitigate the impacts of those emissions.

The Amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. The Preliminary Amendments maintain CEQA's discretion for lead agencies to establish thresholds of significance based on individual circumstances.

The guidelines developed by OPR provide the lead agency with discretion in determining what methodology is used in assessing the impacts of greenhouse gas emissions in the context of a particular project. This guidance is provided because the methodology for assessing greenhouse gas emissions is expected to evolve over time. The OPR guidance also states that the lead agency can rely on qualitative or other performance based standards for estimating the significance of greenhouse gas emissions.

California Air Resources Board: Interim Significance Thresholds

In October 2008, CARB released interim guidance on significance thresholds for industrial and residential projects (CARB 2008a). The draft proposal for industrial projects states that a project would not be significant if, with mitigation, it will emit no more than 7,000 metric tons CO₂e per year from non-transportation related sources and performance standards for construction and transportation emissions.

California Air Resources Board: Scoping Plan

On December 11, 2008, the CARB adopted the Scoping Plan as directed by AB 32 (CARB 2008b). The Scoping Plan proposes a set of actions designed to reduce overall greenhouse gas emissions in California. The measures in the Scoping Plan approved by the Board will be in place by 2012, with further implementation details and regulations to be developed, followed by the rulemaking process to meet the 2012 deadline. Measures include a cap-and-trade system, car standards, low carbon fuel standards, landfill gas control methods, energy efficiency, green buildings, renewable electricity standards, and refrigerant management programs.

California businesses are required to report their annual greenhouse gas emissions. It is contained within sections 95100-95133 of Title 17, California Code of Regulations. It establishes who must report GHG emissions to CARB and sets forth the requirements for measuring, calculating, reporting and verifying those emissions. The rule specifies a reporting threshold of 25,000 metric tonnes of CO₂.

California Air Resources Board and SB 375

SB 375 (Steinberg) became effective January 1, 2009. This new law requires CARB to develop regional reduction targets for GHG, and prompts the creation of regional plans to reduce emissions from vehicle use throughout the state. California's 18 Metropolitan Planning Organizations (MPO) have been tasked with creating Sustainable Community Strategies (SCS). The MPO are required to develop the SCS through integrated land use and transportation planning and demonstrate an ability to attain the proposed reduction targets by 2020 and 2035.

The Southern California Association of Governments is the MPO for the Los Angeles and Whittier area. They released recommendations for developing targets to the CARB in October, 2009 that recommended setting 2005 as the base year and using a per capita reduction metric, such as tons per person or household. Specific reduction targets will be developed by CARB.

California Climate Action Registry General Reporting Protocol

The California Climate Action Registry is a program of the Climate Action Reserve and serves as a voluntary greenhouse gas registry. The California Climate Action Registry was formed in 2001 when a group of chief executive officers, who were investing in energy efficiency projects that reduced their organizations' greenhouse gas emissions, asked the State to create a place to accurately report their greenhouse gas emissions history. The California Climate Action Registry publishes a General Reporting Protocol, which provides the principles, approach, methodology, and procedures to estimate GHG emissions.

Local Climate Change Regulations

The SCAQMD has adopted guidance concerning CEQA evaluation of greenhouse gas emissions associated with residential and commercial projects. A SCAQMD board meeting on December 5, 2008, adopted an interim threshold of 10,000 tonnes CO₂e for stationary and industrial facilities. Residential development thresholds have not been adopted as of this writing.

4.1.3 Significance Criteria

The SCAQMD makes significance determinations based on the maximum daily emissions during the construction period, which provides a worst-case analysis of the construction emissions. Similarly, significance determinations for operational emissions are based on maximum daily emissions during the operational phase.

To determine whether or not air quality impacts from the proposed Project are significant, emissions are evaluated and compared to the SCAQMD air quality significance thresholds (see Table 4.1-7). If impacts exceed any of the criteria, they will be considered significant and all

feasible mitigation measures will be identified and implemented to reduce significant impacts to the maximum extent feasible.

After adopting the SCAQMD CEQA Air Quality Handbook, the SCAQMD adopted Regulation XX - Regional Clean Air Incentive Market (RECLAIM), which changed the framework of air quality rules and permits (SCAQMD 1993). The RECLAIM program is a pollution credit trading program that applies to the largest sources of NO_x and SO_x emissions within SCAQMD jurisdiction.

The SCAQMD has developed a localized significance threshold methodology to evaluate the potential localized impacts of criteria pollutants from construction activities (SCAQMD 2007). The localized significance threshold methodology requires an analysis regarding whether or not emissions of specified criteria pollutants exceed ambient air quality standards at a sensitive receptor. SCAQMD defines sensitive receptors as offsite locations where persons may be exposed to the emissions from project activities. Receptor locations include residential, commercial, and industrial land use areas and any other areas where persons could be situated for an hour or more at a time. These other areas include parks, bus stops, and sidewalks but would not include building tops, roadways, or permanent bodies of water such as oceans or lakes.

The localized significance threshold analysis is performed for emissions of CO, NO₂, and particulates, both PM₁₀ and PM_{2.5}, associated with proposed Projects. The SCAQMD has developed localized significant thresholds lookup tables that utilize the allowable concentrations of pollutants (shown in Table 4.1-7) combined with distances and construction or operational areas to calculate allowable emission rates. The lookup tables are specific for the source/receptor area in the Basin as it also includes pollutant background and meteorological data specific to the area.

The lookup table for source area 11 is shown in Table 4.1-8. For sources that do not fit the construction or operational criteria in the lookup tables, source specific modeling is conducted to estimate the receptor pollutant concentration and assess whether it is less than the values shown in Table 4.1-8.

Table 4.1-7 SCAQMD Air Quality Significance Thresholds

Mass Daily Thresholds		
Pollutant	Construction	Operation
NO _x	100 pounds/day	55 pounds/day
VOCs	75 pounds/day	55 pounds/day
PM ₁₀	150 pounds/day	150 pounds/day
PM _{2.5}	55 pounds/day*	55 pounds/day*
SO _x	150 pounds/day	150 pounds/day
CO	550 pounds/day	550 pounds/day
Lead	3 pounds/day	3 pounds/day
Toxic Air Contaminants and Odor Thresholds		
Toxic Air Contaminants (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk > 10 in 1 million The risk per year shall not exceed 1/70 of the maximum allowable risk Maximum Cancer Burden >0.5 Hazard Index > 1.0 (project increment)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Ambient Air Quality for Criteria Pollutants(a)		
NO ₂ 1-hour average annual average	In attainment; significant if project causes or contributes to an exceedance of any following standard: 0.18 ppm (state) 0.03 ppm (state)	
PM ₁₀ and PM _{2.5} 24-hour annual (PM ₁₀ only)	10.4 µg/m ³ (recommended for construction)(b) 2.5 µg/m ³ (operation) 1.0 µg/m ³	
Sulfate 24-hour average	1 µg/m ³	
CO 1-hour average 8-hour average	In attainment; significant if project causes or contributes to an exceedance of any following standard: 20 ppm (state) 9.0 ppm (state/federal))	
Greenhouse Gas Emissions		
CO ₂ , N ₂ O, CH ₄ , etc	If the Project's GHG emissions are less than or mitigated to less than 10,000 metric tonnes CO ₂ equivalent per year the Project is presumed to be insignificant for GHG	

Ambient air quality thresholds for criteria pollutants based on SCAQMD Rule 1303, Table A-2 unless otherwise stated.

Ambient air quality threshold based on SCAQMD Rule 403.

µg/m³ = micrograms per cubic meter; lbs/day = pounds per day; ≥ greater than or equal to

* Based on SCAQMD 2006 "Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds" regional thresholds, October 2006

Source: SCAQMD CEQA website

Table 4.1-8 SCAQMD Air Quality Localized Significance Thresholds for San Gabriel Valley Source Receptor Area 11

Source/Receptor Area	Allowable Emissions as a Function of Receptor Distance (pounds per day)				
	25 meters	50 meters	100 meters	200 meters	500 meters
NO_x^a					
1-acre sites	83	84	96	123	193
2-acre sites	121	118	126	147	206
5-acre sites	183	176	184	202	245
CO^a					
1-acre sites	673	760	1113	2110	6884
2-acre sites	1031	1143	1554	2660	7530
5-acre sites	1814	1984	2549	4024	9342
PM₁₀/PM_{2.5} Operations					
1-acre sites	1/1	4/2	7/3	15/5	37/20
2-acre sites	2/2	6/2	9/3	17/6	39/22
5-acre sites	4/2	11/3	15/5	22/9	45/25
PM₁₀/PM_{2.5} for Construction					
1-acre sites	5/4	13/5	29/9	60/20	153/83
2-acre sites	7/5	22/8	37/12	68/24	162/89
5-acre sites	14/9	43/12	59/19	91/34	186/104

a. NO_x and CO thresholds for operations and construction.

Source: SCAQMD 2007a

4.1.4 Project Impacts and Mitigation Measures

The proposed Project would generate air emissions due to the following activities:

- Construction equipment and fugitive dust;
- Drilling emissions during test drilling;
- Operational combustion equipment (e.g., heaters, flare);
- Operational fugitive emissions (e.g., valves, tanks);
- Drilling emissions during initial well drilling for 5 (or more) years;
- Drilling emissions during re-drills;
- Workover rig emissions; and
- Vehicles commuting to and from the site.

Emissions are generated related to criteria pollutants for construction and operations, greenhouse gasses, and toxics and odors. The following sections discuss each of these.

4.1.4.1 Construction Criteria Emissions

Air emissions of criteria pollutants (CO, ROC, NO_x, SO₂ and PM) during construction would result from construction equipment with internal combustion engines (e.g., backhoes, cranes) and offsite vehicles (e.g., construction employee commuter vehicles and trucks delivering equipment and materials). Air emissions from construction equipment were estimated using the emission factors from the URBEMIS software and the assumptions on the duration and personnel detailed in Section 2.0, Project Description. The Applicant states that all machinery would be equipped with appropriate mufflers and all engines would be regularly maintained. Appendix B includes details on the construction equipment and periods of operation for each equipment piece.

NO_x emissions are a byproduct of combustion in engines, including construction equipment and vehicles. NO_x emissions from construction equipment can be reduced by using newer, cleaner engines. Combustion, particularly of diesel fuel, also produces PM emissions. However, a large portion of PM emissions during construction typically arises from large pieces of equipment traveling on disturbed soil, unpaved surfaces, and various earth-moving activities, such as trenching, grading, clearing, etc (called fugitive dust). These emissions mostly depend on the size of graded area, volume of moved soil, the number of construction machinery and vehicles, and the duration of construction. The Project fugitive dust PM₁₀ emissions are estimated based on a disturbed area as provided by the Applicant. Dust control measures would be employed during construction activities and would include spraying water from tank trucks over exposed areas two times per day. Controlled emission factors were used from URBEMIS for calculation of the fugitive dust emissions. The detailed calculations are contained in Appendix B. Construction air emissions are summarized in Table 4.1-9.

Construction emissions generated during the proposed Project could exceed the SCAQMD thresholds.

Impact #	Impact Description	Phase	Residual Impact
AQ.1	Construction activities would generate emissions that exceed South Coast Air Quality Management District thresholds.	Construction	Significant and Unavoidable

Several Project activities would generate construction emissions, including the initial site clearing, site grading, facility construction, and pipeline construction. Table 4.1-9 shows each activity and emissions associated with those activities.

Table 4.1-9 Proposed Project Construction Criteria Emissions

Activity	Peak Day Emissions (pounds/day)					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Pad Clearing						
Construction Equipment	2.7	10.2	24.4	0.0	1.0	1.0
Fugitive Dust Emissions					14.5	3.0
Subtotal: Construction Equipment and Fugitive Dust	2.7	10.2	24.4	0.0	15.5	4.0
Offsite Mobile Emissions	1.1	6.6	9.3	0.0	0.5	0.4
<i>Total</i>	<i>3.8</i>	<i>16.8</i>	<i>33.7</i>	<i>0.0</i>	<i>15.9</i>	<i>4.4</i>
Grading and North Access Road Construction						
Combustion Equipment	10.6	37.3	96.1	0.1	4.0	3.9
Fugitive Dust Emissions					52.9	11.0
Subtotal: Construction Equipment and Fugitive Dust	10.6	37.3	96.1	0.1	56.8	14.9
Offsite Mobile Emissions	7.2	29.5	88.2	0.1	4.2	3.7
<i>Total</i>	<i>17.8</i>	<i>66.9</i>	<i>184.3</i>	<i>0.2</i>	<i>61.0</i>	<i>18.6</i>
Facility Construction						
Combustion Equipment	8.0	20.3	44.2	0.1	2.6	2.6
Fugitive Dust Emissions					18.3	3.8
Subtotal: Construction Equipment and Fugitive Dust	8.0	20.3	44.2	0.1	20.9	6.4
Offsite Mobile Emissions	3.6	20.2	33.3	0.0	1.6	1.4
<i>Total</i>	<i>11.6</i>	<i>40.5</i>	<i>77.6</i>	<i>0.1</i>	<i>22.5</i>	<i>7.8</i>
Pipeline Construction						
Combustion Equipment	6.1	19.0	37.7	0.0	2.4	2.4
Fugitive Dust Emissions					2.2	0.5
Subtotal: Construction Equipment and Fugitive Dust	6.1	19.0	37.7	0.0	4.7	2.9
Offsite Mobile Emissions	1.5	8.3	14.9	0.0	0.7	0.6
<i>Total</i>	<i>7.6</i>	<i>27.3</i>	<i>52.5</i>	<i>0.1</i>	<i>5.4</i>	<i>3.5</i>
SCAQMD Regional Construction Thresholds (pounds/day)	75	550	100	150	150	55
SCAQMD Localized Construction Thresholds (pounds/day)	-	1554	126	-	37	12
Significant Impact Regional?	No	No	Yes	No	No	No
Significant Impact Local (onsite emissions only)?	No	No	No	No	Yes	Yes
Can Be Mitigated to Less Than Significant Impact?	-	-	No	-	Yes	Yes

Notes: Localized thresholds are based on SCAQMD lookup tables and a 2-acre site with 100 meters to receptors. Localized significance determination does not include offsite mobile emissions.

The emissions from construction activities would exceed those specified by the SCAQMD regional and local thresholds for both NO_x and particulate emissions.

NO_x emission levels would exceed both regional and local threshold levels during site grading due to grading equipment and a relatively large number of offsite vehicles necessary for soils transport.

Emissions of and $PM_{2.5}$ would not exceed the SCAQMD regional emissions thresholds but do exceed the local threshold for facility construction, pad grading and pad clearing. The emissions of PM_{10} and $PM_{2.5}$ are associated both with fugitive dust due to travel on dirt roads and disturbed areas and vehicle and construction equipment combustion.

Emissions of NO_x can be reduced by utilizing newer, cleaner diesel engines that meet EPA Tier 3 emissions requirements. These engines have been available for several years.

PM emissions associated with fugitive dust can be reduced by implementing measures such as watering, maintaining a level of soil moisture and reducing vehicle speeds, and treating roadways, thereby reducing dust generation. These measures are common practice at construction sites and are described in SCAQMD CEQA Guidance documents and in the mitigation measures below, along with the estimated reduction in PM emissions for each measure. Although SCAQMD Rule 403 requires a fugitive dust control plan, the specifics of the plan are left to the Applicant and the SCAQMD. Therefore, details of the plan are provided to ensure that emissions are reduced to below the thresholds.

Mitigation Measures

AQ-1a The Applicant shall submit and implement a Fugitive Dust Control Plan that includes SCAQMD mitigations for fugitive dust mitigation, according to Rule 403, and SCAQMD CEQA Guidelines. The Plan shall also address fugitive dust measure impacts to native habitats. Fugitive dust mitigation measures in the plan should include the following:

- *Apply water every 3 hours to disturbed areas within a construction site (61% reduction).*
- *Require minimum soil moisture of 12% for earthmoving, by using a moveable sprinkler system or water truck. Moisture content can be verified by lab sample or moisture probe (69% reduction).*
- *Limit on-site vehicle speeds on unpaved roads to 15 mph with radar enforcement (57% reduction) and posting of speed limits.*
- *Replace ground cover in disturbed areas as quickly as possible (5% reduction).*
- *All trucks hauling dirt, sand, soil, or other loose materials are to be tarped with a fabric cover and maintain a freeboard height of 12 inches (91% reduction).*
- *Install gravel bed trackout apron (3 inches deep, 25 feet long, 12 feet wide per lane, and edged by rock berm or row of stakes) to reduce mud and dirt trackout from unpaved truck exit routes (46 to 80% reduction).*

- *Water industrial unpaved road three times per day (61% reduction).*
 - *Water storage piles by hand or apply cover when wind events are declared, according to SCAQMD Rule 403 when instantaneous wind speeds exceed 25 miles per hour (90% reduction).*
 - *Appoint a construction relations officer to act as a community liaison concerning onsite construction issues, such as dust generation.*
- AQ-1b Treat all dirt roads with water three times per day prior to and during the Drilling and Resting Phase pad clearing to substantially reduce dirt road fugitive dust emissions.*
- AQ-1c Treat all roads (pave or apply non-toxic soil binders with at least 80% effectiveness) before beginning the development phase pad grading and facility construction to substantially reduce dirt road fugitive dust emissions during those phases of construction.*
- AQ-1d The Applicant shall implement a NOx reduction program including the following, or equivalent, measures:*
- *All off-road diesel construction equipment greater than 100 horsepower shall be EPA Tier 3-certified or better engines, or utilize other CARB-verified emission control technologies to achieve the same level of emission reduction.*
 - *All off-road construction equipment shall be tuned and maintained according to manufacturers' specifications.*
 - *Any temporary electric power shall be obtained from the electrical grid, rather than portable diesel or gasoline generators.*
 - *Soil hauling shall be coordinated with the Savage Canyon Landfill to receive the soil to limit haul truck travel distance, or utilize trucks that comply with the EPA 2010 model year emissions requirements.*
 - *Limit onsite truck idling to less than 5 minutes.*
 - *During the pad and access road grading phase, all off-road dump trucks shall meet EPA 2010 model year NOx emission requirements or achieve a certified NOx emission level of less than 2.0 g/bhp-hr.*
 - *A copy of the certified tier specification, best available control technology documentation, or the CARB or SCAQMD operating permit for each piece of equipment shall be provided when each piece of equipment is mobilized.*

Residual Impacts

Implementing a fugitive dust control plan, reducing distances of dirt road travel, and roadway treatments would reduce particulate emissions to less than both the regional and local SCAQMD significance thresholds. Soil binders are relatively non-toxic (for polymers) and they reduce particulate emissions from untreated roadways by more than 80 percent (DRI 1996). Note that most of Catalina Ave located within the Preserve is currently paved, although it would need to be re-paved during the construction phase. This reduces emissions of fugitive dust due to travel on roadways.

NO_x emissions from construction equipment and trucks hauling the soils could be reduced to below the SCAQMD thresholds for construction by utilizing cleaner haul trucks (that meet the EPA 2010 NO_x emissions requirements) or requiring the haul trucks to dispose of the fill dirt at the nearby Savage Canyon Landfill, thereby reducing the distance of travel and corresponding emissions. Dumps trucks used onsite during the pad grading phase would be required to be new trucks or meet a specified NO_x emission level that would reduce construction emissions to below the SCAQMD thresholds. However, since the availability of new diesel trucks that meet the EPA 2010 emissions requirements or the need for fill dirt at the Landfill are unknown, emissions might continue to exceed the regional SCAQMD thresholds for NO_x emissions if these measures cannot be implemented (see Appendix B). Therefore, this would remain a significant and unavoidable impact.

4.1.4.2 Operations Criteria Emissions

Proposed Project operations emissions would be from the gas plant heater and flare combustion engines, new equipment fugitive emissions at all locations, well drilling engines, workover engines, vehicles delivering materials to and from the site, and personnel vehicles.

Fugitive emissions are associated with gas leaks from fittings, valves, and tanks. The amount of gas that leaks from tanks is a function of the amount of throughput as the tank floating roof is raised and lowered, leaving a film of crude oil on the sides of the tank. The Applicant has proposed a vapor recovery system that was included in the air emissions calculations and which utilized the EPA Tanks version 409d emissions model. Crude throughput was assumed to be the maximum throughput identified in Section 2.0, Project Description.

There would still be fugitive emissions from valves, compressors, pumps and connections. These emissions are a function of the number of components and the levels of maintenance. Component counts were estimated based on the Applicant-supplied diagrams and other similarly sized facilities.

Drilling new wells would also produce fugitive emissions.

Emissions from the new heater were estimated based on the equipment heat rating and the application of best available control technology, including low-NO_x burners and an assumed permit NO_x level of 20 ppm.

Workovers would be conducted at the field, as described in Section 2.0, Project Description. Workovers would use truck-based well servicing equipment.

Trucks and personnel vehicles would create offsite emissions during operations, as described in Section 2.0, Project Description.

Drilling emissions would primarily be associated with diesel engines used to power the drawworks, mudworks, generators, and support equipment, including cranes, loaders, and welding machines. Drawworks, mudworks, and generators associated with the drilling rig were assumed to be EPA Tier 3-certified according to specifications provided by Kenai Drilling for their number 14 rig.

Operational emissions would be associated with several operational phases, including:

- Drilling associated with testing;
- The testing phase;
- Operations of the oil and gas plants and wells;
- Drilling associated with the development of the 52 wells while the oil and gas plants are operating; and
- Re-drills during oil and gas plant operations.

Table 4.1-10 shows the estimated operational emissions associated with each of these phases.

Table 4.1-10 Proposed Project Operational Criteria Emissions

Activity	Peak Day Emissions (pounds/day)					
	VOC	CO	NO _x	SO _x	PM ₁₀	PM _{2.5}
Drilling Emissions Testing						
Combustion Equipment & Fugitives	3.7	12.3	70.2	0.1	3.7	3.7
Fugitive Dust Emissions					4.7	1.0
<i>Subtotal: Construction Equipment and Fugitive Dust</i>	3.7	12.3	70.2	0.1	8.4	4.6
Offsite Mobile Emissions	2.3	12.0	22.8	0.0	1.1	1.0
<i>Total</i>	<i>6.0</i>	<i>24.3</i>	<i>93.0</i>	<i>0.1</i>	<i>9.5</i>	<i>5.6</i>
Testing Emissions						
Combustion Equipment & Fugitives	10.4	12.3	45.8	0.2	2.6	2.6
Fugitive Dust Emissions					1.9	0.4
<i>Subtotal: Construction Equipment and Fugitive Dust</i>	10.4	12.3	45.8	0.2	4.6	3.0
Offsite Mobile Emissions	0.7	3.7	7.9	0.0	0.4	0.3
<i>Total</i>	<i>11.1</i>	<i>16.0</i>	<i>53.7</i>	<i>0.2</i>	<i>4.9</i>	<i>3.3</i>
Operational Emissions while Drilling						
Combustion Equipment & Fugitives	46.0	210.1	780.3	3.6	45.0	44.1
Workover Emissions	0.5	1.6	6.5	0.0	0.2	0.2
Drilling Emissions	3.7	12.3	70.2	0.1	3.7	3.7
<i>Subtotal: Stationary Equipment, Workovers, and Drilling</i>	50.2	224.0	857.0	3.7	48.9	47.9
Offsite Mobile Emissions	3.4	19.7	30.1	0.0	1.5	1.3
<i>Total</i>	<i>53.6</i>	<i>243.7</i>	<i>887.1</i>	<i>3.7</i>	<i>50.4</i>	<i>49.2</i>
SCAQMD Regional Operations Thresholds (pounds/day)	75	550	100	150	150	55
SCAQMD Localized Operations Thresholds (pounds/day)	-	1554	126	-	9	3
Significant Impact Regional?	No	No	Yes	No	No	No
Significant Impact Local?	No	No	Yes	No	Yes	Yes
Can Be Mitigated to Less Than Significant Impact?	-	-	Yes	-	Yes	Yes

Notes: Operations while drilling emissions peak day would be the same as peak day emissions during re-drilling.

Impact #	Impact Description	Phase	Residual Impact
AQ.2	Operational activities would generate emissions that exceed South Coast Air Quality Management District thresholds.	Operations	Less Than Significant With Mitigation

Operational emissions of the proposed Project would exceed the regional thresholds for NO_x. On the worst-case peak day, assuming that the flare would operate for 24 hours during an upset condition, the entire gas flow would necessarily be directed to the flare. When the flare would not operate for the entire day, emissions would still exceed the regional emissions thresholds due to emissions from the drilling operations and offsite mobile sources.

Operational emissions would exceed the local thresholds for NO_x, PM₁₀, and PM_{2.5}. On the worst-case peak day, assuming that the flare would operate for 24 hours during an upset condition, the entire gas flow would necessarily be directed to the flare. When the flare would not operate for the entire day, emissions of PM₁₀ and PM_{2.5} would still exceed the local emissions thresholds due to emissions from drilling operations.

Mitigation measures could include the use of cleaner, newer drilling engines and obtaining offsets for NO_x emissions. PM emissions from roadway dust could be reduced by applying mitigation measures AQ-1a through AQ-1c.

Mitigation Measures

AQ-2a The Applicant shall comply with all SCAQMD regulations, including but not limited to Regulation IV (Prohibitions), Regulation XIII (New Source Review), Regulation XI (Source Specific Standards), and Regulation XIV (New Source Review for Toxic Air Contaminants). The operator shall implement best available control technology and obtain emission offsets as required by SCAQMD Regulation XIII and/or Regulation XX for new and modified permitted emission sources. Emission offsets are required for all emission increases associated with stationary sources, thus, minimizing the impacts associated with emissions from stationary sources.

AQ-2b The Applicant shall implement a program to reduce NO_x and PM emissions, including:

- All drilling engines shall meet EPA Tier 3 emissions levels, or utilize other CARB-verified emission control technologies to achieve the same level of emission reduction, or utilize electric engines.*
- Treat all used Preserve dirt roads that will be used (pave or apply soil binders with at least 85% effectiveness) or pave all Preserve dirt roads that will be used during test drilling.*
- Limit onsite truck idling to less than 5 minutes.*
- Electrify service equipment and auxiliary power units where feasible.*

- *Use clean street sweepers during operations.*
- *Pave roads and road shoulders during operational phase.*
- *Utilize trucks that meet EPA 2010 emission standards and off-road equipment that meets EPA 2015 emissions levels to the extent feasible.*
- *A copy of the certified tier specification, best available control technology documentation, or the CARB or SCAQMD operating permit for each piece of equipment shall be provided when each piece of equipment is mobilized.*
- *Purchase emission offsets to reduce remaining NO_x emissions to less than significant levels.*

Residual Impacts

Ensuring that diesel engines meet the EPA Tier 3 requirements or equivalent on the drilling rig would help reduce emissions. The Applicant-proposed drilling rig is reported to have Tier 3 engines. This mitigation measure ensures that any other rigs selected would also have Tier 3 engines. However, even with Tier 3 engines, NO_x emissions levels would still exceed the thresholds. Measures requiring electrifying equipment and utilizing cleaner trucks, where feasible, would also reduce NO_x emissions. Since the availability of new trucks in many areas is unknown, this measure is assumed to be required where feasible.

The recommended mitigation measures associated with fugitive dust during test drilling and operations would reduce particulate emissions associated with fugitive dust to less than the localized thresholds. Although particulate emissions from diesel equipment would remain greater than the localized thresholds, modeling related to the health risk assessment (see impact AQ.5), including acute impacts, determines that diesel-powered equipment emissions would be less than the acute and chronic risk thresholds. Therefore, particulate emissions would be less than significant with mitigation.

Emission offsets would then be required to reduce the remaining NO_x emission impacts, if any, to less than significant levels with mitigation. Emissions offsets are validated and acquired through the SCAQMD Emissions Reduction Credit Program (ERC), which can then be sold to other operators for the installation of new equipment or the increase in emissions from existing equipment (SCAQMD Rule 1309). Impacts would be less than significant with mitigation measures AQ-2a and AQ-2b.

4.1.4.3 Potential Operations Odor Emissions

An odor is produced by the release of material that contains even small amounts of sulfur compounds or hydrocarbons. Several compounds associated with the oil and gas industry can produce nuisance odors. Sulfur compounds, found in oil and gas, have very low odor threshold levels. For instance, H₂S (hydrogen sulfide) can be detected by humans at concentrations from 0.5 parts per billion (ppb) (detected by 2 percent of the population) to 40 ppb, qualified as annoying by 50 percent of the population. Above these levels, it would be detected by most people. The OSHA allowable limit for occupational exposure to H₂S is 20 ppm with a 50 ppm peak over 10 minutes (29 CFR 1910.1000 Z-2 Table). Inhaling 100 ppm of H₂S can be lethal

according to the Emergency Response Planning Guideline (AIHA 2008). The H₂S levels in the gas are estimated to be less than a few ppm.

Many volatile compounds found in oil and gas (pentane, n-pentane, hexane, ethane and longer chain hydrocarbons) also typically have a petroleum or gasoline odor with varying odor thresholds. The most odiferous of these compounds are hexane, which has an odor threshold of between 68 and 248 ppm, and pentane, with an odor threshold of 2 ppm (New Jersey 2007).

Natural gas contains mostly methane, which is odorless so it is odorized as dictated by law before entering a distribution pipeline. The various odorizing compounds contain sulfur compounds and have very low odor thresholds and can produce odors if released into the atmosphere.

The facility would inspect components for fugitive emissions as required by SCAQMD rule 1173 “Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants.” Rule 1173 prohibits: (1) leaks of light liquids greater than three drops per minute; (2) leaks from gas components greater than 10,000 ppm; (3) leaks from heavy liquid components greater than 100 to 500 ppm; and (4) leaks from a pressure relief valve greater than 200 ppm. Rule 1173 also requires daily inspection of compressors, pumps, and pressure relief devices and inspection of all other components at least quarterly. Any leaks identified greater than 10,000 ppm are required to be repaired within 2 days and any leaks greater than 25,000 ppm are required to be repaired in 1 day.

With the addition of equipment at the field and the drilling operations, an odor event could occur.

Impact #	Impact Description	Phase	Residual Impact
AQ.3	Potential operations and drilling at the Whittier Main Oil Field would create odor events.	Operations	Less Than Significant With Mitigation

Odor events could occur due to several different situations associated with equipment or drilling upset conditions. The equipment components could also leak and cause odors. Tanks are equipped with hatches to protect them from overpressure. If these hatches lift, due to a failure of the vapor recovery compressor, for example, odor events could occur. During drilling, drilling muds, well kicks, and releases from increased pressure up the wellbore could cause odor events. During drilling, pockets of gas can be encountered, which can be picked up by the circulating muds, brought to the surface, and released through the muds processing system. These types of releases have caused notices of violation (NOV) at other oilfields in the past, such as the Baldwin Hills Oilfield. Any of these scenarios would be considered a significant impact.

Releases of materials causing odors can travel a substantial distance since the odor thresholds for materials can be very low, in the parts per billion. Odor impacts associated with accidental releases from the oil field could impact surrounding areas.

Odor events can be mitigated with systems that direct odor-causing releases to flare-type systems, odor masking materials, and systems in place to notify operators when releases could or do occur. These mitigation measures are utilized in oil fields in urban areas.

Mitigation Measure

- AQ-3a The Operator shall have a gas buster and SCAQMD-approved portable flare at the oil field and available for immediate use to circulate out and combust any gas encountered during drilling. The flare shall be capable of recording the volume of gas that is flared. The operator shall report any flared gas from drilling to the Los Angeles County Fire Chief and the SCAQMD.*
- AQ-3b The Operator shall install a detection system that will monitor vapor space on all crude oil tanks. The detection system shall be capable of monitoring pressure in the vapor space of the tanks and notifying the operator via an alarm when the pressure in the tanks gets within 10 percent of the tank relief pressure. If the tank pressure exceeds the relief pressure, the Operator shall report the incident to the SCAQMD as a breakdown pursuant to Rule 430, and submit a report of the breakdown to the Los Angeles County Fire Chief and the SCAQMD, which shall detail the corrective actions the Operator shall take to avoid exceeding the tank relief pressure.*
- AQ-3c The Operator shall develop an Odor Minimization Plan. The Odor Minimization Plan shall address odors from all oil field equipment, including wells and drilling operation. The Plan shall address issues such as facility information, buffer zones, signs with contact information, logs of odor complaints, and the protocol for handling odor complaints.*
- AQ-3d The Operator shall develop an Air Monitoring Plan. The Plan shall provide for the monitoring of total hydrocarbon vapors and hydrogen sulfide at each well drill and re-drilling site and total hydrocarbon vapors at the gas plant. At all times during drilling and re-drilling operations, the Operator shall maintain monitoring equipment that shall monitor and digitally record the levels of hydrogen sulfide and total hydrocarbon vapors. Monitors shall be installed at the edge of the drill pad and around the outer edge of the gas plant. Such monitors shall provide automatic alarms that are audible or visible to the Operator of the drilling equipment for the drill rig monitors, and gas plant for the gas plant monitors, and shall be triggered by the detection of hydrogen sulfide or total hydrocarbon vapors. Alarm points shall be set at a maximum of 5 and 10 ppm H₂S and 500 and 1,000 ppm hydrocarbons, with the higher level requiring shut-down of drilling or gas plant operations and notification to appropriate agencies, including the Los Angeles County Fire Department and SCAQMD. A meteorological station to monitor wind speed and direction under the guidance and specification of the SCAQMD shall be installed at the Processing, or applicable location.*
- AQ-3e The Operator shall use an odor suppressant spray system or vapor capture hood and carbon filter system on the mud shaker tables for all drilling operations so that no odor can be detected at the edge of the oil field property.*

Residual Impacts

Implementing these mitigation measures would eliminate odor events that have resulted in odor complaints and NOV at other oilfields in the past, as well as other suspected sources of odors associated with the oil field operations.

Using portable flares and odor suppressants during drilling would eliminate the odor events associated with mud vapors and drilling gasses. Technology to separate the muds from entrained gasses and utilize flares, or equivalent devices, to combust the gasses would prevent events similar to the January 2006 event at the Baldwin Hill Oilfield, where gasses entrained in the muds were released and detected by oilfield neighbors. The flare systems would utilize a degassing vessel (i.e., gas buster); the muds would first pass through this vessel to release entrained gasses. These gasses would be combusted in a flare while the liquid muds would flow to muds processing. The dedicated flare pilot or igniter would automatically and immediately ignite the flare gasses. The flare would essentially eliminate all of the hydrocarbons in the gas, and the combustion of gasses would create substantial heat, providing the combusted products with sufficient buoyancy to rise quickly into the air without producing odors. This type of flare technology for drilling operations is well developed in the oil and gas industry.

Engineering analysis of the field operations identified tank hatches as a potential odor sources. The tanks have a relief system that relieves the pressure to the atmosphere instead of to the vapor recovery system if the pressure gets too high inside of the tank. This could occur if the vapor recovery system fails or if surges in fluid flow cause short-term increases in pressure that exceed the capacity of the vapor recovery system compressor. Ensuring appropriate monitoring of the tank relief systems would increase the understanding associated with intermittent tank releases and allow for minimizing these potential odor events by increasing compressor capacity if necessary.

By implementing these mitigation measures, the oil field operations would apply best available technology applied (e.g., tank monitoring, drilling flare and odor control, muds odor control). Impacts would therefore be reduced to less than significant with mitigation.

4.1.4.4 Potential Operations Greenhouse Gas Emissions

With the addition of equipment at the field, and the drilling operations, emissions of GHG would occur.

Impact #	Impact Description	Phase	Residual Impact
AQ.4	Potential operations and drilling at the Whittier Main Oil Field would increase greenhouse gas emissions.	Operations	Significant and Unavoidable

GHG emissions were estimated utilizing the equipment size and fuel use data that were used to estimate criteria emissions along with emission factors as defined by the CARB and the EPA

(see Appendix B for the detailed calculations). GHG associated with operations include emissions from combustion sources (e.g., flare, heater, diesel drilling engines), offsite vehicles, electrical generation, and fugitive emissions that contain CO₂ and methane. The largest source of GHG emissions are the heater and the flare, followed by electrical generation.

Table 4.1-11 Proposed Project Greenhouse Gas Emissions

Activity	N ₂ O (tons)	CH ₄ (tons)	CO ₂ (tons)	CO ₂ e (metric tonnes)
Construction				
Pad Clearing Emissions	0.00	0.00	31	28
Grading and Access Road Construction Emissions	0.03	0.10	1,788	1,619
Facility Construction Emissions	0.03	0.08	871	793
Pipeline Construction Emissions	0.01	0.04	507	461
<i>Construction Total</i>				2,901
Testing Operations (one time)				
Drilling Emissions - Testing	0.01	0.03	470	426
Testing Emissions	0.01	0.13	2,590	2,336
<i>Operations – one-time total</i>				2,762
Operations while Drilling (per year)				
Stationary Equipment	0.02	1.33	8,301	7,500
Workover Emissions	0.00	0.01	94	85
Drilling Emissions	0.02	0.10	1,666	1,507
Offsite Mobile Emissions	0.03	0.06	397	366
Offsite Electrical Generation	0.01	0.13	7,523	6,777
<i>Total</i>				16,235
Operations while Re-Drilling (per year)				
Stationary Equipment	0.02	1.33	8,301	7,500
Workover Emissions	0.00	0.01	94	85
Drilling Emissions	0.00	0.01	205	186
Offsite Mobile Emissions	0.01	0.03	185	172
Offsite Electrical Generation	0.01	0.13	7,523	6,777
<i>Total</i>				14,720

Emissions associated with stationary equipment, including electrical generation, would exceed the SCAQMD threshold of 10,000 tonnes per year. This would be a significant impact. Mitigation measures could include a wide variety of measures, from onsite increased efficiency to offsite programs implemented in the community, which could reduce GHG emissions. Onsite measures could include: reduced facility water consumption, waste generation, and material use; recycling to the maximum extent feasible; and using bio-diesel or bio-diesel blends for diesel equipment. Offsite, community-wide measures could include sponsoring retrofitting of diesel buses with hybrid engines and methane-capture technology projects, including methane capture from dairy and agricultural operations. All of these activities would reduce emission of GHG.

Mitigation Measure

AQ-4 The Applicant shall implement a program to quantify and reduce greenhouse gas emissions associated with operations, such as using green electrical power to run equipment, using high efficiency pumps and electrical devices, requiring diesel engines to use biodiesel, or offsite measures that could offset greenhouse gas emissions. Operations GHG emissions levels shall be quantified and reported to the City and to the SCAQMD annually, and, if GHG emissions exceed the SCAQMD thresholds, a GHG emission reduction program shall be implemented to reduce emissions to less than the threshold value. The reduction program shall include planting at least 500 trees within the Preserve to sequester GHG emissions, in coordination with the Habitat Authority, and it shall follow the Climate Action Reserve protocols. The reduction program shall focus on onsite and local basin-area methods for GHG reductions.

Residual Impacts

Mitigation measure AQ-4 requires annual quantification and reporting of GHG emissions. Several measures could be implemented if GHG emissions exceed the SCAQMD thresholds, potentially including the following for onsite emissions:

- Reducing energy use, including natural gas and electricity, from existing and proposed direct sources, which would reduce GHG emissions from fuel combustion and electrical generation. Reducing water use, raw material use, and waste generation and increasing recycling would also reduce GHG emissions by reducing the energy used to transport and pump water, produce goods, and truck trips.
- Biodiesel (fatty acid methyl ester) is produced from plant crops, such as soybeans. Since it is made from plant sources, the carbon in the biodiesel has been recently removed from the atmosphere and therefore does not contribute to GHG emissions. Diesel vehicles can use biodiesel fuel (UC 2007). The American Society of Testing and Materials has approved a standard for biodiesel at blend levels up to 20 percent by volume, but some engine manufacturers recommend caution with blends greater than 10 percent. Replacement of 10 to 20 percent of diesel fuel with biodiesel would reduce GHG emissions by a proportionate amount. Biodiesel could be used in Project equipment or other engines in the area, such as school buses, to offset direct emissions from the Project.

Programs in the community that could reduce GHG emissions include the following:

- Planting trees removes CO₂ from the atmosphere as the tree grows. Trees remove CO₂ from the atmosphere through photosynthesis and store, or sequester, the carbon in the tree trunk, branches, and leaves. Tree carbon calculators indicate that a sycamore, 20 inches in diameter (at 4.5 feet height) and 50 feet tall, stores approximately 2.2 metric tonnes of CO₂e and grows at a rate that sequesters approximately 0.1 metric tonnes of CO₂ per year. Protocols for forest carbon sequestration would be utilized to ensure reductions are legitimate, such as those developed by the Climate Action Reserve.

- Retrofitting diesel buses with more efficient, hybrid-diesel engines would decrease GHG emissions from buses by increasing fuel economy and efficiency and, by association, decreasing fuel combustion. Diesel-hybrid buses employ technology that includes regenerative braking, electric motors, and battery storage to increase fuel efficiency. Experience in New York City indicates fuel economy efficiencies averaging 26 to 52 percent improvement compared to regular diesel buses. This savings in GHG emissions could be applied to offset the increase in GHG emissions from the proposed Project.
- Installation of solar panels at parking lots, for example, or on City buildings or structures, would reduce the need to generate electricity by area utilities and would therefore reduce emissions of GHG. The installation of approximately 300 solar panels could reduce annual emissions of GHG by approximately 100 tons.
- Obtaining offset credit through the Climate Action Reserve would decrease GHG emissions impacts. This offset program establishes standards for the development, quantification, and verification of GHG emissions reduction projects; issues carbon offset credits known as Climate Reserve Tonnes generated from such projects; and tracks the transaction of credits. The CARB participates in the program. The Climate Action Reserve has issued more than 10 million Climate Reserve Tonnes.

A combination of these mitigation measures could reduce the GHG emissions to below the SCAQMD threshold of 10,000 tons per year. However, the ability to implement some of these measures is uncertain; therefore, the impacts would still be potentially significant and unmitigable.

4.1.4.5 Toxic Emissions

With the addition of equipment at the field and drilling operations, emissions of toxics would occur. Toxic emissions associated with operations would include the emissions from combustion sources (e.g., flare, heater, diesel drilling engines), fugitive emissions, and mobile sources including diesel trucks visiting the site. Emissions were quantified using toxic emission factors defined by CARB speciation profiles and the SCAQMD. Appendix B lists emissions quantified by toxic material for the 5-year continuous drilling period and the following period when the only drilling would be re-drills.

Impact #	Impact Description	Phase	Residual Impact
AQ.5	Potential operations and drilling at the Whittier Main Oil Field would emit toxic materials.	Operations	Less Than Significant With Mitigation

According to AB 2588, health risk assessments (HRA) are required for facilities that emit toxic pollutants above a threshold criteria level. Based on SCAQMD annual emission reporting requirements, future operations at the oil field could exceed the emissions for equipment that is covered by the SCAQMD Rule 301 reporting requirements. Although the SCAQMD Rule 301

reporting requirement does not include mobile sources and temporary equipment (e.g., drill rigs and construction equipment), they have been included to provide a comparison of these emissions to the reporting thresholds.

As part of this analysis, a health risk assessment was conducted using the CARB Hotspots Analysis and Reporting Program (HARP) model. HARP is a computer software package that combines the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. All of these tools are tied to a single database allowing sharing and utilizations of information. HARP inputs are included in Appendix B.

The Office of Environmental Health Hazard Assessment (OEHHA) document Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments outlines the risk assessment methods and procedures (OEHHA 2003). The following paragraphs discuss the inputs associated with the model.

Receptor locations were established based on the Preserve boundary, a regional receptor grid, and the closest residences. The main receptor grid covered a 1- by 1-kilometer (0.6 by 0.6 miles) grid with spacing every 100 meters (328.1 feet). Receptors along the Preserve boundary were spaced approximately 20 meters (65.6 feet) apart.

The health risk assessment utilized local meteorological data for worst-case health risk estimates: SCAQMD meteorological data from the Whittier monitoring station is located on Leffingwell Road, approximately three miles northwest of the oil field.

Pursuant to SCAQMD Guidelines, terrain elevation heights were included in the modeling analysis. Digital Elevation Mapping data in the HARP modeling software were used to input elevation for all sources and receptors. Digital Elevation Mapping data from four U.S. Geological Survey quadrangles were required, which included Baldwin Park, El Monte, La Habra and Whittier.

It was assumed that all offsite individuals would experience a lifetime exposure (i.e., 70 years under the SCAQMD and OEHHA risk assessment guidelines) for operations and drilling. Two emission scenarios were evaluated in the analysis: a 70-year average emissions profile to estimate lifetime cancer risk, and a peak emissions year that was assumed to persist for 70 years to evaluate the SCAQMD's criteria limiting the risk per year to 1/70 of the maximum allowable risk. Since drilling would only occur over a five year period, the maximum emissions scenario represents a very conservative estimate of potential health risk.

Table 4.1-12 shows the results of the HARP modeling. Overall, the worst-case health risk associated with future operations exceeded applicable health risk criteria for individual cancer risk. Based on the health risk assessment modeling results, potential health risks would be considered potentially significant. Sources that contributed the greatest to the high health risk levels mainly included diesel engines, especially those associated with the drilling of new wells.

Table 4.1-12 Whittier Oil Field Potential Future Oil Field Development Health Risk Assessment Results

Criteria Description	HRA Result	Threshold Value
Cancer risk, per million	6.3	10
Peak Annual Equivalent Cancer risk, per million	28.5	10
Cancer Burden	0.04	0.5
Chronic risk, health index	0.003	1
Acute risk, health index (refined)	0.029	1

Source: HARP model

The cancer burden is defined as the estimated increase in the occurrence of cancer cases in a population subject to a MICR of greater than or equal to one in 1,000,000 (1×10^{-6}) resulting from exposure to toxic air contaminants.

Emissions of toxic materials can be reduced by limiting operations near sensitive receptors and installing devices on the diesel engines that reduce emissions of toxic materials. These devices are verified and registered by the CARB and are commonly used on diesel engines throughout industry to reduce diesel particulate matter, the main toxic component of diesel exhaust.

Mitigation Measure

Several mitigation measures have been identified as part of the air quality analysis. These mitigation measures, including AQ-1d, AQ-2a and AQ-2b, and AQ-3a through AQ-3d, would also reduce emissions of toxic air contaminants. However, the following mitigation measures would also be required to reach acceptable levels of public health risk.

AQ-5 The Applicant shall install CARB-verified Level 3 diesel catalysts on all diesel-powered drilling equipment. The current list of CARB-Verified Level 3 diesel catalysts is available from <http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>. Catalysts shall be capable of achieving 85% reduction for diesel particulate matter.

Residual Impacts

Diesel catalysts are widely used to reduce emissions from diesel engines. CARB recommends diesel catalysts as part of their ongoing Airborne Toxic Control Measures and maintains a list of certifications of applicable technologies. CARB has evaluated various types of control options for diesel particulate and identified the control efficiency, cost, and source test data. CARB found that the most effective control technologies are catalyst-based diesel particulate filters. CARB requires diesel catalyst manufacturers to certify that they can achieve the required reduction levels.

To evaluate the effectiveness of the proposed mitigation measures (i.e., AQ-1d, AQ-2b, AQ-5a), the HARP model was rerun using the same approach as was used to evaluate the potential future oil field development. Table 4.1-13 presents the results of the revised health risk assessment modeling. Overall, worst-case health risks associated with mitigated project operations are below all applicable health risk criteria.

With implementation of these mitigation measures, which would meet the SCAQMD Best Available Control Technology for Toxics requirements, impacts would be reduced to less than significant with mitigation.

Table 4.1-13 Whittier Oil Field Potential Future Oil Field Development Mitigated Health Risk Assessment Results

Criteria Description	HRA Result	Threshold Value
Cancer Risk, per million	0.5	10
Peak Annual Equivalent Cancer Risk, per million	1.27	10
Cancer Burden	0.00	0.5
Chronic Risk, health index	0.00	1
Acute Risk, health index (refined)	0.024	1

Source: HARP model

Compliance with Area Air Quality Management Plans

The SCAQMD AQMP includes implementing control measures and strategies to attain state and federal ambient air quality standards in the Basin. The SCAQMD then implements these control measures as regulations to control or reduce criteria pollutant emissions from stationary sources or equipment. A project is deemed inconsistent with the AQMP if it results in population or employment growth that exceeds growth estimates in that AQMP. Projects that do not involve growth-inducing impacts or exceed local or regional population or growth projections are generally considered consistent with the AQMP. The proposed Project would comply with all SCAQMD regulations and is not expected to result in population growth, and it would therefore comply with the goals of the AQMP.

Other Issue Area Mitigation Measure Impacts

Mitigation measures proposed for other issues areas could increase impacts to air quality if they are implemented. This section discusses those potential mitigation measure impacts.

Some mitigation measures could increase construction requirements associated with the Project, which could increase construction-related emissions, including fuel modification requirements for fire protection (FP-1e), installing sound walls (N-2a), increased structural construction requirements (GR-3c, GR-3d, GR-4a, GR-4b, and GR-5b through GR-5d), modifications to some intersections related to traffic (T-1a and T-1b), and restoration of habitat areas (BIO-1a and BIO-2a). However, none of these mitigation measures would increase the peak day emissions or health risk emissions. Therefore, the mitigation measures would not result in additional impacts, and additional analysis or mitigation is not required.

4.1.5 Cumulative Impacts and Mitigation Measures

None of the residential cumulative projects would be constructed near the proposed Project area, so there would be no operational localized impacts associated with cumulative projects.

Operational regional impacts could be produced, however, as multiple projects would emit into the same air basin at the same time. As the proposed Project would produce significant impacts, cumulative impacts could also be significant.

The Matrix City of La Habra Heights project, approximately 1.6 miles southwest of the proposed Project Site, and the proposed Project would not overlap localized criteria pollutant impacts since they are too far from one another to produce cumulative impacts.

Since none of the residential cumulative projects would be constructed near the proposed Project area, there would be no cumulative impacts associated with odors or toxic emissions. However, modeling indicates that the Matrix City of La Habra Heights oil development project, assuming it would not include diesel particulate mitigation, and the proposed Project could together realize cumulative impacts, with the City of La Habra Heights project contributing up to four in one million cancer cases to the maximum receptor location. Nonetheless, this impact would be less than significant for toxic emissions.

Emissions of GHG would contribute to global GHG emissions. Since they would be significant, cumulative GHG emissions could also be significant.

4.1.6 Mitigation Monitoring Plan

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
<p>AQ-1a The Applicant shall submit and implement a Fugitive Dust Control Plan that includes SCAQMD mitigations for fugitive dust mitigation, according to Rule 403, and SCAQMD CEQA Guidelines. The Plan shall also address fugitive dust measure impacts to native habitats. Fugitive dust mitigation measures in the plan should include the following:</p> <ul style="list-style-type: none"> - Apply water every 3 hours to disturbed areas within a construction site (61% reduction). - Require minimum soil moisture of 12% for earthmoving, by using a moveable sprinkler system or water truck. Moisture content can be verified by lab sample or moisture probe (69% reduction). - Limit on-site vehicle speeds on unpaved roads to 15 mph with radar enforcement (57% reduction) and posting of speed limits. - Replace ground cover in disturbed areas as quickly as possible (5% reduction). - All trucks hauling dirt, sand, soil, or other loose materials are to be tarped with a fabric cover and maintain a freeboard height of 12 inches (91% reduction). - Install gravel bed trackout apron (3 inches deep, 25 feet long, 12 feet wide per lane, and edged by rock berm or row of stakes) to reduce mud and dirt trackout from unpaved truck exit routes (46 to 80% reduction). - Water industrial unpaved road three times per day (61% reduction). - Water storage piles by hand or apply cover when wind events are declared, according to 	Fugitive dust control plan	Review of plan and inspection during construction and operations	Before construction and operations	City of Whittier and SCAQMD

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
<p>SCAQMD Rule 403 when instantaneous wind speeds exceed 25 miles per hour (90% reduction).</p> <ul style="list-style-type: none"> - Appoint a construction relations officer to act as a community liaison concerning onsite construction issues, such as dust generation. 				
<p>AQ-1b Treat all roads with water three times per day prior to and during the Drilling and Resting Phase pad clearing to substantially reduce dirt road fugitive dust emissions.</p>	Treating of roads	Inspection of test drilling clearing and drilling activities	Before and during test drilling	City of Whittier
<p>AQ-1c Treat all roads (pave or apply non-toxic soil binders with at least 80% effectiveness) before beginning the development phase pad grading and facility construction to substantially reduce dirt road fugitive dust emissions during those phases of construction.</p>	Paving of roads	Inspection before facility construction and pad grading	Before pad grading/facility construction	City of Whittier
<p>AQ-1d The Applicant shall implement a NO_x reduction program including the following, or equivalent, measures:</p> <ul style="list-style-type: none"> - All off-road diesel construction equipment greater than 100 horsepower shall be EPA Tier 3-certified or better engines, or utilize other CARB-verified emission control technologies to achieve the same level of emission reduction. - All off-road construction equipment shall be tuned and maintained according to manufacturers' specifications. - Any temporary electric power shall be obtained from the electrical grid, rather than portable diesel or gasoline generators. - Soil hauling shall be coordinated with the Savage Canyon Landfill to receive the soil to limit haul truck travel distance, or utilize trucks that comply with the EPA 2010 	Tier 3 engines, no portable generators, haul routes, idling times	Inspection of engine certifications, haul routes, idling times included in contractor language, etc.	Before construction	City of Whittier

4.1 Air Quality

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
<p>model year emissions requirements.</p> <ul style="list-style-type: none"> - Limit onsite truck idling to less than 5 minutes. - During the pad and access road grading phase, all off-road dump trucks shall meet EPA 2010 model year NOx emission requirements or achieve a certified NOx emission level of less than 2.0 g/bhp-hr. - A copy of the certified tier specification, best available control technology documentation, or the CARB or SCAQMD operating permit for each piece of equipment shall be provided when each piece of equipment is mobilized. 				
<p>AQ-2a The Applicant shall comply with all SCAQMD regulations, including but not limited to Regulation IV (Prohibitions), Regulation XIII (New Source Review), Regulation XI (Source Specific Standards), and Regulation XIV (New Source Review for Toxic Air Contaminants). The operator shall implement best available control technology and obtain emission offsets as required by SCAQMD Regulation XIII and/or Regulation XX for new and modified permitted emission sources. Emission offsets are required for all emission increases associated with stationary sources, thus, minimizing the impacts associated with emissions from stationary sources.</p>	Offsets	Inspection of offsets compliance	Before operations	SCAQMD
<p>AQ-2b The Applicant shall implement a program to reduce NOx and PM emissions, including:</p> <ul style="list-style-type: none"> - All drilling engines shall meet EPA Tier 3 emissions levels, or utilize other CARB-verified emission control technologies to 	Tier 3 engines, fugitive dust measures, newer trucks	Inspection of engine and truck certifications, road conditions	Before drilling, before operations	City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
<p>achieve the same level of emission reduction, or utilize electric engines.</p> <ul style="list-style-type: none"> - Treat all used Preserve dirt roads that will be used (pave or apply soil binders with at least 85% effectiveness) or pave all Preserve dirt roads that will be used during test drilling. - Limit onsite truck idling to less than 5 minutes. - Electrify service equipment and auxiliary power units where feasible. - Use clean street sweepers during operations. <p>Pave roads and road shoulders during operational phase.</p> <ul style="list-style-type: none"> - Utilize trucks that meet EPA 2010 emission standards and off-road equipment that meets EPA 2015 emissions levels to the extent feasible. - A copy of the certified tier specification, best available control technology documentation, or the CARB or SCAQMD operating permit for each piece of equipment shall be provided when each piece of equipment is mobilized. - Purchase emission offsets to reduce remaining NOx emissions to less than significant levels. 				
<p>AQ-3a The Operator shall have a gas buster and SCAQMD-approved portable flare at the oil field and available for immediate use to circulate out and combust any gas encountered during drilling. The flare shall be capable of recording the volume of gas that is flared. The operator shall report any flared gas from drilling to the Los Angeles County Fire Chief and the SCAQMD.</p>	Gas buster and flare	Inspection of drilling site	Before drilling	City of Whittier
<p>AQ-3b The Operator shall install a detection system that will monitor vapor space on all crude</p>	Crude tank relief detection	Inspection of crude tanks	Before operations	City of Whittier

4.1 Air Quality

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
oil tanks. The detection system shall be capable of monitoring pressure in the vapor space of the tanks and notifying the operator via an alarm when the pressure in the tanks gets within 10 percent of the tank relief pressure. If the tank pressure exceeds the relief pressure, the Operator shall report the incident to the SCAQMD as a breakdown pursuant to Rule 430, and submit a report of the breakdown to the Los Angeles County Fire Chief and the SCAQMD, which shall detail the corrective actions the Operator shall take to avoid exceeding the tank relief pressure.				
AQ-3c The Operator shall develop an Odor Minimization Plan. The Odor Minimization Plan shall address odors from all oil field equipment, including wells and drilling operation. The Plan shall address issues such as facility information, buffer zones, signs with contact information, logs of odor complaints, and the protocol for handling odor complaints.	Odor Minimization Plan	Inspection of plan and signage	Before drilling	City of Whittier
AQ-3d The Operator shall develop an Air Monitoring Plan. The Plan shall provide for the monitoring of total hydrocarbon vapors and hydrogen sulfide at each well drill and re-drilling site and total hydrocarbon vapors at the gas plant. At all times during drilling and re-drilling operations, the Operator shall maintain monitoring equipment that shall monitor and digitally record the levels of hydrogen sulfide and total hydrocarbon vapors. Monitors shall be installed at the edge of the drill pad and around the outer edge of the gas plant. Such monitors shall provide automatic alarms that are audible	Air Monitoring Plan	Inspection of plan and equipment	Before drilling	City of Whittier

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
or visible to the Operator of the drilling equipment for the drill rig monitors, and gas plant for the gas plant monitors, and shall be triggered by the detection of hydrogen sulfide or total hydrocarbon vapors. Alarm points shall be set at a maximum of 5 and 10 ppm H ₂ S and 500 and 1,000 ppm hydrocarbons, with the higher level requiring shut-down of drilling or gas plant operations and notification to appropriate agencies, including the Los Angeles County Fire Department and SCAQMD. A meteorological station to monitor wind speed and direction under the guidance and specification of the SCAQMD shall be installed at the Processing Site, or applicable location.				
AQ-3e The Operator shall use an odor suppressant spray system or vapor capture hood and carbon filter system on the mud shaker tables for all drilling operations so that no odor can be detected at the edge of the oil field property.	Muds odor suppressant or capture system	Inspection of drilling operations	During drilling	City of Whittier
AQ-4 The Applicant shall implement a program to quantify and reduce greenhouse gas emissions associated with operations, such as using green electrical power to run equipment, using high efficiency pumps and electrical devices, requiring diesel engines to use biodiesel, or offsite measures that could offset greenhouse gas emissions. GHG emissions levels shall be quantified and reported to the City and to the SCAQMD for operations on an annual basis, and, if GHG emissions exceed the SCAQMD thresholds, then a GHG emission reduction program shall be implemented to reduce	Greenhouse gas reduction program	Inspection of equipment and programs	During operations	City of Whittier

4.1 Air Quality

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
emissions to less than the threshold value. The reduction program shall include planting at least 500 trees within the Preserve to sequester GHG emissions, in coordination with the Habitat Authority, and it shall follow the Climate Action Reserve protocols. The reduction program shall focus on on-site and local/basin area methods for GHG reductions.				
AQ-5 The Applicant shall install CARB-Verified Level 3 diesel catalysts on all diesel-powered drilling equipment. The current list of CARB-Verified Level 3 diesel catalysts is located at http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm . Catalysts shall be capable of achieving 85% reduction for diesel particulate matter.	Diesel catalysts	Inspection of drilling operations	During drilling	City of Whittier