4.1 Air Quality

This section discusses operational emissions and odors that could result from the Proposed Project. The Project does not involve any construction, so construction-related impacts are not considered. The section also discusses air toxic emissions as well as greenhouse gas emissions.

Emission rates were generated using standard emission factors and use rates contained within the Urban Emissions (URBEMIS) modeling program, as applicable. Emission calculations are included in Appendix B. As described in Section 2.0, Project Description, the Proposed Project would include increasing the permitted volume of processed crude oil. Some activities would occur daily, while others would occur sporadically. This analysis is intended to provide a reasonable worst-case scenario of potential air emissions resulting from the proposed activities and recommends mitigation to reduce any significant impacts to less than significant levels.

4.1.1 Environmental Setting

San Luis Obispo County (SLOC) is part of the South Central Coast Air Basin, which also includes Santa Barbara and Ventura counties. The climate of the region is strongly influenced by its proximity to the Pacific Ocean. Airflow around the County plays an important role in the movement and dispersion of pollutants. The speed and direction of local winds are controlled by the location and strength of the Pacific high-pressure system and other global weather patterns, topographical factors, and circulation patterns that result from temperature differences between the land and the sea.

The land area of San Luis Obispo County is approximately 3,316 square miles, encompassing varied vegetation, topography, and climate. From a geographical and meteorological standpoint, the County can be divided into three general regions: the Coastal Plateau, the Upper Salinas River Valley, and the East County Plain. Air quality in each of these regions is characteristically different, although the physical features that divide them provide only limited barriers to the transport of pollutants between the regions.

The Proposed Project is within the Coastal Plateau. Approximately 75 percent of the County population, and a corresponding portion of the commercial and industrial facilities, are also within the Coastal Plateau. Due to higher population density and closer spacing of urban areas, emissions of air pollutants per unit area are generally higher in this region than in the other two regions of the county.

4.1.1.1 Air Quality Monitoring

Ten air-quality monitoring stations measure San Luis Obispo County’s air quality (Grover Beach only monitors wind speed and direction, no air quality). The San Luis Obispo County Air Pollution Control District (SLOCAPCD) operates seven permanent stations at Nipomo Regional Park, Grover Beach, Morro Bay, Atascadero, Red Hills (near Shandon in eastern San Luis Obispo County), Arroyo Grande, and the Carrizo Plain. The California Air Resources Board (CARB) operates two additional stations in the cities of San Luis Obispo and Paso Robles. One station on the Nipomo Mesa (i.e., Nipomo-Guadalupe) is operated by the SLOCAPCD for the Phillips Refinery.

Although the Arroyo Grande station is the closest to the Proposed Project, it only monitors particulate matter (PM10 and PM2.5). Therefore, the closest SLOCAPCD station to the proposed Project area that monitors for Project-related pollutants is the Nipomo Regional Park monitoring station, approximately 5 miles east of the Proposed Project area. The Nipomo-Guadalupe monitoring station, approximately 1 mile southeast of the Proposed Project Site, is examined in this report for particulate matter, sulfur dioxide, and wind speed and direction information.

Air quality monitoring is rigorously controlled by federal and state quality assurance and control procedures to ensure data validity. Gaseous pollutant levels are measured continuously and averaged every hour, 24 hours per day. Particulate pollutants (PM10) are monitored continuously at the Arroyo Grande, Nipomo Regional Park and Nipomo-Guadalupe stations and continuous PM 2.5 monitors (hourly average) at Nipomo-Guadalupe and Arroyo Grande stations.

Specific Air Pollutants

Carbon Monoxide (CO): 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, thus reducing the blood's ability to transport oxygen to vital organs in the body. The ambient air quality standard for CO is intended to protect people whose medical condition already compromises their circulatory system's ability to deliver oxygen.

Nitrogen Dioxide (NO_2): NO_2 is a brownish gas formed in the atmosphere through a rapid reaction of the colorless gas nitric oxide (NO) with atmospheric oxygen. NO and NO_2 are collectively referred to as nitrogen oxides (NO_x). NO_2 can cause respiratory irritation and constriction of the airways, making breathing more difficult.

Sulfur Dioxide (SO_2): SO_2 is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. Health effects include acute respiratory symptoms and breathing difficulty.

PM_{10}, the coarse fraction of suspended particulate matter measuring 10 microns or less in diameter, includes a complex mixture of man-made and natural substances including sulfates, nitrates, metals, elemental carbon, sea salt, soil, organics, and other materials. PM_{10} have adverse health impacts because these microscopic particles can penetrate the respiratory system. In some cases, the particulates themselves may cause actual damage to the alveoli of the lungs or they may contain adsorbed substances that are injurious.

Ambient PM_{10} concentrations have been primarily a localized issue of concern in San Luis Obispo County, including Paso Robles, San Luis Obispo, Morro Bay, and Nipomo. Exceedances in these areas are the major impetus for the county’s nonattainment designation for the state PM_{10} standard. The major sources for PM_{10} are mineral quarries, grading, demolition, agricultural tilling, road dust, and vehicle exhaust.

The $PM_{2.5}$ standard is a subset of the PM_{10} standard. In addition to the health effects of PM_{10}, exposure to $PM_{2.5}$ may result in increased respiratory symptoms, disease, and decreased lung function.

In addition to primary criteria pollutants, the SLOCAPCD monitors ozone at various locations throughout the region. 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 volatile organic compounds (VOC), NO_x, oxygen, and other hydrocarbon materials with sunlight.

Ozone is a deep lung irritant, causing the passages to become inflamed and swollen. Exposure to ozone alters respiration, most characteristically with shallow, rapid breathing and a decrease in pulmonary performance. Ozone also reduces the respiratory system's ability to fight infection and remove foreign particles.

Ozone exists both at ground level, where it is considered a pollutant with harmful effects and at higher elevations in the lower portion of the stratosphere from approximately 13 to 40 kilometers above Earth, where it absorbs more than 95 percent of the sun's ultraviolet light providing a beneficial effect.

Combustion byproducts reacting with sunlight and ambient conditions primarily generate ground-level ambient ozone. Areas where ozone violations primarily occur are the northern and eastern portions of the county, where summer temperatures are high. Ozone levels exceeding the state standard have been measured in Paso Robles, the Carrizo Plain, and Atascadero in recent years. In addition, ozone is carried into San Luis Obispo County from upwind regions of the state.

Because concentrations of ozone and PM_{10} exceed state health-based standards, San Luis Obispo County has been designated as a non-attainment area for these two pollutants. Table 4.1-2 shows 3 years of monitoring data between 2007 and 2009 for ozone, NO_2, and PM_{10} for the Nipomo monitoring station, approximately 5 miles east of the Refinery site (at West Tefft Street and Pomeroy Road). Also shown are PM and SO_2 monitoring results for the Nipomo-Mesa and Nipomo-Guadalupe sites, which are within 1 mile of the Refinery to the east. The federal PM_{10} were not exceeded in any of these years. Exceedances to the federal ozone standard were noted during this timeframe at monitors located in eastern SLO County. PM_{10} and ozone exceed the state standards. The eastern portion of San Luis Obispo County has been designated non-attainment for the federal 8-hr ozone standard. Table 4.1-3 shows the attainment status of criteria pollutants throughout the entire South Central Coast Air Basin.

Table 4.1-1 State and National Criteria Air Pollutant Standards, Effects, and Sources

Air Pollutant	State Standard (concentration, averaging time)	Federal Primary Standard (concentration, averaging time)	Most Relevant Effects
Ozone	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	9.0 ppm, 8-hour average 20 ppm, 1-hour average	9 ppm, 8-hour average 35 ppm, 1-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	0.18 ppm, 1-hour average, 0.03 ppm, annual average	0.053 ppm 0.10 ppm 98th percentile, 3-year average	(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	0.04 ppm, 24-hour average 0.25 ppm, 1-hour average	0.075 ppm, 1-hour, 99th percentile 3-year average 0.14 ppm 24-hour 0.03 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})	20 µg/m^3, annual arithmetic mean 50 µg/m^3, 24-hour average	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	15 µg/m^3, annual arithmetic mean 35 µg/m^3, 24-hour average	Decreased lung function from exposures and exacerbation of symptoms in sensitive patients with respiratory disease, elderly, children.
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.

Table 4.1-1 State and National Criteria Air Pollutant Standards, Effects, and Sources

Air Pollutant	State Standard (concentration, averaging time)	Federal Primary Standard (concentration, averaging time)	Most Relevant Effects
Lead	1.5 µg/m^3, 30-day average	0.15 µg/m^3, roll 3-month average 1.5 µg/m^3, calendar quarter	(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. to 6 p.m. PST)	No federal standard	Reduction of visibility, aesthetic impact and impacts due to particulates (see above)
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. Was 0.08 ppm prior

Source: SLOC APCD 2009 and CARB 9/8/2010

Table 4.1-2 Monitoring Results at the Nipomo Monitoring Station

Pollutant	Standard	2007	2008	2009
Ozone				
Maximum 1-hour concentration (ppm)		0.072	0.092	.071
Number days exceeded: State	> 0.09 ppm/1-hour	0	0	0
Max 8-hour concentration (ppm)		0.068	0.072	.067
Number days exceeded: State	> 0.07 ppm/8-hour	0	1	0
Number days exceeded: Federal	> 0.075 ppm/8-hour	0	0	0
Particulates (PM10)				
Maximum 24-hour concentration (μg/m^3)		82	58	58
Number days exceeded: State	> 50 μg/m^3/24-hour	12.2	6.1	17.9
Number days exceeded: Federal	> 150 μg/m^3/24-hour	0	0	0
Maximum 24-hour concentration (μg/m^3) – Nipomo-Guadalupe		133	91	120
Number days exceeded: State	> 50 μg/m^3/24-hour	-	39.7	53.8
Number days exceeded: Federal	> 150 μg/m^3/24-hour	-	0	0
Nitrogen Dioxide (NO_2)				
Daily Maximum NO_2 (ppm)		0.034	0.05	0.035
Number days exceeded: State	> 0.18 ppm/1-hour	0	0	0
Sulfur Dioxide (SO_2)				
Maximum 1-hour concentration, ppm – Nipomo-Guadalupe		-	.047	.017

Notes: The Nipomo Regional Park Station monitors NO2, ozone and PM10. Nipomo Guadalupe values used for SO2 and PM10
Source: CARB website Air Quality Data, SLOC APCD 2008/2009 Annual reports

The CARB meteorological data from the Nipomo-Guadalupe monitoring station, approximately 1 mile southeast of the Proposed Project Site, is the closest station to the Project Site that has detailed wind direction and speed information. This data was plotted into a wind rose (Figure 4.1-1) to demonstrate the predominant wind direction and speeds at the Project site. Figure 4.1-1 shows that the predominate wind blows from the west and northwest 36 percent of the time, and from the east (east and southeast) less than 20 percent of the time during 2009. Wind speeds averaged approximately 5 miles per hour, with periods of stronger winds above 20 miles per hour occurring less than one percent of the time.

Table 4.1-3 Attainment Status of Criteria Pollutants in San Luis Obispo County

Pollutant	State	Federal
O_3 – 1-hour	Non-attainment	Revoked
O_3 – 8-hour	Non-attainment	Non-attainment eastern SLO County
PM_{10}	Non-attainment	Attainment
$PM_{2.5}$	Attainment	Attainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
Lead	Attainment	Attainment
All others	Attainment/Unclassified	Attainment/Unclassified

Note: The San Luis Obispo County attainment status is pending EPA action and the new ozone standard is scheduled for release in the near future.
Source: CARB

4.1.1.2 Countywide Emissions Inventory

This section summarizes the countywide emission inventory.

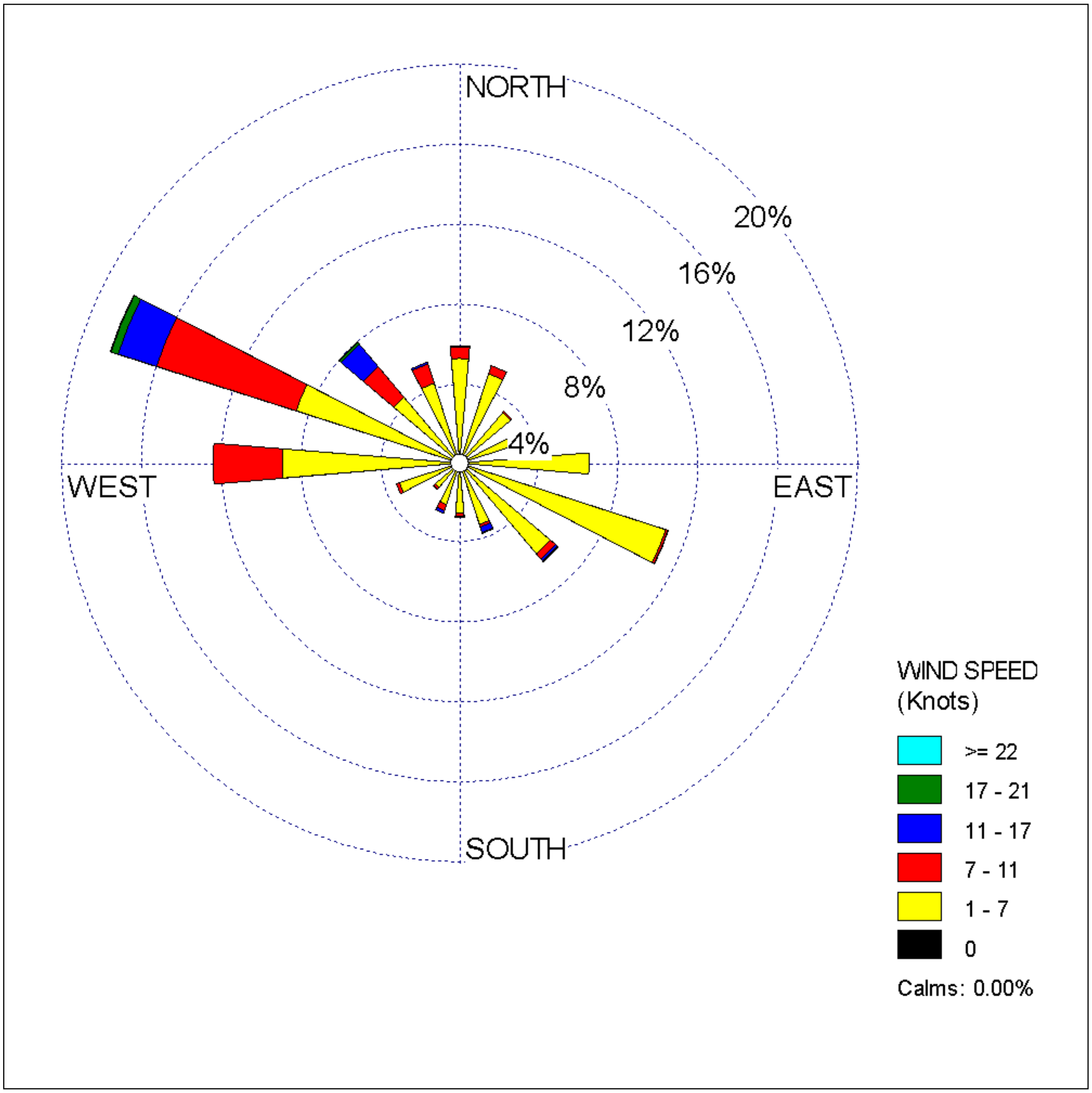
Countywide Criteria Pollutant Emission inventory

On a regional basis, ozone is the criteria pollutant of significant concern in San Luis Obispo County, particularly within the Coastal Plateau. Ozone is a secondary pollutant, formed in the atmosphere by complex photochemical reactions involving the precursor pollutants of nitrogen oxides (NO_x) and reactive organic gases (ROG) and sunlight.

The amount of ozone formed is dependent upon both the ambient concentration of the chemical precursors and the intensity and duration of sunlight. Consequently, ambient ozone concentration tends to vary seasonally with the weather.

NO_x is emitted primarily from the combustion of fossil fuels with mobile source producing the majority of NO_x emissions (see Table 4.1-4). The majority of ROG emissions are also generated by mobile source fossil fuel combustion, wildfires and through the evaporation of petroleum products. Particulate emissions are generated primarily from road dust, wildfires and construction activities.

Figure 4.1-1 Nipomo-Guadalupe Meteorological Station Wind Rose – 2009



Note: Wind rose shows the direction that the wind is coming from.
Source: CARB meteorological data, Nipomo-Guadalupe monitoring station 2009

Although large sources are surveyed and updated each year, the SLOCAPCD performs an emissions inventory for the majority of permitted sources every 3 years. The last complete inventory was conducted for 2008 emissions; Table 4.1-4 shows these emissions for ozone precursors and particulate matter. As seen in the table, the largest sources of ozone precursors are on-road vehicles, other mobile sources, and wildfires. The largest sources of particulate matter are wildfires, road dust, construction and demolition, and residential fuel combustion. Petroleum refining contributes less than one percent of the $PM_{2.5}$ emissions in the County.

A study performed by the SLOCAPCD, the South County Phase 2 Particulate Study, evaluated whether impacts from off-road vehicle activities at the Oceano Dunes State Vehicle Recreational Area (SVRA), the Phillips Refinery coke piles, and adjacent agricultural fields were contributing to the particulate problems on the Nipomo Mesa (SLOC APCD 2010). The SVRA is upwind of the Nipomo Mesa; the study data includes the SVRA in the area that is the major source of particulates on the Nipomo Mesa. Average weekend and weekday particulate measurements taken on the Nipomo Mesa over the past 12 years were analyzed to determine whether there were higher PM levels on the weekends, which would be relevant to the typically higher weekend off-road vehicle activity at the SVRA. The analysis found higher weekend concentrations at one monitoring station but the data were not conclusive. The Phase 2 portion of the study concluded that off-road vehicle activity in the SVRA is a major contributing factor to the PM concentrations observed on the Nipomo Mesa and that neither the petroleum coke piles at the Phillips facility nor agricultural fields or activities in and around the area are a significant source of ambient PM on the Nipomo Mesa.

The study indicates that off road vehicle activity on the dunes is known to cause de-vegetation, destabilization of dune structure, and destruction of the natural crust on the dune surface. All of these increase the ability of winds to entrain sand particles from the dunes and carry them to the Nipomo Mesa, representing an indirect emissions impact from the vehicles. The study concluded that off-road vehicle activity is the primary cause of the high PM levels measured on the Nipomo Mesa during episode days.

The study documents the frequent occurrence of unhealthful particulate levels on the Nipomo Mesa. Even though the composition of the particulates is predominately natural crustal particles, the health implications are not lessened. All fine airborne particulate matter, regardless of composition, can cause respiratory distress when inhaled, especially to the very young, the elderly, and those with compromised respiratory systems. In addition, sand particles from the Oceano Dunes are high in crystalline silica, a known carcinogen.

Table 4.1-4 San Luis Obispo County Ozone Precursors and PM Emissions by Source

Emission Sources of Ozone Precursors	ROG (tpy)	ROG %	NOx (tpy)	NOx %
Fuel Combustion	64	1	586	4
Waste Disposal	8.1	0	1.3	0
Cleaning/Surface Coating	1,023	11	0.0	0
Petroleum Production and Marketing	372	4	13	0
Industrial Processes	101	1	37	0
Solvent Evaporation	604	6	0.0	0
Miscellaneous Processes	1,445	15	258	2
On-Road Motor Vehicles	2,623	27	4,448	33
Other Mobile Sources	1,837	19	7,563*	56
Wildfires	1,581	16	715	5
Total Ozone Precursor	9,657**		13,620	
Emission Sources of Particulate Matter	**PM_{10} (tpy)**	**PM_{10} %**	**$PM_{2.5}$ (tpy)**	**$PM_{2.5}$ %**
Wildfires	2,307	20	1,956	46
Ships & Commercial Boats	366	3	356	8
Cooking	123	1	74	2
Waste Burning & Disposal	34	0	32	1
Fugitive Wind Blown Dust	639	6	106	2
Unpaved Road Dust	3,226	28	321	7
Paved Road Dust	1,789	16	266	6
Construction & Demolition	1,486	13	150	3
Livestock	723	6	150	3
Residential Fuel Combustion	631	6	610	14
Mineral Processes	87	1	-	-
Farm Equipment	-	-	62	1
Off-Road Equipment	-	-	91	2
On-Road Motor Vehicle	-	-	114	3
Petroleum Refining	-	-	9	0
Total PM	11,410		4,298	

Notes: * 4,587 tons of this is ships and commercial boats – ARB area source offshore

** Excludes biogenic and geogenic sources

Source: SLOC APCD 2008 Emission Inventory

Countywide Air Toxics

Air toxics are substances that may cause or contribute to an increase in cancer or serious illness, such as respiratory disease. The federal 1990 Clean Air Act Amendments (CAAA) set up a new nationwide air toxics control program. The federal program focuses on larger industrial sources that are of the highest national priority, such as chemical manufacturers. State and local air pollution control agencies adopt measures to minimize Californians' exposure to toxic air contaminants (TAC). The State of California regulates TAC in several ways. The Toxic Air Contaminant Identification and Control Act (AB1807-1983) created a program to reduce the health risks from air toxics. This law expanded CARB authority to evaluate and control air toxics. An additional state law, the Air Toxics "Hot Spots" Information and Assessment Act (AB2588-1987) supplements the original legislation by requiring a statewide air toxics inventory and notifying local residents of significant risks from nearby sources. A 1992 amendment to the law (SB1731) requires that risks be reduced from these sources.

The CARB has identified asbestos as a TAC. In its natural state, asbestos occurs throughout many areas. Serpentine is a very common rock type in California and was identified by the CARB as having the potential to contain naturally occurring asbestos. Under the CARB Air Toxics Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations, prior to any grading activities at a site, a geologic analysis is necessary to determine if serpentine rock is present. Grading projects larger than 1 acre in serpentine rock would require prior SLOCAPCD approval of an Asbestos Dust Mitigation Plan and an Asbestos Health and Safety Program.

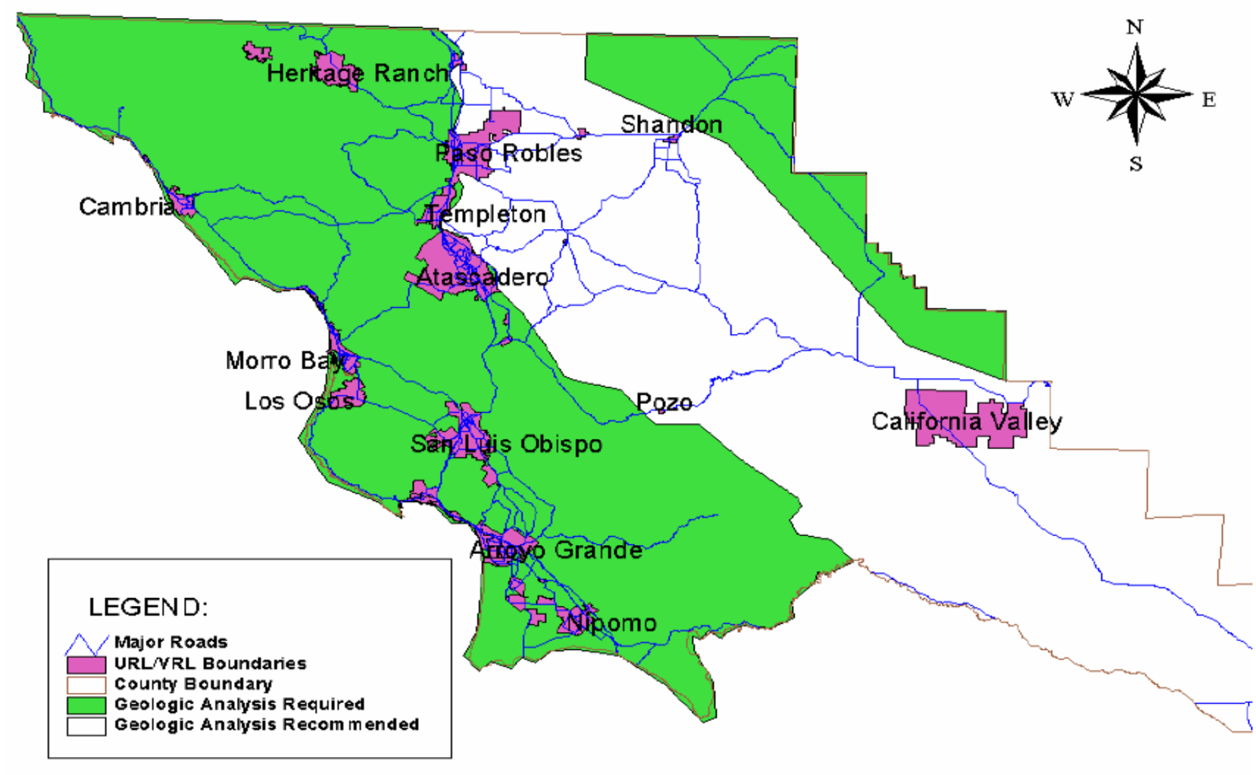
Serpentine rock is found in many regions of San Luis Obispo County, including coastal areas, as far inland as Paso Robles, and the extreme eastern area along the San Andreas Fault. Figure 4.1-2 shows areas subject to the naturally occurring asbestos ATCM requirements. The Project Site is within one of these general areas that may include asbestos-containing rock. However, the Proposed Project does not include any construction or grading activities.

4.1.1.3 Greenhouse Gases

The California legislature concluded that global climate change poses significant adverse effects to the environment (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 man-made (i.e., caused by humans) and that climate change could lead to adverse changes around the globe (Intergovernmental Panel on Climate Change Climate, 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. Although historical records show that dramatic fluctuations in temperature 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 both rate and magnitude (AEP 2007).

Figure 4.1-2 Areas Requiring Asbestos ATCM Geological Analysis and Requirements



Source: SLOC APCD Website

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. Although many groups agree with the conclusions of the Intergovernmental Panel on Climate Change and the CARB, many groups feel the work is lacking. However, in terms of California Environmental Quality Act (CEQA) analysis, jurisdictions 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 (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorocarbons. The warming potential of different types of GHG varies. The global warming potential (GWP) is the potential of a gas or aerosol to trap heat in the atmosphere. Since GHG absorb different amounts of heat, a common reference gas, CO_2, is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as CO_2 equivalent, or CO_2e. CO_2e is the amount of GHG emitted multiplied by the global warming potential. The global warming potential of CO_2 is therefore defined as one.

The increase of GHG emissions has lead to the trapping and buildup of heat in the atmosphere near the earth's surface, commonly known as the greenhouse effect. Put another way, the amount of GHG in the atmosphere regulates the earth's temperature. Without natural GHG, the earth's surface would be cooler (CARB 2006). 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 acceleration of climate change. Unlike criteria air pollutants and TAC, 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 the 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 2006, 2007). 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 Gases

Water vapor is the most abundant and variable GHG 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 percent). 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 GHG with a GWP of 1. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanoes. Man-made sources of carbon dioxide include burning fuels, such as coal, oil, natural gas, and wood. The interaction of man-made sources and natural sources of GHG and how they contribute to the atmospheric levels of GHG is a complex issue. Current concentrations of CO_2 in the atmosphere are approximately 379 parts per million (ppm); some say that concentrations may increase to 1,130 CO_2e ppm by 2100 as a direct result of man-made sources (IPCC 2007). Some predict that this will result in an average global temperature rise of at least 7.2 degrees Fahrenheit by 2100 (IPCC 2007).

Methane, a gas, is the main component of natural gas used in homes and has a GWP of approximately 21. Decaying organic matter in forests and oceans is a natural source of methane. Man-made sources include landfills, fermentation of manure, and cattle. Geological deposits known as natural gas fields contain methane, which is extracted for fuel.

Nitrous oxide (N_2O), also known as laughing gas, is a colorless gas with a GWP 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 N_2O. 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 NO_2) is produced as a criteria pollutant and is not the same as N_2O. Very small quantities of N_2O 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 (SF_6) 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 4.1-5 shows a range of gases that contribute to GHG 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.

Table 4.1-5 Global Warming Potential of Various Gases

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
CF4	50,000	6,500	4,400	10,000
C2F6	10,000	9,200	6,200	14,000
C4F10	2,600	7,000	4,800	10,100
C6F14	3,200	7,400	5,000	10,700
SF6	3,200	23,900	16,300	34,900

Note: GWP = global warming potential
Source: EPA 2007a

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 the CARB, it is difficult to determine accurately the contribution of ozone precursors (NO_x and VOC) to global climate change (CARB 2006).

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 they are not limited to local impacts. Therefore, offsite impacts, such as vehicle emissions and other associated transportation emissions, are included.

Emissions are generally classified as either direct or indirect. Direct emissions are associated with the production of GHG emissions at the Project 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 also 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 GHG 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 GHG 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 GHG emissions associated with uranium mining and enrichment range up to approximately 60 pounds per megawatt hour (lbs/MWh), or approximately 5% of natural gas turbine GHG emissions (Canada 1998).

Detailed information on the power generation plants, their contribution to the 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 2007b). 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 GHG emission levels, based on facility specifics. Nuclear, hydroelectric, wind, geothermal, biomass, and solar are assigned zero GHG emissions. eGRID assigns zero CO_2 emissions to generation from the combustion of all biomass because these organic materials would otherwise release CO_2 (or other GHG) into the atmosphere through natural decomposition. The other fuels are assigned GHG emissions levels based on the fuel carbon content.

This report analyzed the eGRID database to assign a GHG emissions level to electricity generated for the operations. Table 4.1-6 shows the resource mix and estimated GHG emissions for a range of areas. Approximately half of the electricity in the US is generated from coal. Nationwide, GHG emissions from all electricity production sources are approximately 1,363 lbs/MWh. The 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 GHG emission rate of approximately 687 lbs/MWh due to the use of hydroelectric, nuclear, and renewable energy sources.

Table 4.1-6 Electricity Generation Resource Mix and Greenhouse Gas Emissions

Resource Mix[a]	United States	Western States (WECC)	CalISO Service Area[b]
Coal	50.2	34.2	1.2
Oil	3.0	0.5	1.2
Gas	17.4	26.3	51.1
Nuclear	20.0	9.9	16.8
Hydro	6.6	24.3	17.3
Biomass	1.4	1.3	3.2
Wind	0.3	0.9	2.4
Solar	0.0	0.1	0.3
Geo	0.3	2.0	5.5
Other Fossil	0.5	0.3	0.9
Other	0.1	0.0	0.0
Non-Renewables	91.3	71.3	71.3
Renewables	8.7	28.7	28.7
Non-Hydro Renewables	2.1	4.3	11.4
CO_2 Rate, lb/MWh	1363	1107	687

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

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

Source: eGRID database with modifications and updates

Since the Mohave Generating Station shut down in 2005, it was removed from the eGRID database and calculations.

The GHG 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 GHG emissions (e.g., hydroelectric, nuclear, and renewables).

Indirect GHG emissions are also associated with water use, since electricity would be necessary to pump and treat water used at the Proposed Project Site. Water used at the site comes from wells at the Refinery and, therefore, water-associated electrical use is included in total Refinery electricity requirements. Water treatment is incorporated through the electricity used to power the water treatment facility at the SMF.

Indirect GHG emissions associated with trash hauling and other services that might visit the Proposed Project Site are incorporated through the inclusion of the travel of diesel trucks that would visit and service the Project Site.

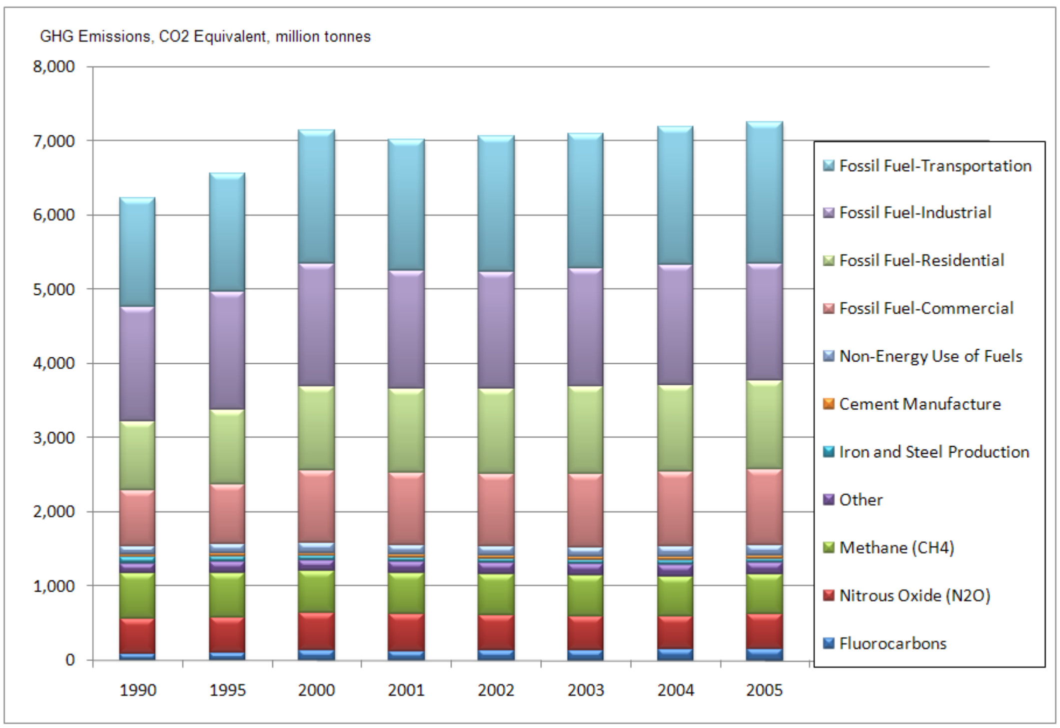
National Greenhouse Gas Emissions

Fossil fuel combustion is responsible for the vast majority of the United State's GHG emissions, and CO_2 is the primary GHG. In 2005, total US GHG emissions were 7,260 million metric tons of carbon equivalent (MMTCE); 84 percent of which were CO_2 emissions (EPA 2007). Figure 4.1-3 shows the breakdown of US GHG emissions since 1990. In 2005, approximately 33 percent of GHG emissions were associated with transportation and approximately 41 percent were associated with electricity generation.

Statewide Greenhouse Gas Emissions

With a population of 33 million, California is the most populous state in the United States. In 2004, California produced 492 MMTCE of GHG emissions (CARB 2008b). Overall, 81 percent of California's emissions are CO_2 from fossil fuel combustion (CARB 2008b). The transportation sector is the single largest contributor of California's GHG emissions, producing 41 percent of the State's total GHG emissions in 2004. In contrast, electrical generation produced more than half that, at 22 percent. Nonetheless, California ranks fourth lowest of the 50 states in CO_2 emissions per capita.

Figure 4.1-3 U.S. Greenhouse Gas Emissions



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

Local Greenhouse Gas Emissions

In July 2008, the County Board of Supervisors made a commitment to calculating San Luis Obispo County's contribution to global climate change through the development of a Energywise Plan (Climate Action Plan), which it adopted on November 22, 2011. The GHG Inventory estimates that the unincorporated areas of San Luis Obispo County emitted approximately 917,700 metric tons of CO_2-equivalent emissions in the baseline year 2006. The transportation sector was by far the largest contributor to emissions (40 percent). Emissions from the commercial/industrial and residential sectors accounted for 24 and 15 percent of the total, respectively. Emissions from other sources, including livestock, select aircraft operations, and agricultural equipment, comprised the remaining 21 percent of the total.

4.1.1.4 Current Emissions from Refinery Operations

Emissions produce impacts associated with criteria pollutant emissions, emissions of GHG and emissions of toxic materials.

SMF Criteria Pollutant Emissions

Current operations at the Refinery produced criteria emissions associated with a range of equipment types and operations, including:

- Combustion sources, including diesel pumps and compressors, heaters, boiler, generators, incinerators, flares (emergency use only);
- Fugitive emissions from pumps, valves, and connections;
- Fugitive emissions from hydrocarbon tanks;
- Coke handling and storage; and
- Other miscellaneous sources, including solvent use, oily water treatment, cooling towers, and sulfur pit vents.

The Refinery reports emissions from these sources to the SLOCAPCD annually. Table 4.1-7 summarizes the emissions for these sources for the baseline scenario of the Refinery operating at the permit level of throughput.

Table 4.1-7 Refinery Emissions Permit Level – Annual and Daily

Annual Emissions, Tons/Year									
Equipment Description	**Affected?**	**TOG**	**ROG**	**CO**	**NOx**	**SO2**	**PM**	**PM-10**	**PM-2.5**
Diesel Pumps and Compressors	N	0.1	0.1	0.3	1.3	0.0	0.1	0.1	0.1
Crude Heaters B2A/B	Y	3.6	1.8	0.0	16.0	33.2	2.5	2.4	2.3
Vacuum Heaters B62A/B	Y	0.6	0.3	0.3	2.1	2.9	0.4	0.4	0.4
Coke Heaters B102A/B	Y	3.9	1.9	0.1	18.3	39.5	2.7	2.6	2.5
Steam Superheaters B201A/B	Y	0.2	0.1	0.0	1.8	1.9	0.1	0.1	0.1
Boilers B504/506	Y	3.7	1.8	1.1	12.0	21.0	2.5	2.5	2.5
Boiler Steam Generators B505	Y	1.0	0.5	2.2	12.1	18.8	2.1	2.1	2.1
Boiler B507	Y	2.1	1.0	1.0	6.5	12.0	1.4	1.4	1.4
Sulfur Plant Incinerator B602A/B	Y	0.2	0.1	1.6	1.9	28.2	0.1	0.1	0.1
Tail Gas Combustor B702	Y	0.2	0.1	1.7	2.0	2.0	0.2	0.2	0.2
Flare Stack C451	Y	0.4	0.1	0.9	0.2	0.0	0.0	0.0	0.0
Kilns (Rotary and Cold Stack) - Carbon Plant	Y	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0
Oily water treatment system	Y	6.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0
Cooling towers	N	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur pit vents	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: non-crude tank	N	6.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: crude tank	Y	9.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0
Coke Storage - Carbon Plant	N	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0
Rail car loading, baghouse	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke handling and conveying	Y	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.1
Cooler Stack to Wet Scrubber	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Misc Sources (solvent use, etc)	N	0.3	0.3	0.0	0.1	0.0	0.0	0.0	0.0
Total, tons/yr		***40.5***	***31.0***	***9.2***	***74.3***	***160***	***12.8***	***12.2***	***11.9***
Average Daily Emissions, lbs/day									
Equipment Description	**Affected?**	**TOG**	**ROG**	**CO**	**NOx**	**SO2**	**PM**	**PM-10**	**PM-2.5**
Diesel Pumps and Compressors	N	0.6	0.4	1.5	7.1	0.1	0.5	0.5	0.5
Crude Heaters B2A/B	Y	19.8	9.9	0.0	87.5	182.1	13.7	13.0	12.7
Vacuum Heaters B62A/B	Y	3.3	1.6	1.5	11.6	16.1	2.2	2.1	2.1
Coke Heaters B102A/B	Y	21.3	10.7	0.3	100.5	216.3	14.7	14.0	13.7
Steam Superheaters B201A/B	Y	1.0	0.5	0.0	10.0	10.6	0.7	0.7	0.7
Boilers B504/506	Y	20.1	10.1	6.0	65.9	115.1	13.9	13.9	13.9
Boiler Steam Generators B505	Y	5.4	2.7	12.3	66.2	102.8	11.4	11.4	11.4
Boiler B507	Y	11.5	5.7	5.7	35.7	65.7	7.9	7.9	7.9
Sulfur Plant Incinerator B602A/B	Y	1.1	0.6	8.6	10.2	154.4	0.8	0.8	0.8
Tail Gas Combustor B702	Y	1.2	0.6	9.1	10.9	11.1	0.8	0.8	0.8
Flare Stack C451	Y	2.0	0.7	5.2	1.0	0.1	0.0	0.0	0.0
Kilns (Rotary and Cold Stack) - Carbon Plant	Y	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0
Oily water treatment system	Y	32.7	31.7	0.0	0.0	0.0	0.0	0.0	0.0
Cooling towers	N	15.5	15.5	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur pit vents	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: non-crude tank	N	35.4	32.9	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: crude tank	Y	49.3	45.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke Storage - Carbon Plant	N	0.0	0.0	0.0	0.0	0.0	1.6	0.8	0.2
Rail car loading, baghouse	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke handling and conveying	Y	0.0	0.0	0.0	0.0	0.0	2.0	1.0	0.3
Cooler Stack to Wet Scrubber	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Misc Sources (solvent use, etc)	N	1.7	1.7	0.1	0.5	0.0	0.0	0.0	0.0
Total, lbs/day		***221.9***	***170.1***	***50.4***	***407.0***	***874***	***70.3***	***67.0***	***65.1***

Source: SLOC APCD Emissions Spreadsheets derived from data submitted by ConocoPhillips. See Air Appendix.

Offsite criteria emissions include the emissions from vehicles used to transport employees and from vehicles used to transport coke, sulfur, and other materials delivered to or exported by the Refinery. These emissions include:

- Emissions from trucks used to transport coke;
- Emissions from trucks used to transport sulfur;
- Emissions associated with transport of crude oil to the Santa Maria Pump Station to be delivered by pipeline to the Refinery;
- Emissions from trucks associated with normal materials shipments and employee duties; and
- Emissions from employee vehicles.

Table 4.1-8 shows emissions from offsite vehicle trips. Trucks delivering crude oil from several locations to the Santa Maria Pump Station create emissions (see Section 2.0, Project Description). The weighted-average distance of these deliveries is 66 miles one way, from as far north as the San Ardo fields in Monterey County (83 miles) and south to Casmalia.

SMF Operations Greenhouse Gas Emissions

Operations at the Refinery in the baseline year produced GHG emissions associated with a range of equipment types and operations, as shown in Table 4.1-7. Table 4.1-9 summarizes Refinery GHG emissions, which the Refinery voluntarily submits to the SLOCAPCD.

GHG emissions associated with employees commuting and offsite movement of sulfur, coke, and miscellaneous materials are not included in the inventories submitted to the SLOCAPCD. These emissions levels, also shown in Table 4.1-9, are calculated separately.

SMF Toxic Emissions

Toxic emissions are associated with operations at the Refinery as well as emissions from diesel truck operating along area roadways. Refinery emissions of toxic materials are estimated by the Refinery and submitted to the SLOCAPCD along with modeling of cancer, acute, and chronic impacts at locations near the Refinery. These estimates are required by regulation, particularly the AB2588 requirements. The results from the most recent emission inventory for the current SMF operations and the 2007 modeling analysis (based on the 2004 emissions year), indicate that toxic emissions from the Refinery create impacts outside of the plant boundaries to a cancer

Table 4.1-8 Offsite Vehicle Emissions – Within and Outside of San Luis Obispo County

	Peak Day Emissions, lbs/day						Total Emissions, Tons or Tons/yr								
Source	ROG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	N2O	CH4	CO2
Within SLO County															
Workers/Visitors weekdays	1.45	41.72	4.65	0.05	0.48	0.23	0.19	5.42	0.60	0.01	0.06	0.03	0.03	0.05	617
Workers/Visitors weekends	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.01	0.00	0.00	0.00	0.00	0.00	15
LDT trucks - misc refinery deliveries	0.17	4.72	0.60	0.00	0.03	0.02	0.03	0.86	0.11	0.00	0.01	0.00	0.01	0.01	63
HHDT Trucks - coke export	8.22	41.16	173.83	0.23	6.51	5.44	1.50	7.51	31.72	0.04	1.19	0.99	0.07	0.07	4531
HHDT Trucks - sulfur export	0.83	4.15	17.53	0.02	0.66	0.55	0.15	0.76	3.20	0.00	0.12	0.10	0.01	0.01	457
HHDT Trucks - crude deliveries to SM	2.29	11.48	48.50	0.07	1.82	1.52	0.42	2.10	8.85	0.01	0.33	0.28	0.02	0.02	1264
Locomotives to Long Beach- SLOC	0.72	2.10	12.86	0.00	0.44	0.40	0.01	0.04	0.26	0.00	0.01	0.01	0.00	0.00	16
Total	***13.68***	***105.33***	***257.97***	***0.37***	***9.94***	***8.16***	***2.31***	***16.82***	***44.77***	***0.07***	***1.72***	***1.41***	***0.13***	***0.15***	***6962***
Kern County															
HHDT Trucks - sulfur export	0.63	3.17	13.40	0.02	0.50	0.42	0.12	0.58	2.45	0.00	0.09	0.08	0.01	0.01	349
HHDT Trucks - coke export	10.96	54.87	231.77	0.31	8.68	7.26	2.00	10.01	42.30	0.06	1.58	1.32	0.09	0.09	6041
Total	***11.59***	***58.05***	***245.17***	***0.33***	***9.18***	***7.68***	***2.11***	***10.59***	***44.74***	***0.06***	***1.68***	***1.40***	***0.09***	***0.10***	***6390***
Santa Barbara County															
HHDT Trucks - crude deliveries to SM	0.51	2.57	10.86	0.01	0.41	0.34	0.09	0.47	1.98	0.00	0.07	0.06	0.00	0.00	283
Locomotives to Long Beach- SBC	16.13	47.32	290.04	0.01	10.04	9.03	0.33	0.97	5.97	0.00	0.21	0.19	0.03	0.01	359
Total	***16.65***	***49.90***	***300.90***	***0.02***	***10.45***	***9.37***	***0.43***	***1.44***	***7.95***	***0.00***	***0.28***	***0.25***	***0.03***	***0.01***	***643***
Monterey County															
HHDT Trucks - crude deliveries to SM	0.69	3.44	14.54	0.02	0.54	0.46	0.13	0.63	2.65	0.00	0.10	0.08	0.01	0.01	379
Ventura County															
Locomotives to Long Beach- VC	8.65	25.37	155.48	0.00	5.38	4.84	0.18	0.52	3.20	0.00	0.11	0.10	0.02	0.01	193
Los Angeles County															
Locomotives to Long Beach- LAC	8.32	24.39	149.50	0.00	5.17	4.66	0.17	0.50	3.08	0.00	0.11	0.10	0.02	0.00	185
Total Emissions All Counties	59.56	266.47	1123.57	0.75	40.66	35.17	5.32	30.51	106.40	0.13	3.99	3.34	0.29	0.28	14,751

Source : Data derived by SLOC APCD from ConocoPhillips permit application submissions and subsequent calculations. Assumes Refinery is operating at the permit level of throughput. See Air Appendix for details.

Table 4.1-9 Greenhouse Gas Emissions - Refinery Operations at Permit Level, metric tonnes

Source Type	CO_2	N_2O	CH_4	SF_6	Total CO_2 Equivalent Emissions
Refinery					
Stationary Combustion	238,905	0.4	4.0	0.0	239,129
Coke Processing (Calciner)	0	0.0	0.0	0.0	0
Mobile Combustion	751	0.0	0.0	0.0	780
Refrigerant Usage	0	0.0	0.0	0.0	20
Sulfur Recovery	8,743	0.0	0.0	0.0	8,743
Water Processes	0	0.2	1.5	0.0	105
VOC Fugitives	0	0.0	0.5	0.0	11
SF6 Usage	0	0.0	0.0	0.0	0
Purchased Electricity	6,256	0.0	0.0	0.0	6,265
TOTAL REFINERY	254,655	0.7	6.1	0.0	255,052
Offsite Mobile					
Workers commuting	568	0.0	0.0	0.0	577
LDT trucks - misc Refinery deliveries	57	0.0	0.0	0.0	60
HHDT Trucks - coke export	9,514	0.1	0.1	0.0	9,560
HHDT Trucks - sulfur export	725	0.0	0.0	0.0	729
HHDT Trucks - crude deliveries to SMPS	1,734	0.0	0.0	0.0	1,742
Locomotives to Long Beach	678	0.1	0.0	0.0	696
TOTAL MOBILE	13,276	0.3	0.3	0.0	13,362
TOTAL	-	-	-	-	268,415

Notes: Mobile combustion is emission related to Refinery operations, including employees, equipment or materials delivery, transport and movement of crude oil to the SMPS. Data is derived from 2009 Offsite Mobile data for this part of the table. The Calciner shut down in 2007. Emissions estimated at the refinery permit level from 2007 data.

Source: SLOC APCD spreadsheets with data derived from ConocoPhillips submittals.

case level of 15 in one million (ConocoPhillips 2007). Although the 10-in-one-million contours were primarily within plant boundaries, they did extend beyond the plant boundaries several kilometers to the west. However, this impact area does not include any residential areas or businesses. The 2007 modeling indicated acute and chronic impacts at 0.77 health impact (HI) and 0.21 HI, respectively, which are below the hazard index of 1.0 at the property boundaries. The 2007 acute impacts were determined to be primarily associated with the calciner operations (85% of the acute impacts were attributable to the calciner), which has since been shut down. Table 4.1-10 summarizes the 2004 emissions of toxic materials.

Cancer risks from the Refinery in 2004 were attributable primarily to the diesel cooling water pump at the coke processing facility and other diesel engine operations, which the report estimates makes up over 90 percent of the cancer health risk. This pump driver has now been replaced with a natural gas fired engine equipped with a catalyst.

Emissions from mobile sources are not included in the AB2588 reporting requirements. Therefore, additional modeling was conducted to estimate the impacts of diesel trucks operating along area roadways. The analysis included routes to and from U.S. Highway 101 and State Highway 166, including a route to and from the Refinery and Highway 101 north, utilizing Highway 1, Halcyon Road, and the Grand Avenue ramps; a route to Highway 101 south utilizing State Highway 1 and west Main Street; and a route to State Highway 166 utilizing Willow Road and Tefft Street. Modeling was conducted using the Aermod system with a grid of receptors spaced every 100 meters. The truck sources were configured as elevated area sources 100 meters long, placed end-to-end along each route. Emission rates were based on EMFAC2007 for heavy-duty diesel trucks and truck traffic data included in Section 2.0, Project Description. Meteorological data utilized was from Vandenberg Air Force Base (station 00093214 for the year 1990) for upper air data and from the Santa Maria station (station 23272 for the year 1990) for surface air data.

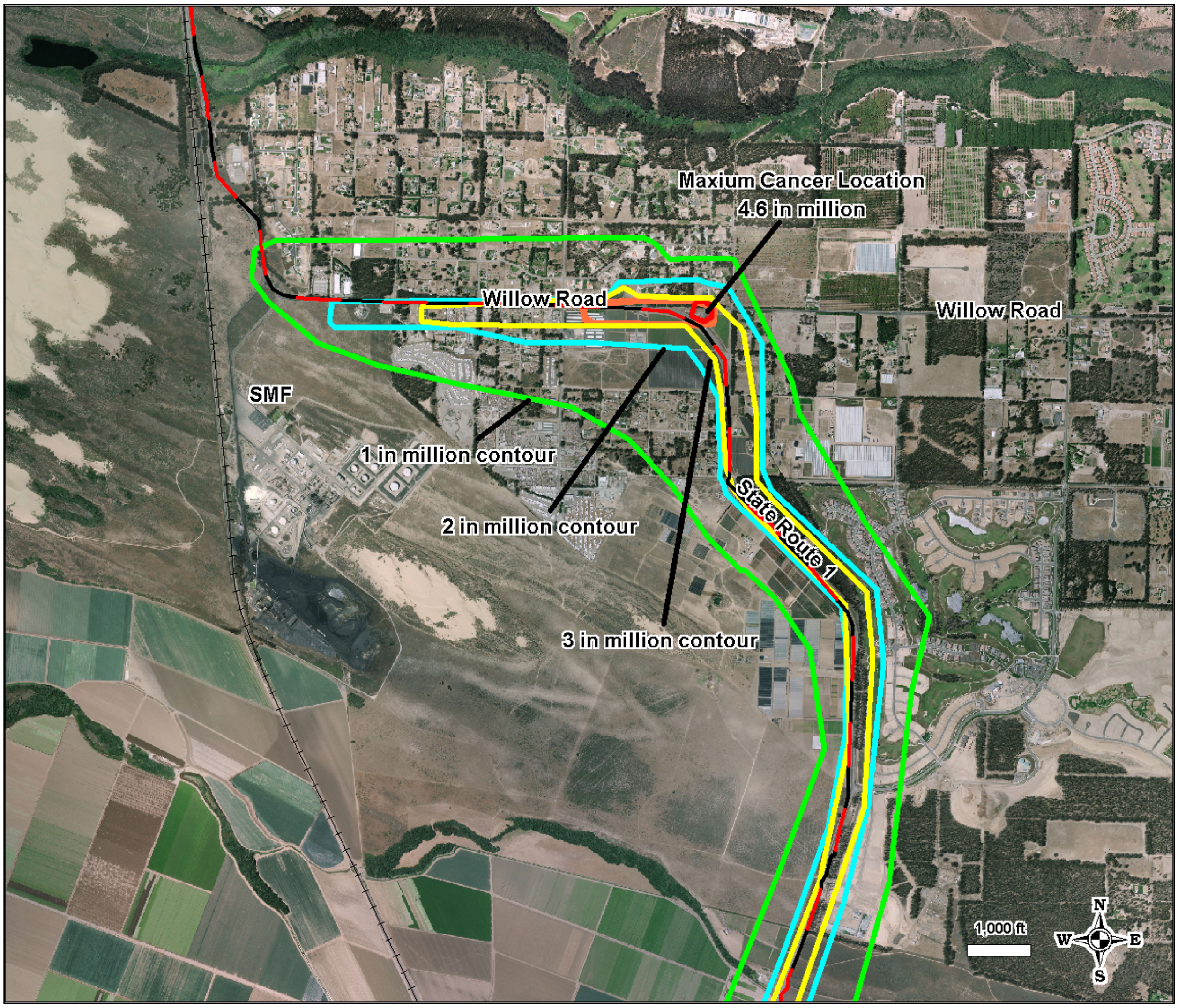
The results of the modeling indicate that the maximum risk levels for cancer along the proposed routes would be a maximum of 4.6 cancer cases per million. The location of the maximum cancer risk would be along State Highway 1 immediately south of the Refinery, since this route would have the greatest amount of traffic. Figure 4.1-4 shows risk contours. Risk levels are greater than one in one million along the southern route to Highway 101 since most traffic between Highway 101 and the SMF is anticipated to utilize the southern route to transport sulfur and coke. The risk contours along the route to Highway 166 and the route to Highway 101 north would create risk levels less than one in one million primarily due to the lower traffic levels along these routes to and from the SMF. The peak cancer risk would be near the intersection of Willow Road and Highway 1 and is approximately 4.6 in one million.

Table 4.1-10 Toxic Emissions From Santa Maria Refinery

Pollutant	Annual Emissions, pounds/year	Pollutant	Annual Emissions, pounds/year
1,3-Butadiene	9.0	H2S	2,301
Acetaldehyde	124	H2SO4*	0
Acrolein	6.4	HCl*	0
Ammonia	258	Hex. Chrome	1.1
Antimony	4.7E-03	Hexane	10.1
Arsenic	4.5	HF	1,100
Benz(a)anthracene	2.2E-02	Indeno(1,2,3-cd)pyrene	0.6
Benzene	303.3	Lead	1.7
Benzo(a)pyrene	4.0E-03	Manganese	59.5
Benzo(b)fluoranthene	0.3	Mercury	9.9
Benzo(k)fluouranthene	0.2	Naphthalene	6.8
Beryllium	4.7E-03	Nickel	65.2
Cadmium	0.3	Propylene	1,733
Carbon Monoxide	221,278	Selenium	43.2
Chlorine	24.8	Sulfates	189
Chromium	33.1	Sulfur Dioxide*	254,378
Chrysene	2.0E-02	Toluene	700
Copper	30.6	Total Dioxins/Furans	1.2E-05
Dibenzo(a,h)anthracene	0.2	Total PCB	2.4E-03
Diesel Particulate	759	Vanadium	220
Ethyl Benzene	63.3	Xylenes	877
Formaldehyde	217	Zinc	135

Notes: * Since the 2004 TAC inventory, sulfur dioxide emissions have been reduced by 97% as a result of the calciner unit closure. Also, the H2SO4 and HCL emissions have been eliminated as a result of the calciner unit closure. These changes have been included in the table above.
Source: 2011 Health Risk Assessment and the 2007 HRA analysis

Figure 4.1-4 Transportation Route Diesel Exhaust Health Risk Contours - Cancer



Notes: See Appendix A for details of the Aermod modeling

SMF Odor Emissions

Several activities at the SMF, including sulfur handling, combustion of sulfurous gases, and fugitive emissions from leaking components, could produce odors in the surrounding residential and industrial areas. The SMF was under an Abatement Order from 1989 to 1993. As a result of that order, plant and process modifications were made to significantly reduce emissions and odors. A fugitive emissions program implemented in 2007 substantially reduced emissions from leaking components. The 2007 shutdown of the Calciner Plant also substantially reduced the combustion and emissions of sulfurous gases.

The SLOCAPCD investigates and compiles odor complaints for the SMF. Over the past 12 years, the SLOCAPCD recorded approximately 7.5 complaints per year on average, and

SLOCAPCD staff verified 3.3 per year were attributable to the SMF. Complaints peaked at 20 in 2008, and the SLOCAPCD verified 11 complaints. In addition, the SMF has received, on average, 2.8 SLOCAPCD notices of violation per year over the past 17 years, for issues ranging from failure to submit appropriate plans to emissions levels that exceed permit values. One notice of violation was issued for odor nuisance in 17 years.

SMPS Criteria Pollutant Emissions

Current operations at the Santa Maria Pump Station produced criteria emissions associated with a range of equipment types and operations, including:

- Unloading of crude oil trucks;
- Emergency standby engines;
- Tank heater boilers;
- Tank storage of crude oil (80,000 bbls) from truck offloading only; and
- Fugitive emissions from pumps, valves, and connections;

According to the Santa Barbara County APCD permits (PTO 08218r8, 11754r2) and annual emission reports (for 2010), the SMPS has a permit truck unloading throughput limit of 26,000 bbls per day as well as limits on the boiler heat inputs (502 mmbtu/day). Permit limits on NOx and ROC are 12.35 and 26.82 lbs/day, respectively. In 2010, the maximum average monthly throughput at the SMPS was 6,847 bpd of crude oil through the truck unloading rack.

4.1.2 Regulatory Setting

Federal, state, and local agencies have established standards and regulations that govern the Proposed Project. The following sections summarize the regulatory setting for air quality that apply to new development within the local air basin and the historic and most recent efforts on addressing GHG emissions.

4.1.2.1 Air Quality

Federal Regulations

The Clean Air Act of 1970 directs attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). The 1990 Amendments to this Act included new provisions that address air pollutant emissions that affect local, regional, and global air quality. The EPA is responsible for implementing the Clean Air Act and establishing the NAAQS for criteria pollutants. In 1997, the EPA adopted revisions to the Ozone and Particulate Matter Standards in the Clean Air Act. These revisions included 8-hour ozone standards and particulate matter standards for $PM_{2.5}$ .However, in May of 1999 the US Court of Appeals for the District of Columbia remanded the ozone standards. In January 2001, the EPA issued a “Proposed Response to Remand” that declared the revised ozone standard should remain at 0.08 ppm, as established with the 1997 revisions. In March 2001, the US Supreme Court upheld the constitutionality of the Clean Air Act as the EPA interpreted it, setting health-protective air quality standards for ground-level ozone and particulate matter. In April 2004, the EPA issued its Final Nonattainment Area Designations for Eight-Hour Ozone Standard.

Air Quality Management Plan

Under the provisions of the Clean Air Act, the EPA requires each state that has not attained the NAAQS to prepare an Air Quality Management Plan, which is a separate local plan detailing how to meet the federal standards. The governor of each state designates a local agency to prepare these plans, which are then incorporated into a State Implementation Plan.

Emission Standards for Non-Road Diesel Engines

To reduce emissions from non-road diesel equipment, the EPA established a series of increasingly strict emission standards for new non-road diesel engines. Tier 1 standards were phased in from 1996 to 2000 (year of manufacture), depending on the engine horsepower category. Tier 2 standards were phased in from 2001 to 2006. Tier 3 standards were phased in from 2006 to 2008. Tier 4 standards, which likely will require add-on emission control equipment, will be phased in from 2008 until 2015. These standards will apply to construction equipment.

Project-Specific Rules

Federal rules applicable to the Proposed Project are outlined in the Refinery Title 5 permit, pages iii-iv PTO 44-50.

State Regulations

California Air Resources Board

The CARB has jurisdiction over all air pollutant sources in the state; it delegated responsibility for stationary sources to local air districts and retained authority over emissions from mobile sources. The County's local air district is the San Luis Obispo County Air Pollution Control District (SLOCAPCD). The California Air Resources Board (CARB) established the California Ambient Air Quality Standards (CAAQS). Comparing the criteria pollutant concentrations in ambient air to the CAAQS determines state attainment status for criteria pollutants in a given region. The CARB, in partnership with local California air quality management districts, developed a pollutant-monitoring network to aid attainment of CAAQS. The network consists of numerous monitoring stations throughout California that monitor and report various pollutants' concentrations in ambient air.

California Clean Air Act

The California Clear Air Act (CCAA) went into effect in January 1, 1989, and was amended in 1992 (California Health and Safety Code, Division 26). The CCAA mandates achieving the health-based CAAQS at the earliest practical date.

Air Toxics "Hot Spots" Information and Assessment Act of 1987

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB2588) requires an inventory of air toxics emissions from individual facilities, an assessment of health risk, and notification of potential significant health risk (California Health & Safety Code, Division 26, Part 6).

California Diesel Fuel Regulations

With the California Diesel Fuel Regulations, the CARB set sulfur limitations for diesel fuel sold in California for use in on-road and off-road motor vehicles. The rule initially excluded harbor craft and intrastate locomotives, but it later included them with a 2004 rule amendment. Under this rule, diesel fuel used in motor vehicles, except harbor craft and intrastate locomotives, has been limited to 500-ppm sulfur since 1993. This sulfur limit was later reduced to 15-ppm, effective September 1, 2006.

4.1.2.2 Local

In 1967, California passed legislation that placed the primary responsibility for controlling air pollution at the local level. In April 1970, the San Luis Obispo County Board of Supervisors formed the SLOCAPCD, which included a decision-making body known as the SLOCAPCD Board of Directors. Over the past 30 years, the District has adopted and implemented nearly 100 rules and currently has nearly 1,070 individual permits and agricultural registrations, and it operates 850 facilities. In 1994, revisions to state law changed the composition of the Board of Directors to include all five County supervisors plus one city council member from each of the seven incorporated cities.

As part of the California Clean Air Act, the SLOCAPCD is required to develop a plan to achieve and maintain the state ozone standard by the earliest practicable date. To this end, the SLOCAPCD developed the Clean Air Plan (CAP). The latest CAP is dated 2001 CAP, adopted by the SLOCAPCD at a hearing on March 26, 2002, which addresses state requirements by updating the 1991 CAP (SLOC APCD 2001). The 1991 CAP, adopted by the SLOCAPCD in 1992, contained a comprehensive set of control measures designed to reduce ozone precursor emissions from a wide variety of stationary and mobile sources. The 2001 CAP, similar to the 1998 CAP, is mainly a continuation of the 1995 CAP and proposed no new control measures.

Control measures proposed in the CAP include vapor recovery, solvent content reduction, improved fuel combustion, fuel switching or electrification, chemical or catalytic reduction, reduced vehicle use, and new source reviews.

The SLOC APCD also issues annual reports that address issues such as air quality summaries for each year as well as air quality trends.

The SLOC APCD developed a number of rules that are potentially applicable to this Project, including:

- Rule 204 – Requirements (new source review);
- Rule 219 – Toxics new source review;
- Rule 401 – Visible emissions;
- Rule 402 – Nuisance;
- Rule 403 – Particulate matter emission standards;
- Rule 405 – Nitrogen oxides emission standards, limitations, and prohibitions;

- Rule 406 – Carbon monoxide emission standards and limitations;
- Rule 407 – Organic material emission standards;
- Rule 412 – Airborne toxic control measures;
- Rule 417 – Control of fugitive emissions of volatile organic compounds;
- Rule 419 – Petroleum pits, ponds, sumps, well cellars and wastewater separators;
- Rule 420 – Cutback asphalt paving materials;
- Rule 425 – Storage of volatile organic compounds;
- Rule 430 – Control of oxides of nitrogen from industrial, institutional, commercial boilers, steam generators, and process heaters;
- Rule 431 – Stationary internal combustion engines; and
- Rule 433 – Architectural coatings.

4.1.2.3 Greenhouse Gas Emissions Regulations

International Regulations

Kyoto Protocol

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

Climate Change Technology Program

In lieu of the Kyoto Protocol's mandatory framework, the US has opted for a voluntary and incentive-based approach toward emissions reductions. This approach, the Climate Change Technology Program, is a multi-agency research and development coordination effort, led by the Secretaries of Energy and Commerce, who are 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 GHG under the Clean Air Act. However, the US Supreme Court recently held that the EPA can, and should, consider regulating motor-vehicle GHG 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 GHG as a pollutant pursuant to the Clean Air Act (US Supreme Court No. 05-1120; 127 S.Ct. 1438 (2007)). The Court ruled that GHG fit within the Clean Air Act's definition of a pollutant and that the EPA's reason for not regulating GHG was insufficiently grounded.

40 CFR Section 98 specifies mandatory reporting requirements for a number of industries. The final 40 CFR part 98 applies to certain downstream facilities that emit GHG, and to certain upstream suppliers of fossil fuels and industrial GHG. For suppliers, the GHG emissions reported are the emissions that would result from combustion or use of the products supplied. The rule also includes provisions to ensure the accuracy of emissions data through monitoring, recordkeeping and verification requirements. The mandatory reporting requirements generally apply to facilities that produce more than 25,000 metric tonnes of CO_2 equivalent per year.

State Regulations and Programs

Executive Order S-3-05

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

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG 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, and 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 GHG emissions would stimulate California's economy and provide jobs. Accordingly, AB 1493 required the CARB to develop and adopt the nation's first GHG emission standards for automobiles. The CARB responded by adopting CO_2-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 California's GHG emissions target and requires the state to reduce global warming emissions to 1990 levels by 2020. It further 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 milestones of AB 32 include:

- June 20, 2007 - Identification of "discrete early action GHG emission-reduction measures."
- January 1, 2008 - Identification of the 1990 baseline GHG emissions levels and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning GHG emissions.
- January 1, 2009 - Adoption of a scoping plan for achieving GHG emission reductions.
- January 1, 2010 - Adoption and enforcement of regulations to implement the actions.
- January 1, 2011 - Regulatory adoption of GHG emission limits and reduction measures.
- January 1, 2012 - GHG emission limits and reduction measures become enforceable.

Since the passage of AB 32, the CARB published Proposed Early Actions to Mitigate Climate Change in California. This publication indicated that the issue of GHG 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 March 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 involve power plants that have emissions no greater than a combined cycle gas turbine plant. That level is established at 1,100 lbs/MWh of CO_2. 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 GHG emissions or the effects of GHG emissions, as required by CEQA, including, but not limited to, effects associated with transportation or energy consumption. The Resources Agency would be 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 CARB 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 March 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 GHG 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 GHG 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 GHG 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 GHG emissions, nor do they prescribe assessment methodologies or specific mitigation measures. The Preliminary Amendments maintain CEQA 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 GHG 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 GHG emissions.

California Air Resources Board: Scoping Plan

On December 11, 2008, the CARB adopted the Scoping Plan as directed by AB 32 (CARB 2008a). The Scoping Plan proposes a set of actions designed to reduce overall GHG 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 GHG emissions. This requirement is contained within sections 95100-95133 of Title 17, California Code of Regulations. It establishes who must report GHG emissions to the 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 CO_2.

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 GHG 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' GHG emissions, asked the state to create a place to accurately report their emissions history. The California Climate Action Registry publishes a General Reporting Protocol, which provides the principles, approach, methodology, and procedures to estimate such emissions.

California Air Resource Board Proposed Mandatory Reporting Regulation

The Air Resources Board approved a mandatory reporting regulation in December 2007, which became effective January 2009 (which appears at sections 95100-95133 of title 17, California Code of Regulations), which requires the mandatory reporting of GHG emissions for specific industries emitting more than 25,000 metric tonnes of CO_2 equivalent per year.

California Air Resource Board Proposed Cap-and-Trade Regulation

The California Air Resource Board has recently adopted a rule to develop a cap-and-trade type system applicable to specific industries that emit more than 25,000 metric tonnes of CO_2 equivalent per year. The AB 32 Scoping Plan identifies a cap-and-trade program as one of the strategies California will employ to reduce the greenhouse gas (GHG) emissions that cause climate change. Under cap-and-trade, an overall limit on GHG emissions from capped sectors will be established by the cap-and-trade program and facilities subject to the cap will be able to trade permits (allowances) to emit GHGs. The program started on January 1, 2012, with an enforceable compliance obligation beginning with the 2013 GHG emissions for GHG emissions from stationary sources. The petroleum and natural gas systems sector is covered starting in 2013 for stationary and related combustion, process vents and flare emissions if the total emissions from these sources exceed 25,000 metric tonnes of CO2 equivalent per year. Suppliers of Natural Gas and transportation fuels are covered beginning in 2015 for combustion emissions from the total volume of natural gas delivered to non-covered entity or for transportation fuels.

Facilities subject to cap and trade are not automatically exempt from the significant evaluation under CEQA. Proposed projects must quantify GHG emissions and determine the significance of a project's environmental impact.

Local Regulations and Programs

County Climate Action Plan

The County Department of Planning and Building adopted a Climate Action Plan on November 22, 2011, as a blueprint for reducing greenhouse gas emissions. Additionally, a Green Building Ordinance to improve energy efficiency in new and existing development will be effective January 1, 2013. The CAP focuses on local actions to reduce GHG emissions through energy efficiencies, including: retrofitting existing buildings; reversing rural sprawl; and increasing use of non-fossil fuels such as solar and wind energy (SLOC 2011).

County General Plan, Conservation, and Open Space Element

The County Board of Supervisors in 2010 adopted a comprehensive Conservation and Open Space Element with a focus on reducing GHG emissions, increasing energy efficiency, and using local renewable energy.

APCD

The SLOCAPCD adopted GHG thresholds on March 28, 2012 and updated their CEQA Handbook in April, 2012, to incorporate the new thresholds.

4.1.3 Significance Criteria

According to the December 2009 SLOC APCD CEQA Air Quality Handbook, project impacts may be considered significant if one or more of the following special conditions apply:

- If any of the thresholds are exceeded;
- If the Project has the ability to emit hazardous or toxic air pollutants in the close proximity of sensitive receptors such that an increased cancer risk affects the population;
- If the Project has the potential to emit diesel particulate matter in an area of human exposure, even if overall emissions are low;
- Remodeling or demolition operations where asbestos-containing materials will be encountered;
- If naturally occurring asbestos has been identified in the Project area;
- If the Project has the ability to emit hazardous or toxic air pollutants in the close proximity of sensitive receptors such as schools, churches, and hospitals;
- If the Project results in a nuisance odor problem to sensitive receptors; and
- If more than 4 acres are graded at any given time.

The CEQA Air Quality Handbook defines thresholds for long-term operational emissions and short-term construction related emissions. Depending on the level of exceedance of a defined threshold, the SLOC APCD has established varying levels of mitigation.

4.1.3.1 Operational Thresholds

Table 4.1-11 shows the threshold criteria established by the SLOC APCD to determine a Project's significance and appropriate mitigation level for long-term operational emissions (i.e., vehicular and area source emissions). Emissions that equal or exceed the designated threshold levels are considered potentially significant and shall be mitigated. For projects requiring air quality mitigation, the SLOC APCD has developed a list of both standard and discretionary mitigation strategies tailored to the type of Project proposed: residential, commercial, or industrial.

Table 4.1-11 SLOC APCD Thresholds of Significance for Operational Emissions Impacts

Pollutant	Daily	Annual
ROG + NOx	25 pounds	25 tons
Diesel Particulate Matter	1.25 pounds	-
Fugitive Dust Particulate Matter (PM_{10})	25 pounds	25 tons
CO	550 pounds	-

Source: SLOC APCD 2009

Construction Thresholds

Use of heavy equipment and earth-moving operations during Project construction generates fugitive dust and combustion emissions that may have substantial temporary impacts on local air quality. Fugitive dust emissions would result from land clearing, demolition, ground excavation, cut and fill operations, and equipment traffic over temporary roads. Combustion emissions, such as NOx and ROG, are most significant when using diesel-fueled equipment, such as loaders, dozers, haul trucks, compressors, and generators. Table 4.1-12 lists construction thresholds.

Table 4.1-12 SLOC APCD Thresholds of Significance for Construction Emissions Impacts

Pollutant	Daily	Quarterly Tier 1	Quarterly Tier 2
ROG + NOx	137 pounds	2.5 tons	6.3 tons
Diesel Particulate Matter	7 pounds	0.13 tons	0.32 tons
Fugitive Dust Particulate Matter (PM_{10})	-	2.5 tons	-

Source: SLOC APCD 2009

Exceeding Tier 1 emissions thresholds requires the implementation of a listing of standard mitigation measures and best available control technologies (BACT). Tier 2 requires the implementation of a construction activity management plan in addition to Tier 1 requirements. If emission levels cannot be decreased to less than the Tier thresholds, then offsite mitigation may be necessary.

There would be no construction activities involved in the Proposed Project.

Greenhouse Gases Thresholds

For land use development projects, the GHG threshold is compliance with a qualified GHG Reduction Strategy; OR annual emissions less than 1,150 metric tons per year (MT/yr) of CO2e; OR 4.9 MT CO2e/service population (SP)/yr (residents + employees). Land use development projects include residential, commercial and public land uses and facilities. This includes amortization of the construction emissions (50 years for residential projects and 25 years for commercial projects).

For stationary-source projects, the threshold is 10,000 metric tons per year (MT/yr) of CO2e. Stationary-source projects include land uses that would accommodate processes and equipment that emit GHG emissions and would require an SLOCAPCD permit to operate.

At the time of writing, only a few air districts in California have drafted adopted thresholds for GHG emissions. Table 4.1-13 lists these districts and summarizes the adopted threshold level.

Table 4.1-13 Current Draft or Proposed GHG Thresholds in California

District/Area	Threshold Level MTCO2e	Notes
Bay Area AQMD	1,100 /year non-stationary land use development projects 10,000/year stationary sources	Adopted 12/2009
City of Orange	10,000 /year (industrial) 3,000 / year (residential, commercial & mixed-use)	Interim guidance 4/2010
San Joaquin APCD Kern County	Reduce from business as usual by 29% by 2020 combined with performance standards	
South Coast AQMD	10,000 for stationary/industrial sources 3,000 for residential developments	Adopted by board 12/2008 Residential is in draft form
Title 17 reporting requirements	25,000 and above for non-listed sources, 20,000 after 3 years for listed sources	

Note: AQMD = Air Quality Management District, CAPCOA = California Air Pollution Control Officers Association
Sources: Environmental Monitor 2009, BAAQMD 2009, CARB 2008, SJVAPCD 2009, City of Orange 2008, SCAQMD 2008

Air Toxic Health Risk Thresholds

SLOC APCD Rule 219, Toxics New Source Review, defines acceptable levels of health risk for regulated sources. Rule 219 identifies significance thresholds as follows:

> The facility-wide risk from any source shall not exceed ten (10.0) in a million for cancer or a health hazard index (HHI) of one (1.0) for either chronic non-cancer or acute health impacts, unless that facility is included in the Air Toxics Hot Spots program by the District, and the source simultaneously develops and implements an APCO-approved airborne toxic risk reduction audit and plan, as codified in Chapter 6, Facility Toxic Air Contaminant Risk Reduction Audit and Plan, of the California Health and Safety Code.

These thresholds were utilized to evaluate facility-wide risk following the implementation of TBACT, which could include the use of cleaner diesel engines and implementing California verified diesel emission control strategies, such as the installation of catalysts.

4.1.4 Project Impacts

Project operations could increase emissions of criteria pollutants from Refinery equipment and from offsite mobile emissions; could increase odor events; could increase GHG emissions; and could increase health risk impacts. Potential increases in emissions would occur both from Refinery operations and from offsite, mobile sources.

Impact #	Impact Description	Residual Impact
AQ.1	Operational activities at the Refinery and offsite would generate emissions that exceed SLOC APCD thresholds.	Class II

Refinery Operations

The Proposed Project would generate an increase in air emissions due to the following activities:

- Increased use of facility equipment, including the crude oil heaters, vacuum heaters, coke heaters, boilers, and cooling towers;
- Increased fugitive emissions from crude oil tanks;
- Increased fugitive dust emissions from increased coke handling;
- Increased indirect emissions from the transportation of crude oil to the Refinery; and
- Increased indirect emissions from the transportation of materials away from the Refinery.

Some equipment and operations would not experience an increase in emissions with an increase in crude oil throughout, including the following:

- Emissions from emergency diesel fired engines;
- Flare stack emissions;
- Fugitive emissions from Refinery pumps, compressors,valves, and connectors; and
- Emissions associated with solvent use and other miscellaneous sources.

Emissions associated with an increase in crude oil processed would be a linear increase in emissions in relation to the level of crude oil processed for most equipment. The amount of gas used to heat the crude oil would increase by the same level as the increased throughput of crude oil. This is true for most of the combustion processes at the facility (except those previously listed). Therefore, an estimate of facility emissions associated with the Proposed Project crude oil throughput increase was produced by increasing the 2009 emissions by the ratio of the Proposed Project crude oil throughput level to the crude oil throughput level in 2009. Table 4.1-14 shows the equipment categories, whether they would be affected by a crude oil throughput increase, and the resulting emissions.

The increase beyond the baseline listed in Table 4.1-14 is the increase over the emissions from the Refinery operating at the current permitted level of 44,500 bpd (see Section 2.0, Project Description). The current permit emissions levels would be greater than 2009 levels since the crude oil throughput in 2009 was less than the permitted level. The permitted level was determined to be the baseline based on past CEQA documents prepared for the facility.

Table 4.1-14 Proposed Project Refinery Emissions and the Associated Increase

Annual Emissions, Tons/Year									
Equipment Description	**Affected?**	**TOG**	**ROG**	**CO**	**NOx**	**SO2**	**PM**	**PM-10**	**PM-2.5**
Diesel Pumps and Compressors	N	0.1	0.1	0.3	1.3	0.0	0.1	0.1	0.1
Crude Heaters B2A/B	Y	4.0	2.0	0.0	17.6	36.6	2.8	2.6	2.6
Vacuum Heaters B62A/B	Y	0.7	0.3	0.3	2.3	3.2	0.5	0.4	0.4
Coke Heaters B102A/B	Y	4.3	2.1	0.1	20.2	43.4	3.0	2.8	2.8
Steam Superheaters B201A/B	Y	0.2	0.1	0.0	2.0	2.1	0.1	0.1	0.1
Boilers B504/506	Y	4.0	2.0	1.2	13.2	23.1	2.8	2.8	2.8
Boiler Steam Generators B505	Y	1.1	0.5	2.5	13.3	20.6	2.3	2.3	2.3
Boiler B507	Y	2.3	1.2	1.1	7.2	13.2	1.6	1.6	1.6
Sulfur Plant Incinerator B602A/B	Y	0.2	0.1	1.7	2.0	31.0	0.2	0.2	0.2
Tail Gas Combustor B702	Y	0.2	0.1	1.8	2.2	2.2	0.2	0.2	0.2
Flare Stack C451	Y	0.4	0.1	1.0	0.2	0.0	0.0	0.0	0.0
Kilns (Rotary and Cold Stack) - Carbon Plant	Y	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0
Oily water treatment system	Y	6.6	6.4	0.0	0.0	0.0	0.0	0.0	0.0
Cooling towers	N	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur pit vents	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: non-crude tank	N	6.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: crude tank	Y	9.9	9.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke Storage - Carbon Plant	N	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0
Rail car loading, baghouse	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke handling and conveying	Y	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.1
Cooler Stack to Wet Scrubber	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Misc Sources (solvent use, etc)	N	0.3	0.3	0.0	0.1	0.0	0.0	0.0	0.0
Total, tons/yr		***43.6***	***33.2***	***10.1***	***81.6***	***176***	***14.1***	***13.4***	***13.1***
Increase over Baseline, tons/yr		***3.1***	***2.2***	***0.9***	***7.3***	***16.0***	***1.2***	***1.2***	***1.2***
Average Daily Emissions, lbs/day									
Equipment Description	**Affected?**	**TOG**	**ROG**	**CO**	**NOx**	**SO2**	**PM**	**PM-10**	**PM-2.5**
Diesel Pumps and Compressors	N	0.6	0.4	1.5	7.1	0.1	0.5	0.5	0.5
Crude Heaters B2A/B	Y	21.8	10.9	0.0	96.2	200.3	15.1	14.3	14.0
Vacuum Heaters B62A/B	Y	3.6	1.8	1.6	12.8	17.7	2.5	2.4	2.3
Coke Heaters B102A/B	Y	23.5	11.7	0.4	110.5	237.9	16.2	15.4	15.1
Steam Superheaters B201A/B	Y	1.2	0.6	0.0	11.0	11.7	0.8	0.8	0.7
Boilers B504/506	Y	22.1	11.1	6.6	72.4	126.6	15.3	15.3	15.3
Boiler Steam Generators B505	Y	5.9	3.0	13.5	72.8	113.0	12.5	12.5	12.5
Boiler B507	Y	12.6	6.3	6.3	39.3	72.2	8.7	8.7	8.7
Sulfur Plant Incinerator B602A/B	Y	1.2	0.6	9.4	11.2	169.9	0.9	0.9	0.9
Tail Gas Combustor B702	Y	1.3	0.7	10.1	12.0	12.2	0.9	0.9	0.9
Flare Stack C451	Y	2.2	0.8	5.7	1.0	0.1	0.0	0.0	0.0
Kilns (Rotary and Cold Stack) - Carbon Plant	Y	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0
Oily water treatment system	Y	36.0	34.9	0.0	0.0	0.0	0.0	0.0	0.0
Cooling towers	N	15.5	15.5	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur pit vents	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: non-crude tank	N	35.4	32.9	0.0	0.0	0.0	0.0	0.0	0.0
Fugitive Emissions: crude tank	Y	54.2	49.5	0.0	0.0	0.0	0.0	0.0	0.0
Coke Storage - Carbon Plant	N	0.0	0.0	0.0	0.0	0.0	1.6	0.8	0.2
Rail car loading, baghouse	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coke handling and conveying	Y	0.0	0.0	0.0	0.0	0.0	2.2	1.1	0.3
Cooler Stack to Wet Scrubber	Y	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Misc Sources (solvent use, etc)	N	1.7	1.7	0.1	0.5	0.0	0.0	0.0	0.0
Total, lbs/day		***238.7***	***182.1***	***55.3***	***447.0***	***962***	***77.2***	***73.5***	***71.5***
Increase over baseline, lbs/day		***16.9***	***12.0***	***4.9***	***39.9***	***87.4***	***6.8***	***6.6***	***6.4***

Note: "Affected" means that the equipment would experience an emissions increase if crude oil throughput is increased. The increase over baseline is the amount of emissions that would occur above the refinery operating at a crude throughput value of 44,500 bpd.

Source: SLOC APCD derived Table from data submitted by ConocoPhillips.

An increase in emissions of criteria pollutants (CO, ROG, NOx, SO_2, and PM) during operations would occur due to the increased intensity of operations of the Refinery equipment needed to process the additional crude oil. The ROG+NOx emissions associated with the daily emissions would increase by more than the SLOCAPCD thresholds. Daily emissions of diesel particulate matter, fugitive dust or CO would be below the thresholds. The annual emissions of ROG+NOx and fugitive dust would also be less than the thresholds. Increases in emissions would be subject to New Source Review requirements.

Offsite Mobile Emissions

Air emissions of criteria pollutants (CO, ROG, NOx, SO_2, and PM) during operations would also increase as a result of increased transportation of materials associated with the Refinery operations. Increased transportation would occur from the following activities:

- Increased generation of sulfur due to an increase in crude oil processing;
- Increased generation of coke due to an increase in crude oil processing; and
- Increased movements of crude oil to supply the Refinery increase in crude oil throughput.

Each of these increased activities would generate additional emissions. The level of increase in emissions associated with the transportation of crude oil would be a function of the crude oil origin and the transportation methods. At this time, it is not known where the additional crude oil would come from that would allow the Refinery to operate at a higher throughput level. Increased throughput could be produced from onshore fields or from offshore fields. It could be transported by pipeline or it could be transported by truck to the Santa Maria Pump Station. Since the mode and source of the transportation are not known, a reasonable worst-case scenario is defined where the additional crude oil would come from onshore sources and would be transported by truck to the Santa Maria Pump Station. This scenario would produce the highest emissions associated with an increase in crude deliveries to the Refinery.

The Proposed Project would not increase the emissions associated with employees or miscellaneous Refinery deliveries since an increase in the crude oil throughput would not increase employee travel or miscellaneous deliveries.

Emissions associated with offsite mobile emissions from the Proposed Project are shown in Table 4.1-15. Daily emissions of ROG+NOx and diesel particulate matter would increase more than the SLOCAPCD thresholds. Annual thresholds would not be exceeded.

Table 4.1-15 Offsite Mobile Emissions – Proposed Project Operations

Source	Peak Day Emissions, lbs/day						Total Emissions, Tons or Tons/yr								
	ROG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	ROG	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$	N2O	CH4	CO2
Within SLO County															
Workers/Visitors weekdays	1.45	41.72	4.65	0.05	0.48	0.23	0.19	5.42	0.60	0.01	0.06	0.03	0.03	0.05	617
Workers/Visitors weekends	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.01	0.00	0.00	0.00	0.00	0.00	15
LDT trucks - misc refinery deliveries	0.17	4.72	0.60	0.00	0.03	0.02	0.03	0.86	0.11	0.00	0.01	0.00	0.01	0.01	63
HHDT Trucks - coke export	8.86	44.39	187.50	0.25	7.02	5.87	1.62	8.10	34.22	0.05	1.28	1.07	0.07	0.07	4887
HHDT Trucks - sulfur export	0.91	4.57	19.28	0.03	0.72	0.60	0.17	0.83	3.52	0.00	0.13	0.11	0.01	0.01	503
HHDT Trucks - crude deliveries to SM	5.00	25.04	105.77	0.14	3.96	3.31	0.91	4.57	19.30	0.03	0.72	0.60	0.04	0.04	2757
Locomotives to Long Beach- SLOC	0.72	2.10	12.86	0.00	0.44	0.40	0.02	0.05	0.28	0.00	0.01	0.01	0.00	0.00	17
Total	***17.11***	***122.54***	***330.67***	***0.47***	***12.66***	***10.44***	***2.94***	***19.96***	***58.05***	***0.08***	***2.22***	***1.83***	***0.16***	***0.18***	***8858***
Increase over Baseline	***3.44***	***17.21***	***72.70***	***0.10***	***2.72***	***2.28***	***0.63***	***3.14***	***13.29***	***0.02***	***0.50***	***0.42***	***0.03***	***0.03***	***1896***
Kern County															
HHDT Trucks - sulfur export	0.63	3.17	13.40	0.02	0.50	0.42	0.12	0.58	2.45	0.00	0.09	0.08	0.01	0.01	***349***
HHDT Trucks - coke export	11.82	59.19	250.00	0.34	9.36	7.83	2.16	10.80	45.63	0.06	1.71	1.43	0.09	0.10	***6516***
Total	***12.45***	***62.36***	***263.40***	***0.35***	***9.86***	***8.25***	***2.27***	***11.38***	***48.07***	***0.06***	***1.80***	***1.51***	***0.10***	***0.10***	***6865***
Increase over Baseline	***0.86***	***4.32***	***18.23***	***0.02***	***0.68***	***0.57***	***0.16***	***0.79***	***3.33***	***0.00***	***0.12***	***0.10***	***0.01***	***0.01***	***475***
Santa Barbara County															
HHDT Trucks - crude deliveries to SM	1.12	5.61	23.69	0.03	0.89	0.74	0.20	1.02	4.32	0.01	0.16	0.14	0.01	0.01	***617***
Locomotives to Long Beach- SBC	16.13	47.32	290.04	0.01	10.04	9.03	0.36	1.05	6.41	0.00	0.22	0.20	0.03	0.01	***386***
Total	***17.25***	***52.93***	***313.73***	***0.04***	***10.93***	***9.78***	***0.56***	***2.07***	***10.74***	***0.01***	***0.38***	***0.34***	***0.04***	***0.02***	***1004***
Increase over Baseline	***0.61***	***3.04***	***12.83***	***0.02***	***0.48***	***0.40***	***0.14***	***0.63***	***2.78***	***0.00***	***0.10***	***0.09***	***0.01***	***0.01***	***361***
Monterey County															
HHDT Trucks - crude deliveries to SM	1.50	7.51	31.71	0.04	1.19	0.99	0.27	1.37	5.79	0.01	0.22	0.18	0.01	0.01	***827***
Increase over Baseline	***0.81***	***4.06***	***17.17***	***0.02***	***0.64***	***0.54***	***0.15***	***0.74***	***3.13***	***0.00***	***0.12***	***0.10***	***0.01***	***0.01***	***447***
Ventura County															
Locomotives to Long Beach- VC	8.65	25.37	155.48	0.00	5.38	4.84	0.19	0.56	3.44	0.00	0.12	0.11	0.02	0.01	***207***
Increase over Baseline	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***0.04***	***0.24***	***0.00***	***0.01***	***0.01***	***0.00***	***0.00***	***14***
Los Angeles County															
Locomotives to Long Beach- LAC	8.32	24.39	149.50	0.00	5.17	4.66	0.18	0.54	3.31	0.00	0.11	0.10	0.02	0.01	***199***
Increase over Baseline	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.01***	***0.04***	***0.23***	***0.00***	***0.01***	***0.01***	***0.00***	***0.00***	***14***
Total All Counties Increase Over Baseline	***5.72***	***28.63***	***120.92***	***0.16***	***4.53***	***3.79***	***1.09***	***5.38***	***23.00***	***0.03***	***0.86***	***0.72***	***0.05***	***0.05***	***3208***

Notes: Increase over baseline operations is the increase over the potential emissions generated from the permitted operations at 44,500 bpd. Note that these emission levels have not occurred, but have been evaluated in past CEQA documents. Santa Barbara APCD Significance Threshold for mobile sources is 25 lbs NOx/day. Monterrey APCD Significance Threshold for is 137 lbs NOx or VOC/day. San Joaquin (Kern County) APCD Significance Threshold for is 10 tons NOx or VOC/year.

Table 4.1-16 shows offsite emissions and the SLOCAPCD thresholds associated with Proposed Project operations (at the 48,950 bpd throughput level).

Table 4.1-16 Proposed Project Emissions Increases and SLOCAPCD Thresholds

Thresholds	Daily Emissions Increases, pounds		Annual Emissions Increases, tons	
	Thresholds	Project	Thresholds	Project
ROG + NOx	25	128.1	25	23.4
Diesel Particulate Matter	1.25	2.7	-	-
Fugitive Dust Particulate Matter (PM_{10})	25	0.10	25	0.02
CO	550	22.1	-	-

Note: SMF and Offsite Mobile Sources combined. Fugitive dust sources are from the coke storage and handling and rail car loading only.

Emissions associated with Refinery operations would increase with the Proposed Project due to the increased use of equipment associated with crude oil processing. Emissions associated with the transportation of sulfur and coke and the delivery of crude oil to the Santa Maria Pump Station would also increase. The increase would be more than the SLOCAPCD thresholds and would therefore be a significant impact.

Mitigation Measures

AQ-1.1 Prior to issuance of the updated permit and increase in Refinery throughput, the Applicant shall apply BACT on the crude heaters, coker heaters and boilers, vacuum heaters and superheaters, and/or utilize an equivalent method onsite with other equipment, to reduce the NOx emissions to less than the SLOCAPCD thresholds.

AQ-1.2 To the extent feasible, and if AQ-1.1 does not reduce emissions to below the thresholds, all trucks under contract to the SMF shall meet EPA 2010 or 2007 model year NOx and PM emission requirements and a preference for the use of rail over trucks for the transportation of coke shall be implemented to the extent feasible in order to reduce offsite emissions. Annual truck trips associated with refinery operations and their associated model year and emissions shall be submitted to the SLOCAPCD annually.

AQ-1.3 Prior to issuance of the updated permit, if emissions cannot be mitigated below significance thresholds through implementation of mitigation measures AQ-1.1 and AQ-1.2, then offsite mitigation will be required as per SLOCAPCD guidance in the CEQA Handbook.

Residual Impacts

Implementing the recommended mitigation measure, for example, to use the low-NOx burners on the crude heaters, the coke heaters, and the boilers B504/506 to reduce the NOx emissions to 21 ppm from 30 ppm could reduce the NOx emissions from this equipment by almost 84 pounds NOx per day. Boiler B507 is a relatively new boiler designed with forced draft and flue gas recirculation to achieve the NOx limit of 21 ppm. Implementing this technology on other boilers would reduce boiler NOx emissions. The Refinery could also implement other emission controlling techniques on heaters, as safe design practices allow, to reduce heater NOx emissions, if a significant increase warrants the mitigation. The mitigated emissions increases with low NOx burners on the crude heaters, coker heaters, and boilers B504/506 (as per AQ.1-1) are listed in Table 4.1-17.

Table 4.1-17 Proposed Project Refinery and Mobile Emissions Increases and SLOCAPCD Thresholds - Mitigated

Thresholds	Daily Emissions Increases, pounds		Annual Emissions Increases, tons	
	Thresholds	Project	Thresholds	Project
ROG + NOx	25	44.3	25	8.1
Diesel Particulate Matter	1.25	2.7	-	-
Fugitive Dust Particulate Matter (PM_{10})	25	0.10	25	0.02
CO	550	22.1	-	-

Notes: Fugitive dust is calculated from coke handling operations only.

Emissions of ROG+NOx and emissions of diesel particulate matter would remain greater than the SLOCAPCD thresholds primarily due to offsite use of diesel trucks. Mitigation measures to reduce offsite, mobile emissions are more difficult to address since locomotive emissions are outside the control of the Refinery and oil and gas companies that supply the crude oil to the Santa Maria Pump Station deliver the oil on their own, independent of Phillips control or oversight. However, some reduction in emissions could be realized by requiring companies that contract with the Refinery to utilize newer, cleaner trucks. This would reduce NOx and PM emissions. The EPA NOx and PM limit on heavy duty truck diesel engines for model year 2010 produces close to a 90 percent reduction over earlier models. However, the feasibility of implementing this measure for the wide range of companies and truck types associated with the offsite Refinery operations is not clear. For the remaining emissions reductions, offsite emission reductions shall be secured to offset the amount of emissions exceeding SLOCAPCD's thresholds and reduce the Project emissions to a level of *less than significant with mitigation* (Class II).

Impact #	Impact Description	Residual Impact
AQ.2	Operational activities could increase the frequency or duration of odor events.	Class II

The release of material that contains even small amounts of sulfur compounds (H_2S) or hydrocarbons produces an odor. 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.

Odor thresholds are defined as the point at which a person can detect the substance. Below the odor threshold, a person would not smell anything. According to the American Industrial Hygiene Association, the odor detection threshold is the lowest concentration of odorant that will elicit a sensory response in the olfactory receptors of a specified percentage of a given population (AIHA 1989). The annoyance level would be a higher concentration.

For instance, H_2S 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, H_2S would be detected by most people. The Occupational Safety and Health Administration limits occupational exposure to H_2S at 20 ppm with a 50 ppm peak over 10 minutes (29 CFR 1910.1000 Z-2 Table). Inhaling 100 ppm can be lethal according to the Emergency Response Planning Guideline (AIHA 2008).

Many volatile compounds found in oil and gas (e.g., pentane, n-pentane, hexane, ethane, and longer chain hydrocarbons) typically have petroleum or gasoline odors with varying odor thresholds. The most odiferous of these compounds are hexane, which has an odor threshold between 68 and 248 ppm, and pentane, which has an odor threshold of 2 ppm (New Jersey 2004).

Odor events could occur from many different situations associated with Refinery equipment operations. The equipment components could leak and cause odors. Tanks are equipped with hatches to protect them from overpressure. These hatches could lift, leading to odor events. The amount of throughput through the crude oil tanks would increase under the Proposed Project. The storage of sulfur at the Refinery could also be a source of odors to nearby residences and the amount of sulfur moved through the Refinery would increase with the Proposed Project. The combustion of Refinery gases that contain sulfur produces SO_2 which could travel downwind after combustion and produces odors. Sulfur levels of Refinery fuel gases vary, but generally are limited by the SLOCAPCD permit to less than 797 ppm and generally range from 250 to 300 ppm. Although these levels would not change with the Proposed Project, the amount of gas that is treated and combusted would increase with the Proposed Project.

Released materials that cause odors can travel a substantial distance since the odor thresholds for materials can be as low as parts per billion. Odor impacts associated with accidental releases or from normal operations at the Refinery could impact surrounding areas. Increased processing of crude oil would lead to increased movements of sulfur and increased emissions, increased cycling of coker units and increased cycling of crude tank levels in the crude oil tanks, all of which would lead to an increase in emissions and a potential for an increased frequency and/or duration of odor events. This would be considered a significant impact.

Mitigation Measure

AQ-2 *The Applicant shall prepare and submit an Odor Control Plan, which shall be approved by the SLOCAPCD prior to the issuance of a revised permit. The Odor Control Plan shall identify all potential sources of odors at the Refinery. The plan shall detail how odors will be controlled at each odor source and the mechanism in place in the event of an upset or breakdown, as well as design methods to reduce odors, including redundancy of equipment (e.g., pumps and VRU compressors) or* *reductions in fuel gas sulfur content. Area monitoring shall be discussed. The Plan shall also include a complaint monitoring and reporting section and include a hotline number for individuals to call in case of a complaint.*

Residual Impacts

Implementing these mitigation measures could reduce odor events that have resulted in odor complaints and notices of violation due to Refinery operations in the past.

These mitigation measures for odor impacts associated with normal operations would reduce odors to a level less than the current operations (less frequency and or shorter duration) and, although odors could still impact nearby residences, impacts are considered *less than significant with mitigation* (Class II).

Impact #	Impact Description	Residual Impact
AQ.3	Operational activities could increase GHG emissions.	Class II

The majority of the GHG emissions come from the combustion of fossil fuels such as natural or Refinery fuel gas at the Refinery. Stationary combustion equipment at the Refinery creates the largest percentage of Refinery GHG emissions.

GHG associated with operations include emissions from combustion sources (e.g., flare, heaters, boilers, and electrical generators), offsite vehicles, and fugitive emissions that contain CO_2 and methane. The largest source of GHG emissions are the heaters and the electrical generators. Table 4.1-19 shows the GHG emissions for operations under the Proposed Project. Table 4.1-19 includes a comparison to the baseline operational emissions that would occur if the Refinery were operating at the permitted throughput level of 44,500 bpd.

Refinery operations account for more than 90 percent of the GHG emissions, with onsite stationary sources creating the vast majority of emissions and offsite mobile emissions accounting for the remaining percentage.

The GHG emissions estimate utilizes the same approach as the criteria emissions estimate, whereby emissions from equipment are assumed to increase proportional to the increase in crude throughput. Since the majority of emissions are associated with Refinery combustion from the crude oil heaters, the coke heaters, and boilers, which would have an increase in heating requirements as a function of the increase in crude oil throughput, this estimate is considered to be an accurate assessment of the Proposed Project GHG emissions.

Emissions of GHG would be greater than the significance threshold of 10,000 metric tonnes CO_2e.

Table 4.1-18 Refinery GHG Emissions and Increase over the Baseline Operations Scenario, metric tonnes

Source Type	CO_2	N_2O	CH_4	SF_6	Total CO_2 Equivalent Emissions
Refinery					
Stationary Combustion	259,563	0.5	4.4	0	259,806
Mobile Combustion	751	0.0	0.0	0	780
Refrigerant Usage	0	0.0	0.0	0	20
Sulfur Recovery	9,617	0.0	0.0	0	9,617
Water Processes	0	0.2	1.5	0	105
VOC Fugitives	0	0.0	0.5	0	11
SF6 Usage	0	0.0	0.0	0	0
Purchased Electricity	2,279	0.0	0.1	0	2,282
TOTAL REFINERY	272,210	1.0	6	0	272,621
Offsite Mobile					
Workers commuting	568	0.0	0.0	0	577
LDT trucks - misc Refinery deliveries	57	0.0	0.0	0	60
HHDT Trucks - coke export	10,262	0.1	0.2	0	10,311
HHDT Trucks - sulfur export	767	0.0	0.0	0	770
HHDT Trucks - crude deliveries to SMPS	3,780	0.1	0.1	0	3,799
Locomotives to Long Beach	728	0.1	0.0	0	747
TOTAL MOBILE	16,163	0.3	0.3	0	16,264
TOTAL					288,885
Increase Over Baseline Operations					**20,470**

Source: Data submitted to SLOC APCD by ConocoPhillips (see also Applicant comments on the DEIR, Exhibit 5). Data from 2009 offsite mobile sources submitted by ConocoPhillips used to derive Offsite Mobile project data.

Mitigation Measure

AQ-3 *The Applicant shall implement a program to increase efficiency of the Refinery stationary combustion devices to maintain GHG emissions to less than the SLOCAPCD thresholds (10,000 metric tonnes per year) over the emissions associated with the current permitted throughput. In addition to increasing stationary equipment efficiency, additional measures may include the use of more efficient model year trucks or alternative fueled vehicles for hauling vehicles. If after all applicable measures have been implemented, emissions are still over the thresholds, then off-site mitigation will be required. The off-site mitigation measures shall be approved by the SLOCAPCD prior to permit issuance.*

Residual Impacts

A substantial majority of GHG emissions are produced from combustion of produced gas at the Refinery. By increasing the efficiency of the use of this gas, more electricity and heat could be generated for each unit of gas and GHG emissions could be reduced. However, at high crude oil throughput rates, the Refinery could operate with a surplus of produced gas and might need to flare the surplus gas, which would negate the efficiency gains. Therefore, it is not clear that the stationary, onsite GHG emissions could be reduced to below the thresholds. Also, the availability of newer, more efficient trucks as well as the availability of alternative-fueled trucks is uncertain. Emissions reductions within the community shall be obtained to further reduce emissions to below the significance thresholds, as per SLOCAPCD requirements. A combination of these mitigation measures could reduce the GHG emissions to below the threshold of 10,000 tons per year which would reduce the emissions to less than significant with mitigation. (Class II).

Impact #	Impact Description	Residual Impact
AQ.4	Potential increased operations at the Refinery would emit air-borne toxic materials.	Class III

The increase in throughput associated with the Proposed Project would increase emissions at the Refinery and along transportation routes between the Refinery and area highways. Some of these emissions would be toxic materials that could increase health risks for populations near to the Refinery.

A toxic emission inventory was developed for the Refinery in 2004, which included only stationary sources at the SMF and also included operations such as the calciner, which have since been shut down. The 2004 inventory was used in a 2007 health risk assessment prepared by ConocoPhillips which utilized the California Air Resources Board's Hotspots Analysis and Reporting Program model to assess the cancer, chronic, and acute health risk impacts. The primary cause of health risk impacts at the Refinery in 2004 was determined to be the diesel-cooling water pump. In 2005, a diesel oxidation catalyst (DOC) was reportedly installed on the diesel cooling water pump to reduce diesel particulate emissions by 30 percent. The installation of the DOC and shutdown of calcining operations resulted in a reduction in health risk levels to 15 cancer cases per one million at the Refinery boundary (ConocoPhillips 2007).

Since 2004, several additional changes at the Refinery have reduced toxic emissions, including shutting down the calciner, installation of various DOC and diesel particulate filters (DPF) on several diesel engines, and reductions in fugitive emissions with a more rigorous fugitive emissions control program. Additionally, the SLOCAPCD reported that the diesel cooling water pump has been replaced by a natural gas engine with catalyst, which has reduced risk levels by at least 80 percent. This would reduce health risk levels to approximately five cases per one million.

As part of the Applicant's comments on the DEIR, the Applicant prepared and submitted a revised HRA utilizing 2010 emission data and assumptions about the operating characteristics of the Refinery if it were to operate at the Proposed Project levels. This HRA is included in the comments on the DEIR. The HRA indicated that the highest cancer risks at the facility fence line would be 2.1 in a million, and that chronic and acute risks would be 0.02 and 0.38, respectively, associated with the Proposed Project operations. These levels are less than the health risk thresholds of 10 in one million (for cancer) and 1.0 HI for acute and chronic impacts and would be less than significant.

Diesel-powered trucks traveling along area roadways could also increase health risks associated with emissions. Modeling was conducted using Aeromod to assess the impacts of truck traffic along area roadways between the Refinery and U.S. Highway 101. The cancer risks associated with truck traffic would increase over the baseline to a level of 5.9 cancer cases per million immediately south of the Refinery along area roadways. This would be less than the thresholds and would be a less than significant impact.

Mitigation Measure

None required

Residual Impacts

Health risks associated with the mitigated Project operations would be less than all applicable health risk criteria and impacts would be considered *less than significant* (Class III).

4.1.5 Other Issue Area Mitigation Measure Impacts

No other issue area mitigation measures are anticipated to produce additional air quality and greenhouse gas impacts. Therefore, the mitigation measures would not result in additional significant impacts, and additional analysis or mitigation is not required.

4.1.6 Cumulative Impacts

With one exception, none of the proposed developments in the cumulative projects list (see Section 3.0, Cumulative Projects) would be constructed near the Proposed Project area so there would be no localized impacts associated with cumulative projects. The Sheridan Properties development project would construct 21 industrial units on approximately 13 acres east of the SMF. Impacts of the development project would be a function of the type of industrial development proposed for the site. Any substantial emission sources at the proposed Sheridan Properties site could increase impacts associated with health risk between the Sheridan site and the SMF. Since the Sheridan Properties industrial uses have not been defined at this point, the impacts could be potentially cumulatively significant.

Regional impacts could be realized since multiple projects would emit into the South Central Coast Air Basin at the same time. Most of these projects are within the South County planning area. All residential projects within the South County planning area are subject to the cumulative air quality impact program which collects a fee per proposed residence (SLOC 2009). These fees contribute to several identified improvements that will help reduce some of the cumulative air quality impacts within the South County (e.g., clean-fuel bus replacement, park-and-ride lots).

Projects are preceded by an update of the South County Area Plan that conducted a cumulative assessment and projection of build-out, where air quality impacts where considered. Individual projects (previously planned or not) may also be required to undergo CEQA analysis, and mitigation measures applied, where appropriate. Further, projects must comply with SLOCAPCD rules and regulations that include air emission reduction strategies for the basin. These, in concert with individual project mitigation measures, will help reduce air quality impacts. However, until San Luis Obispo as a whole attains all federal and state standards, it is likely that the air emissions from the cumulative projects would be significant.

The development of additional oil resources in SLOC, such as at the Excelaron Project approximately 25 miles from the Santa Maria Pump Station in Huasna Valley, or from fields in northern Santa Barbara County, could supply crude oil to the Refinery. Since the Excelaron distance is less than the crude volume-weighted distance associated with the current onshore crude sources supplied by truck (the current distance weighted by the amount of crude oil supplied to the Refinery is 66 miles), using crude oil from the Excelaron site could reduce mobile emissions associated with delivering crude oil to the Santa Maria Pump Station.

The additional crude oil supplied by northern Santa Barbara County fields could also contribute to the proposed Project throughput increase. Crude oil would be transported by pipeline from some Orcutt area fields and would not pass through the SMPS. Additional crude oil production at other onshore fields might utilize the SMPS if the crude oil is delivered by truck instead of pipeline, and could cause the permit limits at the SMPS to be exceeded. This might cause some displacement of crude oil to other refineries if the SMPS permit limits are exceeded. However, historical operations at the SMPS indicate that there is plenty of excess capacity at the SMPS and within the pipelines to handle additional crude oil (a permit limit of 26,000 bpd of truck unloading at the SMPS with 2010 throughput levels of less than 7,000 bpd).

Since one of the cumulative projects would be constructed near the Proposed Project area, the cumulative impacts associated with odors or toxic emissions could be significant. With the application of APCD requirements related to toxic emissions and odors, cumulative impacts would be reduced to less than significant.

4.1.7 Mitigation Monitoring Plan

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
AQ-1.1	Prior to issuance of the updated permit and increase in Refinery throughput, the Applicant shall apply BACT on the crude heaters, coker heaters and boilers, vacuum heaters and superheaters, and/or utilize an equivalent method onsite with other equipment, to reduce the NOx emissions to less than the SLOCAPCD thresholds.	Inspection of equipment	During operations	San Luis Obispo County Planning and Building Department, SLOCAPCD
AQ-1.2	To the extent feasible, and if AQ-1.1 does not reduce emissions to below the thresholds, all trucks under contract to the SMF shall meet EPA 2010 or 2007 model year NOx and PM emission requirements and a preference for the use of rail over trucks for the transportation of coke shall be implemented to the extent feasible in order to reduce offsite emissions. Annual truck trips associated with refinery operations and their associated model year and emissions shall be submitted to the SLOCAPCD annually.	Inspection of equipment	During operations	San Luis Obispo County Planning and Building Department, SLOCAPCD
AQ-1.3	Prior to issuance of the updated permit, if emissions cannot be mitigated below significance thresholds through implementation of mitigation measures AQ-1.1 and AQ-1.2, then offsite mitigation will be required as per SLOCAPCD guidance in the CEQA Handbook.	Inspection of off-site mitigation	During operations	SLOCAPCD
AQ-2	The Applicant shall prepare and submit an Odor Control Plan, which shall be approved by the SLOCAPCD prior to the issuance of a revised permit. The Odor Control Plan shall identify all potential sources of odors at the Refinery. The plan shall detail how odors will be controlled at each odor source and the mechanism in place in the event of an upset or breakdown, as well as design methods to reduce odors, including redundancy of equipment (e.g., pumps and VRU compressors) or reductions in fuel gas sulfur content. Area monitoring shall be discussed. The Plan shall also include a complaint monitoring and reporting section and include a hotline number for individuals to call in case of a complaint.	Inspection of plan	During operations	SLOCAPCD
AQ-3	The Applicant shall implement a program to increase efficiency of the Refinery	Inspection of	During	SLOCAPCD

Mitigation Measure	Requirements	Compliance Verification		
		Method	Timing	Responsible Party
	stationary combustion devices to maintain GHG emissions to less than the SLOCAPCD thresholds (10,000 metric tonnes per year) over the emissions associated with the current permitted throughput. In addition to increasing stationary equipment efficiency, additional measures may include the use of more efficient model year trucks or alternative fueled vehicles for hauling vehicles. If, after all applicable measures have been implemented, emissions are still over the thresholds, then offsite mitigation will be required. The off-site mitigation measures shall be approved by the SLOCAPCD prior to permit issuance.	program	Operations	