4.4 AIR QUALITY

Section 4.4 describes the existing air quality conditions and setting for the Tesoro Avon Marine Oil Terminal (Avon Terminal) Lease Consideration Project (Project), including site-specific factors such as climatology and topography, which influence emissions dispersion. Additionally, the setting section identifies the locations of sensitive receptors that would be impacted by air pollution from the Project. The regulatory background section includes a discussion of the potential human health impacts and effects of pollutants on the surrounding community. Significance criteria are also discussed, and the baseline level of pollutants within the Project area are identified. The Impacts section includes anticipated Project air pollutant emissions and their impacts on the surrounding environment.

The Avon Terminal is currently operational. As part of a new 30-year lease, the Avon Terminal would need to comply with Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS). Tesoro Refining and Marketing Company, LLC (Tesoro) has concluded that construction of a new berth (Berth 1A) next to the existing berth (Berth 1) is the most effective way to achieve MOTEMS compliance at the Avon Terminal. The Avon Terminal's emissions are a part of the existing ambient air quality in the local and regional area, and have been included in the San Francisco Bay Area (Bay Area) regional air emissions inventory and planning process. Therefore, this section includes both a discussion of the existing emissions and an analysis of the impacts associated with continued operations under the proposed 30-year lease period, as well as MOTEMS renovation emissions and impacts.

4.4.1 ENVIRONMENTAL SETTING

4.4.1.1 Local Climatology

The climate of the San Francisco Bay Area is considered a Mediterranean-type, characterized by warm, dry summers and mild, wet winters. Extreme variations in ambient temperature are rare. The climate is strongly influenced by the proximity of the Pacific Ocean and irregularities in the inland topography.

During the summer months, the high-pressure system over the Pacific Ocean diverts precipitation and facilitates northwest wind flows over the Bay Area. These northwesterly flows, along with the natural current flowing southward from Alaska, promote the upwelling of cold water near the San Francisco coastline. Cool, moisture-laden air approaching the coast often results in condensation and the formation of fog and clouds in the region. In winter, the high-pressure system over the Pacific Ocean shifts southward, allowing weather systems to move inland across northern California. The formation of high-pressure systems over the mountainous regions of northern California cause winter winds in the Bay Area to come from the east and northeast.

A majority of the Bay Area's precipitation occurs from November to March. Average annual rainfall for the city of Martinez is 19.6 inches. Inversion conditions (characterized by cold air trapped at the surface by warm air), which are common in winter in many areas, are either nonexistent or very weak in the Bay Area. Stagnant conditions are unusual, due to the replacement of air masses with each storm.

Weather patterns influence the dispersion of pollutants. Stagnant periods, which inhibit the dispersion of pollutants in the lower atmosphere, generally result from high temperatures and relatively stable environmental conditions. In the Bay Area, however, the land-sea temperature differential is frequently high on warm days, and turbulence results from the passage of westerly winds over the irregular topography, improving the dispersion of pollutants.

The air pollution potential is lowest for those regions closest to the bay, due largely to instability and strong atmospheric mixing characteristics created by onshore winds. During summer and fall, air emissions generated within the Bay Area, especially inland, can combine with sunshine under the restraining influences of topography to create conditions that are conducive to the buildup of photochemical pollutants, such as ozone, and secondary pollutants, such as sulfates and nitrates. Also, stable conditions characterized by low wind speeds contribute to increased concentrations of air pollutants, due to accumulation in the air mass.

4.4.1.2 Atmospheric Air Pollutants

Criteria Air Pollutants

Criteria air pollutants are those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health. The national and state ambient air quality standards have been set at levels to protect human health with a determined margin of safety. For some pollutants, there are also secondary standards to protect the environment.

The U.S. Environmental Protection Agency (USEPA) has established ambient air quality standards for the following air pollutants:

- ozone (O_3)
- carbon monoxide (CO)
- nitrogen dioxide (NO_2)
- sulfur dioxide (SO_2)
- lead
- particulate matter (PM_{10} and $PM_{2.5}$)

The California Air Resources Board (CARB) has also established ambient air quality standards for the six pollutants regulated by the USEPA. Some of the California ambient

air quality standards are more stringent than the national ambient air quality standards (NAAQS). In addition, California has established ambient air quality standards for the following pollutants or air quality conditions: hydrogen sulfide, sulfates, vinyl chloride, and particulates reducing visibility

The following paragraphs provide descriptions of the USEPA-established ambient air pollutants, including potential health effects of each.

Ozone. O_3 is one of a number of substances called photochemical oxidants that are formed when volatile organic compounds (VOCs) and NO_x (a mixture of nitric oxide [NO] and NO_2) react in the presence of ultraviolet sunlight. The damaging effects of photochemical smog, which is a popular name for a number of oxidants in combination, are generally related to concentrations of O_3. Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the subgroups most susceptible to O_3 effects. Short-term exposures (lasting for a few hours) to O_3 at elevated levels can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes.

Carbon Monoxide. CO is a colorless, odorless gas formed by the incomplete combustion of fuels. Motor vehicles are the main source of this gas. 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 carbon monoxide is intended to protect persons whose medical condition already compromises their circulatory system's ability to deliver oxygen. These medical conditions include certain heart ailments, chronic lung diseases, and anemia. Persons with these conditions have reduced exercise capacity even when exposed to relatively low levels of CO. Smokers are also at risk from ambient CO levels, because smoking increases the background level of CO in their blood.

Nitrogen Dioxide. NO_2 is a byproduct of fuel combustion. The principal form of nitrogen oxide produced by combustion is NO, but NO reacts quickly to form NO_2, creating the mixture of NO and NO_2 commonly referred to as NO_x. NO_2 acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in young children has also been observed at concentrations below 0.3 parts per million. NO_2 absorbs blue light, which results in a brownish red cast to the atmosphere and reduced visibility. NO_x emissions are also of concern because of their contribution to the formation of O_3 and particulate matter.

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

difficulty in breathing for children. Individuals with asthma may experience constriction of airways with exposure to SO_2. Though SO_2 concentrations have been reduced to levels well below State and federal standards, further reductions in SO_2 emissions are needed, because SO_2 is a precursor to sulfate and PM_{10}.

Lead. Lead concentrations in air in California have historically exceeded the State and federal air quality standards by a wide margin, but have not exceeded State or federal standards at regional air quality monitoring stations since 1982. Infants and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence levels. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures, and death. Lead can be stored in the bone from early-age environmental exposure, and elevated blood lead levels can occur due to the breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue).

Particulate Matter. Inhalable fine particulate matter (PM_{10}) consists of extremely small suspended particles, or droplets 10 microns or smaller in diameter that can lodge in the lungs, contributing to respiratory problems. PM_{10} arises from such sources as re-entrained road dust, diesel soot, combustion products, tire and brake abrasion, construction, and fires. It is also formed in the atmosphere from NO_x and SO_2 reactions with ammonia. PM_{10} scatters light and significantly reduces visibility. Inhalable particulates pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled will be deposited in the lungs and can cause permanent lung damage. Inhalable particulates can also have a damaging effect on health by interfering with the body's mechanism for clearing the respiratory tract or by acting as a carrier of an absorbed toxic substance. In 1997, the USEPA established a new particulate matter $PM_{2.5}$ standard, in addition to the PM_{10} standard. $PM_{2.5}$ is defined as particulate matter with a diameter less than 2.5 microns and is a subset of PM_{10}. $PM_{2.5}$ consists mostly of products from the reaction of NO_x and SO_2 with ammonia, secondary organics, finer dust particles, and the combustion of fuels, including diesel soot. $PM_{2.5}$ is considered even more dangerous to human health than PM_{10}, due to its ability to lodge more deeply into lung tissue.

Volatile Organic Compounds. VOCs are not true criteria pollutants in that there are no State or federal ambient air quality standards established. VOCs are regulated, however, because a reduction in VOC emissions reduces certain chemical reactions that contribute to the formation of ozone. VOCs are also transformed into organic aerosols in the atmosphere, contributing to higher PM_{10} and lower visibility levels. Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations of VOCs. Some hydrocarbon

components classified as VOC emissions are hazardous air pollutants (e.g., benzene is a hydrocarbon component of VOC emissions that is known to be a human carcinogen).

Toxic Air Contaminants

Toxic Air Contaminants (TACs), as classified by the State of California, are often referred to as "non-criteria" air contaminants, because ambient air quality standards have not been established for these pollutants. There are hundreds of TACs, and exposure to these pollutants is associated with elevated risk of cancer and non-cancer health effects, such as birth defects and genetic damage. The USEPA has a similar list of toxic substances, referred to as Hazardous Air Pollutants (HAPs). Effects may be chronic (i.e., of long duration) or acute (i.e., of short duration) on human health. Acute health effects are attributable to short-term exposure to air toxins. These effects include nausea, skin irritation, respiratory illness, and, in extreme cases, death. Chronic health effects result from long-term exposure. The effect of major concern for this type of exposure is cancer, which may develop up to 30 years after exposure.

The USEPA regulates HAPs through technology-based requirements, which are implemented by State and local agencies. California regulates TACs through the Air Toxics Program (Health & Saf. Code, § 39660 et seq.) and the Air Toxics "Hot Spots" Information and Assessment Act (Health & Saf. Code, § 44300 et seq.). The CARB, working in conjunction with the Office of Environmental Health Hazard Assessment, identifies TACs. Air Toxic Control Measures (ATCMs) must then be adopted by the CARB to implement controls to reduce TACs. Where there are federal HAP standards, the CARB must, at minimum, adopt the standards established by the USEPA. If there is a threshold below which there would be no significant adverse health impacts, the CARB must create an ATCM to reduce emissions so there are no adverse health effects. If there is not a threshold below which there would be no significant adverse health impacts, the CARB must create an ATCM that reduces TAC emissions using the best available control technologies.

Diesel exhaust is the predominant contributor to human health risk from TACs statewide, and is estimated to represent approximately 84 percent of the total risk (South Coast Air Quality Management District 2008). Diesel exhaust is a complex mixture of gases, vapors, and fine particles, and the evaluation of health effects of diesel exhaust is a complex scientific issue. CARB has identified some chemicals in diesel exhaust, such as benzene and formaldehyde, as TACs. California has adopted a comprehensive diesel risk-reduction program. The USEPA has adopted low-sulfur diesel fuel standards that will facilitate substantial reductions in diesel particulate matter through exhaust treatment. These low-sulfur standards went into effect in June 2006.

Ozone-depleting Gases

"Stratospheric ozone depletion" refers to the slow destruction of naturally occurring ozone, which lies in the upper atmosphere (called the stratosphere), and which protects the Earth from the damaging effects of solar ultraviolet radiation. Certain compounds, including chlorofluorocarbons, halons, carbon tetrachloride, methyl chloroform, and other halogenated compounds, accumulate in the lower atmosphere, and then gradually migrate into the stratosphere. In the stratosphere, these compounds participate in complex chemical reactions to destroy the upper ozone layer. Destruction of the ozone layer increases the penetration of ultraviolet radiation to the Earth's surface, a known risk factor that can increase the incidence of skin cancers and cataracts, contribute to crop and fish damage, and further degrade air quality. (See also Section 4.5, Greenhouse Gas Emissions and Climate Change.)

4.4.1.3 Site Setting and Sensitive Receptors

The Project site is located in the lower Suisun Bay, approximately 1.75 miles east of the Benicia-Martinez Bridge, in unincorporated Contra Costa County. The nearby Carquinez Strait is the only sea-level gap between the San Francisco Bay and the Central Valley. Elevations in excess of 900 feet are reached in the surrounding hills of the Franklin Ridge, located west of Martinez. Topography to the north, across Suisun Bay and the Carquinez Strait, is also hilly. These topographical features create a high-pressure gradient causing high wind flows through the Carquinez Strait. Mount Diablo is also a major topographical feature, with an elevation of over 3,800 feet, located approximately 14 miles to the southeast, in Mount Diablo State Park.

For the purposes of air quality, sensitive receptors are generally defined as land uses with population concentrations that would be particularly susceptible to disturbance from dust or air pollution associated with the continued operation of the Avon Terminal. These receptors generally include schools, day care centers, hospitals, residential care centers, parks, and churches, none of which are located near the Avon Terminal. The nearest residential area is approximately 2 miles from the berthing area.

4.4.1.4 Air Monitoring Data near the Avon Terminal

The Bay Area Air Quality Management District (BAAQMD) operates a regional air quality network to monitor compliance ("attainment") with ambient air quality standards. The network consists of a series of monitoring stations used to measure ambient air concentrations of pollutants for which air quality standards have been established. Each station monitors a combination of gaseous and/or particulate pollutants. The data are used to describe the air quality within the surrounding community and determine the attainment status of the air basin. Table 4.4-1 provides a 3-year summary of data collected at the following air monitoring stations: (1) the Vallejo station, approximately 9 miles northwest of the Avon Terminal, is the station closest to the site that monitors O_3,

CO, NO_2, and $PM_{2.5}$; (2) the Martinez station, approximately 3.5 miles southwest of the Avon Terminal, presently only records SO_2 concentrations; and (3) the Concord station, approximately 8 miles south of the Avon Terminal, is the closest station that records PM_{10} data.

Table 4.4-1: Summary of Air Quality Monitoring at the Vallejo, Concord, and Martinez Monitoring Stations

Pollutant/Standard	No. Days Thresholds Exceeded/ Maximum Levels			Pollutant/Standard	No. Days Thresholds Exceeded/ Maximum Levels		
	2011[1]	2012[2]	2013[3]		2011[1]	2012[2]	2013[3]
Ozone				**Sulfur Dioxide**			
State 1 Hr >0.09 ppm	2	0	0	State 1 Hr >0.25 ppm	0	0	0
State 8 Hr >0.70 ppm	5	3	0	FED 1 Hr >0.075 ppm	0	0	0
-	-	-	-	State 24 Hr >0.04 ppm	0	0	0
FED 8 Hr >0.075 ppm	2	2	0	FED 24 Hr >0.14 ppm	0	0	0
-	-	-	-	FED Ann > 0.030 ppm	0	0	0
Max 1 Hr conc (ppm)	0.099	0.093	0.082	Max 1 Hr conc (ppm)	0.029	0.014	0.016
Max 8 Hr conc (ppm)	0.078	0.085	0.068	Max 24 Hr conc (ppm)	0.005	0.003	0.005
Carbon Monoxide				**Nitrogen Dioxide**			
State 1 Hr >20 ppm	0	0	0	State 1 Hr >0.18 ppm	0	0	0
FED 1 Hr >35 ppm	0	0	0	FED1 Hr >0.10 ppm	0	1	0
State 8 Hr >9 ppm	0	0	0	FED Ann > 0.03 ppm	0	0	0
FED 8 Hr >9 ppm	0	0	0				
Max 1 Hr conc (ppm)	3.0	2.8	2.8	Max 1 Hr conc (ppm)	0.047	0.052	0.049
Max 8 Hr conc (ppm)	2.4	2.2	2.3	Max Ann conc (ppm)	0.010	0.009	0.010
Particulate Matter ($PM_{2.5}$)				**Particulate Matter (PM_{10})**			
FED 24 Hr >35 µg/m^3	8	1	7	FED 24 Hr >150 µg/m^3	0	0	0
-	-	-	-	State 24 Hr >50 µg/m^3	1	0	1
Max 24 Hr conc (µg/m^3)	54.2	36.8	42.6	Max 24 Hr conc (µg/m^3)	59	35	51
Max Ann Avg conc (µg/m^3)	10	9	10	Max Ann Avg conc (µg/m^3)	15.7	12.6	16.0

[1]Source: (BAAQMD 2011)
[2]Source: (BAAQMD 2012a)
[3]Source: (BAAQMD 2013)
Units/Acronyms: FED = Federal standard, ppm – parts per million, µ/m^3 - micrograms per cubic meter, Hr – hour, Ann – annual, conc – concentration

As indicated in Table 4.4-1, monitoring stations in the vicinity of the Avon Terminal did not record violations of carbon monoxide or sulfur dioxide in the last 3 years. There were no recorded violations of the NAAQS for PM_{10} during the 3-year period, but the State standard was exceeded once in 2011 and once in 2013. The federal NO_x standard was exceeded once in 2012. The federal $PM_{2.5}$ standard was exceeded eight times in 2011, once in 2012, and seven times in 2013. The State ozone standard was exceeded seven times in 2011 and three times in 2012, and the federal ozone standard was exceeded twice, in both 2011 and 2012.

The San Francisco Bay Air Basin (SFBAAB) is currently non-attainment for the following CAAQS: 1-hour and 8-hour ozone, annual and 24-hour $PM_{2.5}$, and annual PM_{10}. Additionally, the SFBAAB is currently non-attainment for the following NAAQS: 8-hour ozone and 24-hour $PM_{2.5}$.

4.4.2 REGULATORY SETTING

Federal and State laws that may be relevant to the Project are identified in Table 4-1. Regional and local laws, regulations, and policies are discussed below.

Bay Area Air Quality Management District

The BAAQMD implements federal and State air quality programs and regulations in the Project region, and maintains a comprehensive program of planning, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the BAAQMD includes preparation of plans to attain ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. In 1999, the BAAQMD adopted California Environmental Quality Act (CEQA) Guidelines intended to serve as a guide for those who prepare or evaluate air quality impact analyses for projects in the San Francisco Bay Area. The BAAQMD CEQA Guidelines include:

- information on legal requirements and BAAQMD rules, plans and procedures;
- methods of analyzing air quality impacts;
- thresholds of significance designed to establish the level at which the District believed air pollution emissions would cause significant environmental impacts under CEQA; and
- mitigation measures.

In 2010, the BAAQMD adopted updated thresholds of significance (Updated Thresholds) to assist in the review of projects under CEQA. In 2012, the Alameda County Superior Court (trial court) issued a judgment finding that the BAAQMD did not comply with CEQA when it adopted these thresholds.[1] At this time, the BAAQMD recommends that CEQA lead agencies:

[1] The trial court did not determine whether the Updated Thresholds were valid on the merits, but found that the adoption of these thresholds was a project under CEQA. The court issued a writ of mandate ordering the BAAQMD to set aside and cease dissemination of the Updated Thresholds until the District had complied with CEQA. Subsequent actions included: (1) the BAAQMD appealed the trial court's decision; (2) the Court of Appeal of the State of California, First Appellate District, reversed the trial court's decision; (3) the Court of Appeal's decision was appealed to the California Supreme Court, which granted limited review; and (4) pending final resolution, the trial court's order is in place.

- rely on the BAAQMD CEQA Guidelines (updated May 2012) for assistance in calculating air pollution emissions, obtaining information regarding the health impacts of air pollutants, and identifying potential mitigation measures; and
- rely on the 1999 thresholds of significance and make determinations regarding the significance of an individual project's air quality impacts based on the substantial evidence in the record for each project. (BAAQMD 2014.)

Contra Costa County

The *Contra Costa County General Plan* (2005) includes goals to improve air quality, including by meeting air quality standards, supporting efforts to reduce air pollution, restoring air quality to more healthful levels, and reducing the percentage of traffic trips at peak hours.

4.4.3 EMISSIONS INVENTORY

4.4.3.1 Baseline Condition Annual Operating Emissions

The Avon Terminal operates under a BAAQMD Title V Operating Permit, which includes the Golden Eagle Refinery (Refinery) (BAAQMD Facility #B2758) and the Tesoro Amorco Marine Oil Terminal (Amorco Terminal; BAAQMD Facility #B2759). As a new source of emissions, Berth 1A will require a new BAAQMD operating permit. The leased portion of the Avon Terminal comprises the following operational emissions sources:

- engines on ocean-going vessels (OGV);[2]
- emissions during ship loading;
- displacement of VOCs during ballasting; and
- fugitive emissions from components such as pumps, valves, flanges, and pressure-relief devices and emissions from diesel generators for fire pumps, when operational.

Since the facility is already operational, emissions such as worker commutes are already part of baseline/existing conditions and, because these emissions are not expected to change during the 30-year lease period, they were not considered in the baseline or life-of-lease analyses.

Vessel Engines

The Avon Terminal is a multiple-berth docking facility consisting of two Berths: Berth 1 and Berth 5, though currently only Berth 1 is in operation. OGV (including tankers and

[2] An OGV is defined by the CARB as a commercial ship greater than or equal to 400 feet in length or 10,000 gross tons; or propelled by a marine compression ignition engine with a displacement of greater than or equal to 30 liters per cylinder.

barges) that call on the Avon Terminal contribute indirectly to emissions associated with Avon Terminal operations. These emissions are generated from the combustion of fuel oil by the vessel engines and generators as they travel, as well as emissions from auxiliary engines and boilers used to provide the necessary electrical and accessory power while the OGV are "hoteling" at the Avon Terminal.

Table 2-4 in Section 2.0, Project Description, shows the annual number of vessel calls for the Avon Terminal, as well as the average number of 124 vessel calls for the years 2004 through 2013. This average number of vessel calls serves as the baseline for comparison against the anticipated lease-period vessel calls. The anticipated maximum annual lease-period ship and barge traffic is approximately 70 to 120 vessels.

Avon Terminal emissions are regulated as part of the BAAQMD Title V Operating Permit for the Refinery (BAAQMD 2011a). The Avon Terminal emissions are included in the Refinery annual and monthly emissions caps specified in Condition 8077 Part B2A of the Title V permit. The Refinery is permitted for a maximum annual throughput of 63,875,000 barrels, and the Avon Terminal Berth 1 and Berth 5 are limited to 30,000,000 and 15,000,000 barrels (including both import and export), respectively, on a rolling 12-month basis. Pollutants regulated include CO, N_2O, hydrocarbons, SO_2, and PM. The emissions caps are based on both annual and monthly maximum emissions from all Refinery operations. As long as Tesoro complies with the emissions caps in total, even if emissions from the Avon Terminal increase, the permit would not be considered to be violated.

In addition to regulating emissions, the permit prescribes the calculation methodology to be used to quantify emissions from OGV. The methodology is contained in Condition 878 of the permit and in Appendix B of the permit (BAAQMD 2011a). Since the number of lease-period annual vessel calls would be less than the baseline, it is likely that emissions would be less during the lease period than the baseline. Besides the decrease in vessels, additional factors contribute to the decrease in emissions; among these are cleaner burning fuels (i.e., more stringent fuel standards) and vessel speed restrictions.

The BAAQMD-prescribed method contained in the permit does not anticipate these or other changes impacting vessel emissions. Therefore, the analysis presented herein uses CARB methods to calculate emissions, which are based on engine size, modern emission factors, and updated estimates regarding vessel activities and time in those activities.

Emissions from vessel activity were estimated using calculation methodology prescribed in the CARB Technical Support Division guidance document titled "Emissions Estimation Methodology for Ocean-Going Vessels" (CARB 2011). Emissions from tugboat activity were estimated using calculation methodology prescribed in the CARB

guidance document titled “Emissions Estimation Methodology for Commercial Harbor Craft Operating in California (CARB 2007). Ship criteria pollutant emissions from each vessel trip were estimated. Details of the vessel and tugboat emissions calculations are provided in Appendix D.

Table 4.4-2 presents the ship emissions for a single OGV call based on the CARB methodology for the 2014 baseline year. To estimate emissions, the following assumptions were used:

- OGV with an average size of 114,000 deadweight tons were assumed to call;
- a total travel distance of 31 miles, beginning 11 miles west of the Golden Gate Bridge, was assumed for the transit distance, and a total transit time of 3 hours was assumed for each direction;
- 2 hours of maneuvering time were included for incoming and outgoing OGV, and were added to the total transit time;
- each OGV was assumed to require two tugs for a total of 4 hours per tug for each direction; and
- each tanker was assumed to hotel at the Avon Terminal for 20 hours.

Table 4.4-2: Emissions per OGV (pounds unless indicated)

Activity	VOC	SO_2	NO_x	CO	PM_{10}	$PM_{2.5}$
Transit	26.90	86.07	546.20	45.52	15.72	14.48
Maneuvering	24.65	78.90	500.68	41.72	14.41	13.28
Hoteling	13.94	10.73	372.72	29.50	6.70	6.17
Boiler	2.01	301.33	38.35	3.65	14.61	14.24
Tugs (2)	12.00	27.36	97.54	65.8	3.52	5
Total	**79.50**	**504.37**	**1555.49**	**186.18**	**54.98**	**53.17**
Total (tons)	**0.04**	**0.25**	**0.78**	**0.09**	**0.03**	**0.03**

Liquid Product Loading

The Avon Terminal is primarily (90 percent) an export-only facility, but does infrequently (10 percent) import feedstock. On an as-needed basis, exported products are transferred via pipeline from the Refinery to tanker vessels at Berth 1 from designated upland product storage tanks. For imported products, ~~crude oil~~ feedstocks to be blended with crude oil are transferred from tanker vessels through pipelines to upland storage tanks. Each storage tank is designed with an external floating roof to minimize atmospheric emissions. The storage tanks, which are permitted by the BAAQMD, are located onshore and are not part of the Project; therefore, emissions associated with the storage tanks are not considered in the baseline or life-of-lease assessments. Emissions from these tanks are primarily driven by diurnal temperature changes, as well

as atmospheric pressure conditions, and are not expected to change over the life of the lease.

During liquid product loading of vessels, hydrocarbon vapors escape from the cargo compartment when they are displaced. Under current operations, Berth 1 is equipped with a Marine Vapor Recovery (MVR) system, which captures these hydrocarbon vapors and combines them with propane gas for safe blending into fuel gas at the Refinery's No. 1 Gas Plant.[3] A new MVR skid to comply with BAAQMD Regulation 8, Rule 44 would be installed on Berth 1A. The new MVR system would serve the same function as the existing system: hydrocarbon vapors would be analyzed, enriched as necessary to above the upper explosion limit, and vacuumed through an existing line to the Refinery for processing. Therefore, there is no anticipated change in emissions from liquid product loading over the course of the lease renewal and redesigned Berth 1A.

Crude Oil Ballasting

Ballasting is the practice of loading one or more cargo tank compartments with seawater after the cargo has been offloaded. Ballast water intake allows an OGV to adjust the depth below surface of the ship hull, thus increasing stability and making the OGV less vulnerable to waves and winds. During a ballasting operation, VOCs are emitted into the atmosphere as the vapors from non-segregated tanks are displaced with ballast water. BAAQMD Regulation 8, Rule 44 specifies the following requirements for ballasting operations:

- limit VOC emissions to less than 5.7 grams per cubic meter (2 pounds per 1,000 barrels) loaded;
- reduce VOC emissions by 95 percent by weight; and
- control ballasting emissions with segregated ballast tanks, dedicated clean ballast tanks, internal vapor balancing, and compression ballasting.

These requirements are specifically referenced in the permit on Table VII–D.2, Applicable Limits and Compliance Monitoring Requirements. As these requirements would continue to be adhered to, these emissions are not expected to change, and they were not considered in the baseline or life-of-lease analyses.

Fugitives (Pumps, Valves, Flanges)

There are numerous pipelines associated with the Avon Terminal that transport oil from the Refinery to the OGV. The pumps, valves, flanges, and connectors along the pipelines are potential sources of fugitive emissions of VOC and methane. Leakage

[3] This system was initially installed in 1987, and complies with BAAQMD Regulation 8, Rule 44 and with 33 Code of Federal Regulations, Part 154, for MVR operations.

from these components is a function of the liquid being transported; condition of the components; and other variables such as pressure, vibration, heat, friction, and corrosion. The number of potential sources of fugitive emissions would decrease as a result of the Berth 1 decommissioning and Berth 5 demolition. In addition, the installation of Berth 1A would include new state-of-the-art components. Therefore, the fugitive emissions would decrease over the Avon Terminal lease period. Fugitive emissions are a very small portion of air quality impacts from Avon Terminal continued operations and are assumed to have a negligible air impact; therefore, they were not considered in the baseline or life-of-lease analyses.

4.4.3.2 Lease-period Emissions

Table 4.4-3 presents the emissions from the baseline year (124 OGV) as compared with the level expected during the 30-year lease agreement period (120 OGV, the maximum expected annually; refer to Section 2.4.10, Vessel Calls). The BAAQMD established significance thresholds for VOC, NO_x, and PM_{10} in its 1999 Guidance Document for CEQA. The significance threshold for each of these criteria pollutants is an incremental increase of 15 tons per year and 88 pounds per day. As shown on Table 4.4-3, the annual emissions from the baseline year would decrease and, therefore, no significance thresholds are expected to be exceeded.

Table 4.4-3: 2005 Baseline Year Compared with Anticipated Lease-period Annual Emissions (tons)

Pollutant	**Baseline 2005** (tons/year)	**Lease Period** (tons/year)	**Incremental Increase (tons/year)**	**> 15 tons per year Increase?**
VOC	4.93	4.77	-0.16	No
NO_x	96.44	93.33	-3.11	No
PM_{10}	3.41	3.30	-0.11	No

Detailed emissions calculations are provided in Appendix D. Maximum daily emissions from the Avon Terminal would not increase, because the Avon Terminal can only handle one OGV at a time, and typically, OGV are docked at the Avon Terminal between 20 and 30 hours.

4.4.3.3 Avon Terminal Renovation Emissions

Temporary emissions associated with the Berth 1 decommissioning, Berth 1A installation, Berth 5 demolition and removal, and the approachway renovations would occur as part of the Project. Renovation-related emissions would be comprised primarily of short-term diesel combustion exhaust emissions from heavy-duty construction equipment operation. With land-based construction projects, PM_{10} emissions as a result of fugitive dust generated from earth-moving activity are the greatest concern; to

minimize the potential for significant increases in localized PM_{10} concentrations, Avon Terminal renovations would be performed primarily using equipment located on the wharf and barges. Other emissions sources would include commercial harbor craft activity and additional traffic associated with MOTEMS renovation worker commutes, material hauling, and deliveries.

With the exception of emissions from the tug boats and anchor boats during the Berth 5 demolition, renovation emissions were estimated using equipment estimates provided by Tesoro as data input to the California Emissions Estimation Model (CalEEMod) Version 2013.2.2.[4] The CalEEMod model does not include marine-based emissions sources; therefore, emissions associated with work boats used for MOTEMS renovation were calculated independently of CalEEMod and added to the predicted totals. Work boat emissions data were provided by Tesoro and used to calculate watercraft emissions using the methodology prescribed in the CARB (2007) guidance document "Emissions Estimation Methodology for Commercial Harbor Craft Operating in California."

Due to the short-term nature of MOTEMS renovation emissions, they are reported in average daily units. Table 4.4-4 presents the estimated MOTEMS renovation-related criteria pollutant emissions from the Project.

Table 4.4-4: Project MOTEMS Renovation-related Emissions

Pollutant	Emissions (tons/year)[1]			Total Project Average Daily Emissions (pounds/day)[2]		
	2015	2016	2017	2015	20-16	2017
Reactive organic gases	1.00	1.16	0.25	8.7	6.9	10.4
NO_x	18.26	21.17	4.77	158.1	126.4	106.1
CO	13.14	15.40	3.37	113.8	91.9	77.4
Fugitive PM_{10}[1]	0.19	0.24	0.03	1.6	1.4	0.3
Exhaust PM_{10}	0.54	0.63	0.16	4.7	3.8	3.4
Fugitive $PM_{2.5}$[1]	0.05	0.06	0.01	0.2	0.4	0.1
Exhaust $PM_{2.5}$	0.52	0.61	0.15	4.5	3.6	1.7
SO_x	0.02	0.03	0.01	0.2	0.2	0.1

[1] MOTEMS renovation equipment emissions were modeled assuming all equipment would be certified to a minimum USEPA Tier II Emission standard

[2] Average daily emissions calculated using 2015 duration. Project activity would be occurring from 5/15/15 to 12/31/15 (231 days).

[4] CalEEMod is a Statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and greenhouse gas emissions associated with construction and operation of land use projects. The mobile-source emission factors used in the model are sourced from a tool for estimating mobile-source emissions developed by the CARB titled EMFAC2011 (ENVIRON International Corporation 2013). The model was developed in collaboration with California air districts.

[3] Average daily emissions calculated using 2016 duration. Project activity would be occurring from 1/1/16 to 12/1/16 (335 days).
[4] Average daily emissions calculated using 2017 duration. Project activity would be occurring from 1/1/17 to 7/1/16 (181 days)

The BAAQMD CEQA Guidelines do not establish quantitative significance thresholds for construction emissions (BAAQMD 1999). The guidance indicates that recommended Basic Control Measures should be used to minimize construction and renovation impacts. More details about these control measures are provided in the impact analysis. The CalEEMod results and other renovation-related emissions calculations are provided in Appendix D.

4.4.4 SIGNIFICANCE CRITERIA

As noted in Section 4.4.2, Regulatory Setting, the BAAQMD (2014) recommends that CEQA lead agencies continue to rely upon the thresholds set forth in its 1999 BAAQMD CEQA Guidelines. For the purposes of this analysis, an impact was considered to be significant and to require mitigation if it would result in any of the following:

- Conflict with or obstruct implementation of an applicable air quality plan, permit, or standard, or create an air quality violation
- Result in a considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or State ambient air quality standard, including releasing emissions that exceed quantitative thresholds for ozone precursors
- Expose sensitive receptors to substantial pollutant concentrations
- Create objectionable odors affecting a substantial number of people

Operational impacts of the Project on air quality were assessed by comparing baseline conditions to anticipated changes from the MOTEMS renovation and future Project operation during the proposed 30-year lease period. Impacts were quantified to the extent feasible, using the methods and data presented in Section 4.4.3, Emissions Inventory.

4.4.5 IMPACT ANALYSIS AND MITIGATION

The following subsections describe the Project's potential impacts on air quality. For each impact, both the MOTEMS renovation emissions and operational emissions are evaluated. Where impacts are determined to be significant, feasible mitigation measures (MM) are described that would reduce or avoid the impact.

4.4.5.1 Proposed Project

Impact Air Quality (AQ)-1: Conflict with or obstruct implementation of an applicable air quality plan, permit, or standard, or create an air quality violation. (Less than significant.)

Operational Emissions

Measured and calculated criteria pollutant emissions are limited by the emissions cap included in the BAAQMD-issued Title V Operating Permit encompassing the Refinery and the Avon Terminal. By virtue of the permit, continued operation of the Avon Terminal up to the permitted throughput levels would not result in significant air quality emission impacts, because the limits set by the BAAQMD were determined to be sufficient to render these emissions less than significant. As discussed in Section 4.3.3, Emissions Inventory, it is anticipated that the Avon Terminal use would continue to be below its BAAQMD-permitted limit over the proposed lease period.

Indirect contributions to Avon Terminal emissions include OGV transit, hoteling, pumping, and tugboat operations that are not subject to explicit permit conditions; however, they are calculated using standard methodologies and are considered part of the overall emissions of the facility. As presented in Table 4.4-3, the BAAQMD significance thresholds established in its 1999 Guidance Document for CEQA for VOCs, NO_x, and PM_{10} are not expected to be exceeded; thus, the impact of continued Avon Terminal operations would be less than significant.

Renovation Emissions

Renovation emissions for the Project would be short-term in duration. During the MOTEMS renovation, PM_{10} is typically the pollutant of greatest concern. These emissions typically result from earthmoving-related activities, including excavation, grading, demolition, vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust. For the Project, the majority of MOTEMS renovation activity would occur on the water either on barges or the Avon Terminal berths. Therefore, fugitive PM_{10} emissions from earthmoving activities would be minimized. Most earthen material moved as part of the Project would be from the bay floor and, as a result, would have a high moisture content that would eliminate nearly all fugitive dust. Minor landside earthwork would occur during the preparation of staging areas. The BAAQMD CEQA Guidelines Basic Control Measures for PM_{10} emissions (BAAQMD 1999) would be implemented during renovation activities, where applicable, which would further reduce the less-than-significant impact.

Mitigation Measure: No mitigation required.

Impact AQ-2: Result in a considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or State ambient air quality standard, including releasing emissions that exceed quantitative thresholds for ozone precursors. (Less than significant.)

As outlined in Table 4.4-1, the Project region is in non-attainment for ozone, PM_{10}, and $PM_{2.5}$. The impacts of ozone precursors, $PM_{10,}$ and $PM_{2.5}$ are evaluated in the following paragraphs.

Operational Emissions

Table 4.4-3 shows the calculated anticipated annual decrease in operational emissions for PM_{10} and VOCs (which are a precursor to ozone) from the baseline under the proposed lease. The BAAQMD significance thresholds established in its 1999 Guidance Document for CEQA for VOCs, and PM_{10} ($PM_{2.5}$ is not currently subject to a CEQA threshold) are not expected to be exceeded; thus, the net increase in emissions from these criteria pollutants is not considered to be significant.

Renovation Emissions

The 1999 BAAQMD CEQA Guidelines do not specify significance thresholds for $PM_{2.5}$ or ozone precursors, but are primarily concerned with PM_{10} emissions. As stated previously, PM_{10} emissions from the Project would be minimal, as the majority of MOTEMS renovation activities would be occurring on the water, either on the barges or berths.

Mitigation Measure: No mitigation required.

Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations. (Less than significant.)

Operational Emissions

The Avon Terminal is located in an industrialized area. The nearest residence is located over 7,000 feet from the southwest border of the Project. Since the Avon Terminal and its operations have been permitted through the BAAQMD, the requirements for potential exposure for sensitive receptors ~~have already been~~ were satisfied for the existing operations. Berth 1A will require a new BAAQMD operating permit. During the permitting process, required ~~necessary~~ hazardous and toxic air modeling to evaluate ~~impacts~~ potential risks to sensitive receptors~~, as well as necessary contingency measures,~~ will need to be completed to the satisfaction of the BAAQMD ~~are part of the BAAQMD permitting process~~. Risks will have to be found insignificant or be mitigated to insignificant levels prior to issuance of the permit; therefore, ~~T~~the impact of ongoing Project operations is~~, therefore,~~ less than significant.

Renovation Emissions

Primary MOTEMS renovation activities would be occurring almost 2 miles from the nearest residence located to the southwest of the Avon Terminal. This setback distance would reduce any potential for sensitive receptors to be exposed to substantial pollutant concentrations to less than significant.

Mitigation Measure: No mitigation required.

Impact AQ-4: Create objectionable odors affecting a substantial number of people. (Less than significant.)

Operational Emissions

The primary sources of odor at the Avon Terminal would be fugitive VOC emissions from wharf components and from crude oil in aboveground storage tanks. The tanks are located onshore and are not part of the Project, but in any case, emissions from these tanks are primarily driven by diurnal temperature changes and atmospheric pressure conditions (weather), and are not expected to change over the life of the lease.

No sensitive receptors are located in the immediate area, and odors have not been historically reported. Therefore, the impact is less than significant.

Renovation Emissions

Given the setback distance discussed previously, there is minimal potential for objectionable odors from the MOTEMS renovation and there are no sensitive receptors located in the immediate area to be affected.

Mitigation Measure: No mitigation required.

4.4.5.2 Alternative 1: No Project

Impact AQ-5: Impact air quality during activities associated with decommissioning. (Less than significant.)

Under the No Project alternative, the Avon Terminal lease would not be renewed, and the existing Avon Terminal would be subsequently decommissioned, with its components abandoned in place, removed, or a combination thereof. Decommissioning of the Avon Terminal would be governed by an Abandonment and Restoration Plan and an Abandonment Agreement, both of which would require CSLC review and approval.

Decommissioning would likely be accomplished primarily via the water, with materials, other than those that can be used at the Refinery, taken away via barge. The activity would require heavy equipment to be used in the demolition of the Avon Terminal and

related structures. Emissions from demolition activities would be less than significant, provided all feasible dust implementation measures and emissions controls in regulations and guidance are followed.

Mitigation Measure: No mitigation required.

Impact AQ-6: Create air quality impacts by the transfer of operations to other Bay Area terminals and/or land based alternatives such as railcar or trucking. (Potentially significant.)

After decommissioning, the operations associated with the Avon Terminal would cease, resulting in elimination of all emission sources at the Project site. However, for the air basin as a whole, operations would be transferred to other Bay Area marine terminals. In particular, Tesoro could pursue transitioning to the Amorco Terminal to absorb the export operations from the Avon Terminal, thereby increasing throughput at the Amorco Terminal to continue to meet regional demand. Currently, the Amorco Terminal operates as an import-only facility, and thus would only be capable of absorbing the increased throughput if the wharf were to be substantially upgraded and expanded to accommodate export operations, as well as meet the current combined throughput capacities for both terminals. Such required modifications to the Amorco Terminal would require additional CEQA evaluation, local and State permitting, and land-availability evaluations, and acquisitions of easements or rights-of-way may also be required.

No significant long-term net change to emissions or air quality would be likely as a result of this operations transition. Whether at the Amorco Terminal or another Bay Area terminal, increases to meet regional demand would be subject to review by the BAAQMD to determine whether the increase in operations would be in compliance with permits.

In addition to transitioning the exported Refinery products to existing terminal operations in the Bay Area, land-based infrastructure to handle Refinery export oil by railcar or by truck is a possibility. It could not entirely replace the export products from the Avon Terminal, as approximately 70 to 80 percent of the products are currently shipped overseas. The Refinery has existing rail facilities that would need to be expanded to transport increased quantities of export by rail. Expansion of the existing rail capability and a proposal to increase rail export would be subject to BAAQMD permitting and CEQA review. Export would occur via unit trains of approximately 105 railcars capable of delivering approximately 73,500 barrels per unit train. Up to one unit train per day could be loaded with an expanded railcar handling facility. This would equate to approximately 26.8 million barrels of product per year, which is far more than the total projected annual average export of the Avon Terminal.

Air quality emissions from export by railcar are lower than air quality emissions from OGV on a pounds/barrel crude delivered basis. However, railcar emissions are land-based, and locomotives may emit criteria and toxic pollutants, including diesel particulate emissions, in closer proximity to populations and sensitive receptors than do OGV. In addition, there may be other direct and indirect air quality impacts associated with increased railcar activity, such as energy generation to meet the power requirements to unload and transfer crude oil and additional vehicle-idling emissions from transportation delays caused by the frequent unit trains impacting rail crossings.

Export of Refinery products via tanker truck would have the adverse air quality impact of emissions from the tanker trucks, each of which can only carry approximately 200 barrels of Refinery products. This would require placing 350 tanker trucks on the road for every unit train that receives Refinery products. However, air quality emissions from tanker trucks would be lower than air quality emissions from OGV.

Construction of new pipelines to export Refinery products to existing terminals would also be subject to CEQA review and BAAQMD permitting to ensure the terminals would be operating in accordance with existing BAAQMD permits and regulations. Any new pipeline construction would result in short-term air quality impacts associated with construction equipment.

Any beneficial impact from non-marine transport of Refinery products would primarily be associated with the OGV emissions, and would not result in a significant local benefit beyond the vicinity of the Avon Terminal and along the OGV route to the Avon Terminal. Localized benefits would be offset by potential increases in exposures to sensitive receptors along rail and truck routes and increased impacts at other Bay Area marine or rail terminals.

Mitigation Measures: Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA.

4.4.5.3 Alternative 2: Restricted Lease Taking Avon Out of Service for Oil Transport

Impact AQ-7: Create air quality impacts by the transfer of operations to other Bay Area terminals and/or land based alternatives such as railcar or trucking. (Potentially significant.)

Under this alternative, Tesoro's Avon Terminal lease would be renewed with modification to restrict its allowed use such that the existing Avon Terminal would be left in place, taken out of service, and placed into caretaker status for any petroleum product transfer, and not decommissioned or demolished. No air quality impacts would be associated with these activities. Because the structure of the Avon Terminal would remain in place, Tesoro would retain the option to apply to bring it back into service for

oil transport at some time in the future, should the need arise. Any future change in use of the Avon Terminal would require a lease action and potential separate CEQA review by the CSLC.

As with the No Project alternative, Tesoro might absorb export and import operations from the Avon Terminal by modifying infrastructure at the Amorco Terminal to accommodate export operations, and increase import capability; or consider alternative means of traditional crude oil and hydrocarbon product transportation, such as pipelines and/or rail transportation, or use some combination of the these sources.

Mitigation Measures: Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA.

4.4.6 CUMULATIVE IMPACT ANALYSIS

The 1999 BAAQMD CEQA Guidelines state that:

> *Any proposed project that would individually have a significant air quality impact … would also be considered to have a significant cumulative air quality impact. For any project that does not individually have significant operational air quality impacts, the determination of significant cumulative impact should be based on an evaluation of the consistency of the project with the local general plan and of the general plan with the regional air quality plan.*
>
> *When a project is proposed in a city or county with a general plan that is consistent with the CAP and the project is consistent with that general plan (i.e., it does not require a general plan amendment), then the project will not have a significant cumulative impact (provided, of course, the project does not individually have any significant impacts). No further analysis regarding cumulative impacts is necessary.*

The Project does not have an individually significant air quality impact. Section 3.8 of the *Contra Costa County General Plan* (2005) states the following land use goal: "To provide opportunities for increasing the participation of Contra Costa County in the economic and cultural growth of the region, and the contribute to, as well as benefit from, the continued growth in importance of the Bay Region and the State of California." The lease renewal would enable Tesoro to continue operations, which would be beneficial to the regional economy. The lease renewal would not involve the expansion of the existing Avon Terminal; therefore, the Project would be consistent with the land-use designations of the general plan.

As discussed in Section 4.5, Section 4.5, Greenhouse Gas Emissions and Climate Change, the Project would not have a significant individual greenhouse gas impact, and would not conflict with the *Contra Costa County General Plan*; therefore, it would not be considered to have a cumulative significant impact.

4.4.7 SUMMARY OF FINDINGS

Table 4.4-5 includes a summary of anticipated impacts to air quality and associated mitigation measures.

Table 4.4-5: Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measure(s)
Proposed Project	
AQ-1: Conflict with or obstruct implementation of an applicable air quality plan, permit, or standard, or create an air quality violation.	No mitigation required
AQ-2: Result in a considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or State ambient air quality standard, including releasing emissions that exceed quantitative thresholds for ozone precursors.	No mitigation required
AQ-3: Expose sensitive receptors to substantial pollutant concentrations.	No mitigation required
AQ-4: Create objectionable odors affecting a substantial number of people.	No mitigation required
Alternative 1: No Project	
AQ-5: Impact air quality during activities associated with decommissioning.	No mitigation required
AQ-6: Create air quality impacts by the transfer of operations to other Bay Area terminals and/or land based alternatives such as railcar or trucking.	Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA
Alternative 2: Restricted Lease Taking Avon Out of Service for Oil Transport	
AQ-7: Create air quality impacts by the transfer of operations to other Bay Area terminals and/or land based alternatives such as railcar or trucking.	Should this alternative be selected, MMs would be determined during a separate environmental review under CEQA