

3.4 AIR QUALITY

This section describes the existing environmental conditions as it relates to air quality within and near the project site. The general and site-specific profiles of air quality contained herein provide the environmental baseline by which environmental impacts are identified and measured. Environmental impacts are discussed in **Section 4.0**.

3.4.1 REGULATORY SETTING

FEDERAL

The Federal Clean Air Act (CAA) was enacted for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity (USEPA, 2007a).

In 1971, the United States Environmental Protection Agency (USEPA) developed primary and secondary National Ambient Air Quality Standards (NAAQS). Six pollutants of primary concern were designated: carbon monoxide (CO), ozone, suspended particulate matter, sulfur dioxide, NO_x, and lead. The primary NAAQS must "protect the public health with an adequate margin of safety" and the secondary standards must "protect the public welfare from known or anticipated adverse effects (aesthetics, crops, architecture, etc.)". The primary standards were established, with a margin of safety, considering long-term exposures for the most sensitive groups in the general population. The USEPA allows states the option to develop different (stricter) standards. California elected this option and adopted standards that are more stringent.

If an air basin is not in federal attainment (e.g. does not meet federal standards) for a particular pollutant, the basin is classified as a marginal, moderate, serious, severe, or extreme nonattainment area.

Nonattainment areas must take steps towards attainment by a specific timeline. These steps include establishing a transportation control program and clean-fuel vehicle program, decreasing the emissions threshold for new stationary sources and for major sources, and increasing the stationary source emission offset ratio to at least 1.3:1 (Federal Clean Air Act, 1990). The above programs are published in the State Implementation Plan (SIP), which is approved by the USEPA.

The SIP is a number of documents that set forth the state's strategies for achieving federal air quality standards. The Code of Federal Regulations (CFR Title 40, Chapter I, Part 52, Subpart F, §52.220) lists all of the items that are included in the California SIP. The SIP is not a single document, but a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, State regulations, and Federal controls. Many of California's SIPs detail control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. Local air districts and other agencies, such as the Bureau of Automotive Repair, prepare SIP elements and submit them to California Air Resources Board (CARB) for review and approval. State law makes CARB the lead agency for all purposes related to the SIP.

Federal General Conformity

The General Conformity Rule of the federal Clean Air Act (CAA) (42 USC 7401), implements Section 176(c) of the Act, and establishes minimum thresholds for volatile organic compounds (VOCs) and NO_x (ozone precursors), PM₁₀, and other regulated constituents for non-attainment and maintenance areas.

Title 40 Part 93 of the Code of Federal Regulations (CFR) was promulgated in order to determine conformity of Federal actions to the SIP. A lead agency must make a determination that a federal action conforms to the applicable implementation plan before the action is taken. A conformity determination is required for each pollutant where a total of direct and indirect emissions in a nonattainment or maintenance area caused by the federal action are greater than *de minimis* thresholds as listed in CFR Section 93.153(b).

These thresholds provide simple and direct guidance for federal agencies to ensure that they comply with an approved SIP. The general conformity rule includes a procedure for determining whether the rule is applicable to the actions of a federal agency.

There are two phases to general conformity:

- 1) The Conformity Review process entailing a review of each analyzed alternative to assess whether a full conformity determination is necessary, and
- 2) The Conformity Determination process, which demonstrates how an action would conform to the applicable SIP.

The first step compares emissions estimates for the project to the appropriate general conformity *de minimis* threshold based on nonattainment type. If the emission estimates from step one are below the thresholds, then a general conformity determination is not necessary and step two is not required.

STATE

In 1988, the State legislature adopted the California Clean Air Act (CCAA), which established a statewide air pollution control program. CCAA requirements include annual emission reductions, development and use of low emission vehicles, setting the California ambient air quality standards (CAAQS), and submittal of air quality attainment plans by air districts. CARB is the state agency responsible for coordinating both state and federal air pollution control programs in California.

California's SIP is comprised of the State's efforts to attain the NAAQS as well as plans developed at the regional or local level. Local Air Pollution Control Districts (APCDs) address attainment and maintenance of CAAQS as mandated by the CCAA. Local air quality attainment plans are required, with the exception of particulate matter 10 and 2.5 microns in size (PM₁₀ and PM_{2.5}), if the specific air basin is classified as non-attainment for any NAAQS or CAAQS.

AIR POLLUTANTS OF CONCERN

Criteria Air Pollutants

Criteria Air Pollutants (CAPs) are common pollutants that have been identified as being potentially detrimental to human health. CAPs are used as indicators of regional air quality. The USEPA has designated six CAPs: ozone (O₃), carbon monoxide (CO), particulate matter (PM₁₀ and PM_{2.5}), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and lead (Pb).

Ozone

Ozone is created in the presence of sunlight through a photochemical reactions involving reactive organic gas (ROG) and NO_x. ROG and NO_x are a result of incomplete combustion of fossil fuels, which is the largest source of ground-level ozone (O₃). Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. As a photochemical pollutant, O₃ is formed only during daylight hours under appropriate conditions, but is destroyed throughout the day and night. O₃ is considered a regional pollutant, as the reactions forming it take place over time and are often most noticeable downwind from the sources of the emissions.

Particulate Matter (PM10 and PM2.5)

Particle pollution is a mixture of microscopic solids and liquid droplets suspended in air. This pollution, also known as particulate matter, is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, soil or dust particles, and allergens (such as fragments of pollen or mold spores). The size of particles is directly linked to their potential for causing health problems. Particulate matter less than 10 micrometers (µm) in diameter (PM₁₀) and 2.5 µm in diameter (PM_{2.5}) pose the greatest public health concerns, because they can traverse deep into the lungs (PM₁₀) and can be small enough to enter the bloodstream (PM_{2.5}).

Diesel Particulate Matter

Diesel particulate matter (DPM) is defined as a Toxic Air Contaminant (TACs). TACs are substances that are known or suspected to be emitted in California and have potential adverse health effects. Currently, there are 244 TACs listed by CARB. According to CARB, the estimated health risk from TACs can be primarily attributed to relatively few compounds, such as DPM. DPM differs from many other TACs in that it is not a single substance, but rather a complex mixture of air pollutants, composed of gaseous and solid material. The visible emissions in diesel exhaust are known as particulate matter or PM, which includes carbon particles or “soot.”

National Emissions Standards for Hazardous Air Pollutants

Asbestos is considered a Hazardous Air Pollutant (HAP) and therefore, emissions are regulated under the National Emissions Standards for Hazardous Air Pollutants (NESHAP). The USEPA revised the asbestos NESHAP regulations on November 20, 1990. This revision was specific to demolition practices under NESHAP.

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. Asbestos is made up of microscopic bundles of fibers that may become airborne when distributed. These fibers get into the air where they can be inhaled. Once in the lungs, they can cause significant health problems including cancer and scarring of the lungs. Asbestos is not always an immediate hazard. In fact, if asbestos can be maintained in good condition, it is recommended that it be left alone and periodic surveillance be performed to monitor its condition. It is only when asbestos containing materials (ACM) are disturbed or the materials become damaged that it becomes a hazard. When the materials become damaged, the fibers separate and may then become airborne.

The demolition, renovation, or removal of asbestos-containing materials is subject to the requirements of the NESHAP regulations as listed in the Code of Federal Regulations (40 CFR Part 61, Subpart M), requiring notification and inspection. The appropriate regulatory agency must be notified before any demolition takes place, even if no asbestos is present at the site. Also, all demolitions and renovations are subject to the Asbestos NESHAP insofar as owners and operators must determine if and how much asbestos is present at the site.

Asbestos NESHAP regulations must be followed for demolitions of facilities with at least 80 linear meters (260 linear feet) of regulated asbestos-containing materials (RACM) on pipes, at least 15 square meters (160 square feet) of regulated asbestos-containing materials on other facility components, or at least one cubic meter (35 cubic feet) of facility components where the amount of RACM previously removed from pipes and other facility components could not be measured before stripping. The NESHAP regulations require certain scheduling, handling and disposal methods intended to minimize asbestos emissions. The NESHAP regulations cover demolition and renovation projects and require that the owner/operator thoroughly inspect the facility for asbestos prior to the start of demolition or renovation and require that all regulated asbestos-containing material be properly removed prior to the start of demolition or renovation. All individuals who inspect for asbestos develop management plans, and conduct abatement work must be certified per the Asbestos Hazard Emergency Response Act (AHERA).

AMBIENT AIR QUALITY STANDARDS

The CAA established maximum ambient concentrations for the six CAPs, known as the NAAQS. Concentrations above these time-averaged limits are anticipated to cause adverse health affects to sensitive receptors. The CAA established primary and secondary NAAQS. Primary standards set limits to protect public health, while secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. For some of the CAPs, more than one averaging time standard has been identified in order to address the typical exposures found in the environment. The USEPA has established violation criteria for each CAP. For example, in order to constitute a violation, the NAAQS for O₃ must be exceeded on more than three days

in three consecutive years. On the other hand, if the NAAQS for CO are exceeded on more than one day in any given year, a violation has occurred. Refer to **Table 3.4-1** for the violation criteria for the various averaging times for each CAP.

TABLE 3.4-1
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Standard in parts per million		Standard in microgram per cubic meter		Violation Criteria	
		CAAQS	NAAQS	CAAQS	NAAQS	CAAQS	NAAQS
Ozone	1 hour	0.09	-	180	-	If exceeded	N/A
	8 hours	0.07	0.08	137	157	N/A	If exceeded on more than 3 days in 3 years
PM ₁₀	Annual arithmetic mean	N/A	N/A	20	N/A	N/A	If exceeded
	24 hours	N/A	N/A	50	150	N/A	If exceeded on more than 1 day per year
PM _{2.5}	Annual arithmetic mean	N/A	N/A	12	15	N/A	If exceeded
	24 hours	N/A	N/A	N/A	35	N/A	If exceeded on more than 1 day per year

Source: CARB, 2007.

NOTES: All standards are based on measurements at 25°C and 1 atmosphere pressure. National and state standards shown are the primary (health effects) standards. N/A = not applicable; ppm = parts per million; ug/m³ = micrograms per cubic meter. CAAQS = California Ambient Air Quality Standard NAAQS = National Ambient Air Quality Standard

The CCAA establishes maximum concentrations for the six CAPs, as well as four other air pollutants in California. These maximum concentrations for the State are known as the CAAQS. Concentrations above these time-averaged limits are anticipated to cause adverse health effects to sensitive receptors. The CARB is part of the California Environmental Protection Agency (Cal/EPA) and has jurisdiction over local air districts. CARB has established violation criteria for each CAP. For example, in order to constitute a violation of the CAAQS, O₃ must be exceeded on one day in any given year. Refer to **Table 3.4-1** for the violation criteria for the various averaging times for each CAP.

The USEPA and CARB identify areas throughout the United States and California, respectively, which meet the NAAQS or CAAQS, and are labeled either *attainment* or *unclassifiable*. Areas that do not meet the NAAQS or CAAQS are labeled as being in *nonattainment*. Under NAAQS and CAAQS there can be a designation of *maintenance*, which indicates that an area has met its attainment goals but has not yet applied for attainment designation.

The USEPA further classifies nonattainment areas according to the level of pollution in each area. There are five classes of nonattainment areas: marginal (recently became compliant with the NAAQS), moderate (relatively easy to obtain levels below the NAAQS), serious (will be difficult to reach levels below NAAQS), severe (will be difficult to reach levels below NAAQS), and extreme (will be difficult to reach levels below NAAQS). The CAA uses the classification system to design clean-up requirements appropriate for the severity of the pollution and to set realistic deadlines for reaching clean-up goals. Attainment and nonattainment areas are identified through monitoring. Unclassified designations have not been monitored for the particular designated CAP and are assumed to be in attainment. States, municipal statistical areas, air basins, and counties that contain areas of nonattainment are required to develop a SIP, which outlines policies and procedures designed to bring the nonattainment area into compliance with the NAAQS.

STATE IMPLEMENTATION PLANS

Nonattainment areas must take steps towards attainment by a specific timeline. These steps are consolidated within the SIP, as mandated by the CAA. The SIP sets forth the state's strategy for achieving federal air quality standards. The SIP is not a single document, but a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. All of the documents included in the SIP are published in the Code of Federal Regulations. Bay Area Air Quality Management District (BAAQMD) has adopted an attainment plan or SIP for O₃, which is designated as nonattainment. The applicable SIP for O₃ in the San Francisco Bay Area Air Basin (SFBAAB) is the 2001, *Revised San Francisco Bay Area Ozone Attainment Plan for 1-hour National Ozone Standard*.

CLIMATE CHANGE

Federal

In 1997 the Council on Environmental Quality (CEQ) circulated an internal draft memorandum (CEQ, 1997a) on how global climate change should be treated for the purposes of the National Environmental Policy Act (NEPA). The CEQ draft memorandum advised federal lead agencies to consider how proposed actions subject to NEPA would affect sources and sinks of green house gases (GHGs). During the same year, CEQ released guidance on the assessment of cumulative effects in NEPA documents (CEQ, 1997b). Consistent with the CEQ draft memorandum, climate change impacts were offered as one example of a cumulative effect.

State

California has been a leader among the states in outlining and aggressively implementing a comprehensive climate change strategy that is designed to result in a substantial reduction in total statewide GHG emissions in the future. California's climate change strategy is multifaceted and involves a number of state agencies implementing a variety of state laws and policies. We have attempted to briefly summarize these laws and policies below.

Assembly Bill 1493 (AB 1493)

Signed by the Governor in 2002, AB 1493 requires that the CARB adopt regulations requiring a reduction in GHG emissions emitted by cars in the state. AB 1493 is intended to apply to 2009 and later vehicles, however recently the USEPA has denied a Clean Air Act waiver, which the state needs in order to implement AB 1493. Although the state is apparently planning to appeal this decision, at this time it is unclear whether AB 1493 will be implemented (Bee, 2007).

Executive Order S-3-05 (EO S-3-05)

EO S-3-05 was signed by the Governor on June 1, 2005. EO S-3-05 established the following statewide emission reduction targets:

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

EO S-3-05 created a “Climate Action Team” or “CAT” headed by the California Environmental Protection Agency and including several other state agencies. The CAT is tasked by EO S-3-05 with outlining the effects of climate change on California and recommending an adaptation plan. The CAT is also tasked with creating a strategy to meet the emission reduction target required by the EO. In April 2006 the CAT published an initial report that accomplished these two tasks; **Appendix W** provides the CAT strategies.

Assembly Bill 32 (AB 32)

Signed by the Governor on September 27, 2006, AB 32 codifies a key requirement of EO S-3-05, specifically the requirement to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 tasks CARB with monitoring state sources of GHGs and designing emission reduction measures to comply with the law’s emission reduction requirements. However, AB 32 also continues the CAT’s efforts to meet the requirements of EO S-3-05 and states that the CAT should coordinate overall state climate policy.

In order to accelerate the implementation of emission reduction strategies, AB 32 requires that CARB identify a list of discrete early action measures that can be implemented relatively quickly. In October 2007, CARB published a list of early action measures that it estimated could be implemented and would serve to meet about a quarter of the required 2020 emissions reductions (CARB, 2007a). In order to assist CARB in identifying early action measures, the CAT published a report in April 2007 that updated their 2006 report and identified strategies for reducing GHG emissions (CAT, 2007). In its October 2007 report, CARB cited the CAT strategies and other existing strategies that may be utilized in achieving the remainder of the emissions reductions. AB 32 requires that CARB prepare a comprehensive “scoping

plan” that identifies all strategies necessary to fully achieve the required 2020 emissions reductions. According to AB 32 this scoping plan must be in place no later than January 1, 2009. CARB has initiated preparation of the scoping plan and plans on adopting a final plan in late 2008 (CARB, 2007b).

Executive Order S-01-07 (EO S-01-07)

EO S-01-07 was signed by the Governor on January 18, 2007. It mandates a statewide goal to reduce the carbon intensity of transportation fuels by at least 10 percent by 2020. This target reduction was identified by CARB as one of the AB 32 early action measures identified in their October 2007 report.

Western Regional Climate Initiative

The Western Regional Climate Initiative creates a coalition of western states (California, Washington, Oregon, Arizona, New Mexico) and British Columbia, Canada that have agreed to collaborate on identifying, evaluating, and implementing regional mechanisms for reducing GHG emissions. In light of this goal, the Initiative creates a regional emissions registry and plans the creation of a regional market-based multi-sector emissions reduction mechanism by August 2008.

Senate Bill 97 (SB 97)

Signed by the governor on August 24, 2007, SB 97 requires that no later than July 1, 2009, the state Office of Planning and Research (OPR) prepare CEQA guidelines for evaluating the effects of GHG emissions and for mitigating such effects. The Resources Agency is required to certify and adopt these guidelines by January 1, 2010. It is anticipated that this guidance would establish standardized significance criteria for the purposes of assessing project impacts pursuant to CEQA. In the absence of specific guidelines, OPR has referred CEQA document authors to existing general guidelines, examples of impact analyses in existing CEQA documents (which OPR acknowledges ranges greatly from little analysis due to the speculative nature of climate change impact analysis to the calculation of GHG emissions and the inclusion of mitigation), and to a variety of white papers on the subject of GHG impact analysis, including one prepared by the Association of Environmental Professionals (AEP, 2007).

Governor’s Office of Planning and Research – Technical Advisory

The Governor’s Office of Planning and Research (OPR) released a Technical Advisory on June 19, 2008, titled *CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act Review*. The Technical Advisory provides informal, interim guidance for analyzing climate change impacts in advance of comprehensive amendments to the CEQA Guidelines to be prepared pursuant to SB 97, and scheduled for release on or before January 1, 2010. The Technical Advisory provides the following guidance when providing climate change analyses in a CEQA document:

- Each lead agency needs to develop its own approach to performing climate change analyses.

- Lead agencies should determine whether GHGs are generated by the project and, if they are, they must be quantified.
- A project's impact can either be cumulatively or individually significant, but climate change is "ultimately a cumulative issue."
- A lead agency must provide mitigation measures to avoid, reduce, or otherwise mitigate the impacts of GHG emissions.
- There is no standard format for including the analysis in a CEQA document.
- A less than significant impact can be presented using mitigation measures.
- The Technical Advisory outlines mitigation measures.

The methodology analyzing climate change impacts outlined in **Section 4.4** of this document is consistent with the OPR Technical Advisory.

3.4.2 ENVIRONMENTAL SETTING

REGIONAL METEOROLOGY

The project site is subject to a coastal climate regime. Summer months are often characterized by the presence of a semi-permanent high-pressure cell centered over the California Coast. This high cell sits off the California coast and is the main influence on air quality in the SFBAAB. The SFBAAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are generally weak and diffuse by the time they reach the Bay Area.

The average annual rainfall at the project site is 23.23 inches, with 83 percent of the precipitation occurring from November through March. Summer maximum temperatures average 71.0 °F in July and winter minimum temperatures average 42.5 °F in January (WRCC, 2005).

The project site is bordered by the San Francisco Bay (Bay) on the west; San Pablo Bay lies beyond to the north. Land rises from the Bay to the San Pablo Ridge, which runs the length of the peninsula from Richmond to the end of the peninsula. Elevation on the project site ranges from 380 feet to sea level at Bay's edge. Winds originating from the open ocean find their way into the Bay and are swept eastward through the Carquinez Straits to the Sacramento and San Joaquin Valleys. Both easterly and southern winds originating in the Bay Area transport pollutants into California's Central Valley.

REGIONAL AIR QUALITY

The project site is located in the SFBAAB, with BAAQMD holding jurisdiction over air quality under the delegation and oversight of the CARB and the USEPA. BAAQMD has jurisdiction over Marin, Napa, southern Sonoma, San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, and western Solano Counties in accordance with the CCAA. The USEPA retains jurisdiction over tribal lands. BAAQMD

regulates air quality through its permit authority over most types of stationary emission sources and through its planning and review activities.

NAAQS AND CAAQS DESIGNATIONS

As shown in **Table 3.4-2**, the SFBAAB has been designated “marginal” nonattainment under the federal 8-hour O₃ standard with an attainment deadline of June 2007. Because the SFBAAB is designated marginal nonattainment for O₃, the general conformity rule *de minimis* threshold for O₃ precursors (ROG and NO_x) is 100 tons per year (tpy). The SFBAAB has also been designated nonattainment for one-hour O₃, PM_{2.5}, and PM₁₀, under the CAAQS. The SFBAAB meets the National and California standards or is unclassifiable for all other CAPs.

TABLE 3.4-2
BAY AREA AIR QUALITY MANAGEMENT DISTRICT ATTAINMENT STATUS

Pollutant	CAAQS	NAAQS
Ozone (8-hour/1-hour)	Unclassifiable/ Nonattainment	Nonattainment (marginal) /Not Applicable
Respirable Particulate Matter (PM ₁₀)	Nonattainment	Unclassifiable/Attainment
Fine Particulate Matter (PM _{2.5})	Nonattainment	Unclassifiable/Attainment

Source: BAAQMD 2008.

SENSITIVE RECEPTORS

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air quality related health problems. Residential areas are considered sensitive to poor air quality, because people usually stay home for extended periods of time, with greater associated exposure to ambient air quality. Recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system.

The land surrounding the project site is primarily industrial, with some recreation applications. The closest sensitive receptors to the project site are the athletic fields and sporting venues 0.40 miles east of the project site on Richmond Lane. The Point San Pablo Yacht Harbor is 0.70 miles north of the project site, on the backside of Potrero Ridge. The nearest residence is 1.7 miles south and the nearest school is Washington Elementary School located 2.7 miles south of the project site.

CLIMATE CHANGE

Introduction

It is anticipated that the average global temperature could rise 0.6 (33.0) to 4.0 °C (39.2 °F) between the years 2000 and 2100 (IPCC, 2007). The extent to which human activities affect global climate change is a subject of considerable scientific debate. While many in the scientific community contend that global climate variation is a normal cyclical process that is not necessarily related to human activities, the IPCC report identifies anthropogenic GHGs as a contributing factor to changes in the Earth's climate (Michaels, 2004; IPCC, 2007). Preferring to error on the side of caution, the analysis in this Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) assumes anthropogenic GHGs are in fact contributing to global climate changes.

The U.S. Supreme Court has held that CO₂ (a GHG) falls under the Clean Air Act's (CAA's) definition of an "air pollutant", such that the EPA has statutory authority to regulate the emissions of this gas (CO₂). *Massachusetts v. Environmental Protection Agency*, U.S., 1275 S.Ct. 1438, 1462 (2007), concluded that GHG emission from human activities would result in an additional warming of the Earth's surface. The U.S. Court of Appeals, stated succinctly, the potential for greenhouse gas emissions must be analyzed in NEPA documents, *Center for Biological Diversity v. National Highway Safety Administration*, 508 F.3d 508 (9th Cir. 2007).

The Greenhouse Effect and Climate Change

The Earth's temperature is regulated by a system known as the "greenhouse effect." GHGs are primarily water vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) that trap the heat of the sun, preventing radiation from dissipating into space. Water vapor is the most abundant GHG and CO₂ is a distant second. Without the effect of these GHGs, which are both naturally occurring and anthropogenic, the average temperature on the Earth would be approximately -18 °C (-64.4 °F), instead of the current average of 15 °C (59 °F).

IPCC modeling estimates that anthropogenic CO₂ in the lower atmosphere has increased by approximately 31 percent since 1750. At the same time, average temperature in the lower atmosphere has increased approximately 0.6 (33.0) to 0.8 °C (33.4 °F). Due to the challenges inherent in modeling the complexities of the Earth's climate, the proportional importance of anthropogenic activities as opposed to natural feedback systems is exceptionally difficult to establish. Nonetheless, the IPCC concludes that "Most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations." As noted above, this EIS/EIR assumes that an increase in anthropogenic GHG concentration is in fact contributing to global warming.

IPCC theorizes that a continuation of this warming trend could have profound implications, including flooding, erratic weather patterns, increased sea levels, and reduced arctic ice. The IPCC projects a

number of future GHG emissions scenarios leading to a varying severity of impacts on the environment and the global economy. According to the 2007 IPCC report if anthropogenic GHG continue to increase in the atmosphere there will be a point at which the above impacts would become irreversible, this point is commonly referred to as the “tipping point.” Although the 2007 IPCC Report states the tipping point may be as far off as 20 years, some experts contend the tipping point has already been reached.

Table 3.4-3 illustrates the state contribution to the global increase in GHG emissions. The 2020 estimates assume current GHG emission practices. As shown, without modifications in human activities or the introduction of new technologies, GHG emissions are anticipated to increase.

TABLE 3.4-3
GLOBAL GREENHOUSE GAS EMISSIONS

Regions	Estimated GHG Emissions
	Million metric tons per year of CO ₂ e ¹
1990	
Global Emissions	626,395
California Emissions	427
2020	
Global Emissions	882,246
California Emissions	600

¹Carbon Dioxide Equivalent (see methodology in Section 4.12)
Source: CARB, 2007; IPCC. 2007