# 3.2 Air Quality

This chapter analyzes local, regional, and global air quality issues, identifies the potential impacts of the RTP on air quality, includes mitigation measures for the impacts, and evaluates the residual impacts.

## Environmental Setting

This section provides the environmental setting for air quality in the SCAG region, which encompasses a population exceeding 18 million persons in an area of more than 38,000 square miles within the counties of Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. The section includes information on climate and meteorology for the air basins in the Region, health effects of air pollutants, regulatory setting, and existing air quality.

### Climate and Meteorology

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients, along with local topography, influence the movement and dispersal of pollutants and thereby provide the link between air pollutant emissions and air quality.

The SCAG region incorporates four air basins and five air districts. The four air basins are the South Coast Air Basin (SCAB), the Mojave Desert Air Basin (MDAB), the Salton Sea Air Basin (SSAB), and the Ventura County portion of the South Central Coast Air Basin (SCCAB). The five air districts are the South Coast Air Quality Management District (SCAQMD), Mojave Desert Air Quality Management District (MDAQMD), Imperial County Air Pollution Control District (ICAPCD), Antelope Valley Air Pollution Control District (AVAPCD), and the Ventura County Air Pollution Control District (VCAPCD). The geographic boundaries of these air basins and air districts are shown in **Map 3.2-1**, respectively.

#### *South Coast Air Basin (SCAB)*

The SCAB incorporates approximately 12,000 square miles, consisting Orange County and the urbanized areas of San Bernardino, Riverside and Los Angeles counties. In May 1996, the boundaries of the South Coast Air Basin were changed by the California Air Resources Board (ARB) to include the Beaumont-Banning area. In addition, the Southeast Desert Air Basin was separated into two areas and renamed as the Mojave Desert Air Basin and the Salton Sea Air Basin. The distinctive climate of the SCAB is determined by its terrain and geographic location. The SCAB is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean to the southwest and high mountains around the rest of its perimeter. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes with light average wind speeds. The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, or Santa Ana winds.[1]

The vertical dispersion of air pollutants in the SCAB is hampered by the presence of persistent temperature inversions. High-pressure systems, such as the semi-permanent high-pressure zone in which the SCAB is located, are characterized by an upper layer of dry air that warms as it descends, restricting the mobility of cooler marine-influenced air near the ground surface, and resulting in the formation of subsidence inversions. Such inversions restrict the vertical dispersion of air pollutants released into the marine layer and, together with strong sunlight, can produce worst-case conditions for the formation of photochemical smog. The basin-wide occurrence of inversions at 3,500 feet above sea level or less averages 191 days per year.[2]

The atmospheric pollution potential of an area is largely dependent on winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 mph, smog potential is greatly reduced.[3]

### *Mojave Desert Air Basin (MDAB)*

The MDAB encompasses approximately 21,480 square miles and includes the desert portions of San Bernardino County, Palo Verde Valley, Palmdale and Lancaster in the Antelope Valley. The MDAB is bordered by the SCAB and the Riverside County line to the south, Kern County line to the west, the Arizona and Nevada borders to the north and east, and the eastern portion of Riverside County to the southeast. The Kern County portion of MDAB is not in the SCAG Region. The climate is characteristic of a desert environment. The intervening mountain ranges block cool, moist coastal air and create hot, dry summers and cool winters. Meteorology is influenced by a moderately intense anti-cyclonic circulation, except during periods of frontal activity during the winter. On average, 20-30 frontal systems (i.e. storms) move into the MDAB each winter.[4]

The MDAB experiences high prevailing winds primarily from the south and west, which results in a visible "smog wall" being transported from SCAB through mountain passes. The exchange of lower and upper air tends to accelerate surface winds during the warm part of the day when convection is at a minimum. During the winter the rapid cooling of the surface layers at night retards this exchange of momentum, which often results in calm winds.[5]

The inversion conditions in the MDAB are much less favorable for the build-up of high ozone concentrations than in the coastal areas of Southern California. When subsidence inversions occur, they are generally 6,000 to 8,000 feet above the desert surface, allowing much greater vertical mixing than along the coast where the inversion base is often much lower. As a result,

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1 South Coast Air Quality Management District, *CEQA Air Quality Handbook*, April 1993, p. A8-1.
2 South Coast Air Quality Management District, *CEQA Air Quality Handbook*, April 1993, p. A8-2.
3 Ibid.
4 Mojave Desert Air Quality Management District, *Triennial Revision to the 1991 Air Quality Attainment Plan*, January 1996.
5 Ibid.

meteorology in the MDAB is less favorable for the chemical mixing characteristic of typical ozone formation. [6]

### *Salton Sea Air Basin (SSAB)*

The SSAB includes all of Imperial County and the desert portion of Riverside County between the SCAB and the MDAB (known as the Coachella Valley area). Imperial County extends over 4,597 square miles, bordering on Mexico to the south, Riverside County to the north, San Diego County on the west, and the State of Arizona on the east. [7]

The southern portion of the SSAB is a part of the larger physiographic province of the Salton Trough. This province is a very flat basin surrounded by mountains: the Peninsular Ranges to the west, the Chocolate, Orocopia and Cargo Muchaco Mountains to the east. Most of the trough is below sea level, and consists generally of desert, with agricultural land uses located at the north and south of the Salton Sea. [8]

Climatic conditions in the SSAB are governed by the large-scale sinking and warming of air in the semi-permanent subtropical high pressure center of the Pacific Ocean. The high-pressure ridge blocks out most mid-latitude storms except in the winter when the high is weakest and farthest south. Similarly, the coastal mountains prevent the intrusion of any cool, damp marine air found in California coastal environs. Because of the weakened storms and the orographic barrier, the SSAB experiences clear skies, very low humidities, extremely hot summers, mild winters, and little rainfall. The flat terrain of the valley and the strong temperature differentials created by intense solar heating produce moderate winds and deep thermal convection.[9]

The combination of subsiding air, protective mountains and distance from the ocean all combine to severely limit precipitation. Rainfall is highly variable with precipitation from a single heavy storm exceeding the entire annual total during a later drought condition.[10]

Humidities are low throughout the year, ranging from 28 percent in summer to 52 percent in winter. The large daily oscillation of temperature produces a corresponding large variation in the relative humidity. Nocturnal humidities rise to 50-60 percent, but drop to about 10 percent during the day. [11]

The SSAB occasionally experiences periods of high winds. Wind speeds exceeding 31 mph occur most frequently in April and May. On an annual basis, strong winds (±31 mph) are observed 0.6% of the time, speeds of less than 6.8 mph account for more than one-half of the observed winds. Wind statistics indicate prevailing winds are from the west-northwest through southwest; a secondary flow maximum from the southeast is also evident. [12]

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6 Ibid.
7 Imperial County Air Pollution Control District, *1991 Air Quality Attainment Plan*, April 1992.
8 Ibid.
9 Ibid.
10 Ibid.
11 Ibid.
12 Ibid.

Imperial County, in particular, experiences surface inversions almost every day of the year. Due to strong surface heating, these inversions are usually broken allowing pollutants to more easily disperse. Weak, surface inversions are caused by cooling of air in contact with the cold surface of the earth at night. In valleys and low-lying areas, this condition is intensified by the addition of cold air flowing downslope from the hills and pooling on the valley floor.[13]

The presence of the Pacific high-pressure cell can cause the air mass aloft to sink. As the air descends, compressional heating warms it to a temperature higher than the air below. This highly stable atmospheric condition, termed a subsidence inversion can act as a nearly impenetrable lid to the vertical mixing of pollutants. The strength of these inversions makes them difficult to disrupt. Consequently, they can persist for one or more days, causing air stagnation and the buildup of pollutants. Highest or worst-case ozone levels are often associated with the presence of this type of inversion. Subsidence inversions are common from November through June, but appear to be relatively absent July through October.[14]

### *South Central Coast Air Basin (SCCAB)*

The SCAG region includes the Ventura County portion of the SCCAB. Ventura County is comprised of coastal mountain ranges, the coastal shore, the coastal plain, and several inland valleys. The northern half of the county (Los Padres National Forest) is extremely mountainous with altitudes up to 8,800 feet. Consequently, the climate in the northern half of the County varies a great deal depending on elevation. Therefore, the climatological and meteorological description presented for Ventura County focuses on the southern half of the county where violations of federal and state ozone standards occur.[15]

In the winter, low-pressure systems originating in the northern Pacific Ocean bring clouds, rain, and wind into Ventura County. The average annual temperature in the coastal and inland valleys of the southern half of Ventura County ranges from the upper 50s at the coast (Point Mugu) to the mid-60s in Simi Valley. The difference between the maximum and minimum temperatures becomes greater as the distance increases from the coast. The average minimum and maximum temperatures at Point Mugu are 50°F and 60°F, respectively, while at the inland location of Simi Valley, the averages are 52°F and 77°F. The smaller range of temperatures at Point Mugu demonstrates the moderating influence of the ocean on air temperature. The ocean's ability to warm and cool the air while its temperature remains relatively unchanged produces the moderating effect. Inland area temperatures are more prone to rapid fluctuations.[16] Almost all rainfall in Ventura County falls during the winter and early spring (November through April). Summer rainfall is normally restricted to scattered thundershowers in lower elevations, and somewhat heavier activity in the mountains. Humidity levels vary throughout the County. The range of humidity is primarily influenced by proximity to the ocean. Although the County's climate is semi-arid, average humidity levels are relatively high due to the marine influence. Coastal

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13 Ibid.

14 Ibid.

15 Ventura County Air Pollution Control District, *1994 Air Quality Management Plan*, November 1996.

16 Ibid.

areas are more humid than inland areas during typical fair weather. The reverse is true during stormy periods. The lowest humidity levels are recorded during Santa Ana wind conditions.[17]

Ventura County winds are dominated by a diurnal land-sea breeze cycle. The land-sea breeze regime is broken only by occasional winter storms and infrequent strong northeasterly Santa Ana wind flows. Since the sea breeze is stronger than the land breeze, the net wind flow during the day is from west to east. Under light land-sea breeze regimes, recirculation of pollutants can occur as emissions move westward during morning hours, and eastward during the afternoon. This can cause a build-up of pollutants over several days.[18]

The vertical dispersion of air pollutants in Ventura County is limited by the presence of persistent temperature inversions. Approximately 60 percent of all inversions measured at Point Mugu are surface-based with most occurring during the morning hours.[19]

## Health Effects

This section considers the health effects of air pollution, including “criteria air pollutants” and “toxic air contaminants.” The term “criteria air pollutants,” refers to those pollutants that are pervasive in urban environments and for which health-based state ambient air quality standards have been established. The term “toxic air contaminants,” refers to those pollutants which occur at relatively low concentrations and are associated with carcinogenic and other adverse health effects, but for which no ambient air quality standards have been established.

### *Criteria Pollutants*

Health-based air quality standards have been established by California and the federal government for the following criteria pollutants: ozone, CO, NO2, PM10, PM2.5, SO2, and lead. California also includes standards for sulfate and visibility.

The following summarizes the health effects of the criteria pollutants[20]

#### Ozone ($O_3$)

Ozone (O3), a colorless gas with a sharp odor, is a highly reactive form of oxygen. High ozone concentrations exist naturally in the stratosphere. Some mixing of stratospheric ozone downward through the troposphere to the earth's surface does occur; however, the extent of ozone transport is limited. At the earth's surface in sites remote from urban areas ozone concentrations are normally very low (0.03-0.05 ppm).

While ozone is beneficial in the stratosphere because it filters out skin-cancer-causing ultraviolet radiation, it is a highly reactive oxidant. It is this reactivity which accounts for its damaging effects on materials, plants, and human health at the earth's surface.

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[17] VCAPCD, *1994 Air Quality Management Plan*, November 1996.

[18] Ibid.

[19] Ibid.

[20] SCAQMD, Final EIIR for the 2007 Air Quality Management Plan, June 2007

The propensity of ozone for reacting with organic materials causes it to be damaging to living cells and ambient ozone concentrations in the Basin are frequently sufficient to cause health effects. Ozone enters the human body primarily through the respiratory tract and causes respiratory irritation and discomfort, makes breathing more difficult during exercise, and reduces the respiratory system's ability to remove inhaled particles and fight infection.

Individuals exercising outdoors, children and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible subgroups for ozone effects. Short-term exposures (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in high ozone communities. Elevated ozone levels are also associated with increased school absences.

Ozone exposure under exercising conditions is known to increase the severity of the abovementioned observed responses. Animal studies suggest that exposures to a combination of pollutants which include ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

**Particulate Matter (PM10 and PM2.5)**

Of great concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. Respirable particles (particulate matter less than about 10 micrometers in diameter) and fine particles (PM2.5, or particulate matter less than 2.5 micrometers in diameter) can accumulate in the respiratory system and aggravate health problems such as asthma, bronchitis and other lung diseases. Children, the elderly, exercising adults, and those suffering from asthma are especially vulnerable to adverse health effects of PM10 and PM2.5.

A consistent correlation between elevated ambient particulate matter (PM10 and PM2.5) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. Studies have reported an association between long-term exposure to air pollution dominated by fine particles (PM2.5) and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in fine particulate matter concentration levels have also been related to hospital admissions for acute respiratory conditions, to school and kindergarten absences, to a decrease in respiratory function in normal children and to increased medication use in children and adults with asthma. Studies have also shown lung function growth in children is reduced with long-term exposure to particulate matter.

The elderly, people with pre-existing respiratory and/or cardiovascular disease and children appear to be more susceptible to the effects of PM10 and PM2.5.

**Carbon Monoxide (CO)**

CO is a colorless, odorless, relatively inert gas. It is a trace constituent in the unpolluted troposphere, and is produced by both natural processes and human activities. In remote areas far from human habitation, carbon monoxide occurs in the atmosphere at an average background concentration of 0.04 ppm, primarily as a result of natural processes such as forest fires and the oxidation of methane. Global atmospheric mixing of CO from urban and industrial sources creates higher background concentrations (up to 0.20 ppm) near urban areas. The major source of CO in urban areas is incomplete combustion of carbon-containing fuels, mainly gasoline. In 2002, approximately 98 percent of the CO emitted into the Basin's atmosphere was from mobile sources. Consequently, CO concentrations are generally highest in the vicinity of major concentrations of vehicular traffic.

CO is a primary pollutant, meaning that it is directly emitted into the air, not formed in the atmosphere by chemical reaction of precursors, as is the case with ozone and other secondary pollutants. Ambient concentrations of CO in the region exhibit large spatial and temporal variations due to variations in the rate at which CO is emitted and in the meteorological conditions that govern transport and dilution. Unlike ozone, CO tends to reach high concentrations in the fall and winter months. The highest concentrations frequently occur on weekdays at times consistent with rush hour traffic and late night during the coolest, most stable portion of the day.

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of worsening oxygen supply to the heart.

Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport by competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include patients with diseases involving heart and blood vessels, fetuses (unborn babies), and patients with chronic hypoxemia (oxygen deficiency) as seen in high altitudes.

Reductions in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels. These include pre-term births and heart abnormalities.

**Sulfur Dioxide ($SO_2$)**

SO2 is a colorless gas with a sharp odor. It reacts in the air to form sulfuric acid (H2SO4), which contributes to acid precipitation, and sulfates, which are components of PM10 and PM2.5. Most of the SO2 emitted into the atmosphere is produced by burning sulfur-containing fuels.

Exposure of a few minutes to low levels of SO2 can result in airway constriction in some asthmatics. All asthmatics are sensitive to the effects of SO2. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, is observed after acute higher exposure to SO2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO2.

Animal studies suggest that despite SO2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO2 levels. In these studies, efforts to separate the effects of SO2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

**Nitrogen Dioxide ($NO_2$)**

NO2 is a reddish-brown gas with a bleach-like odor. Nitric oxide (NO) is a colorless gas, formed from the nitrogen (N2) and oxygen (O2) in air under conditions of high temperature and pressure which are generally present during combustion of fuels; NO reacts rapidly with the oxygen in air to form NO2. NO2 is responsible for the brownish tinge of polluted air. The two gases, NO and NO2, are referred to collectively as NOx. In the presence of sunlight, NO2 reacts to form nitric oxide and an oxygen atom. The oxygen atom can react further to form ozone, via a complex series of chemical reactions involving hydrocarbons. Nitrogen dioxide may also react to form nitric acid (HNO3) which reacts further to form nitrates, components of PM2.5 and PM10.

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposures to NO2 at levels found in homes with gas stoves, which are higher than ambient levels found in southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma and/or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups. More recent studies have found associations between NO2 exposures and cardiopulmonary mortality, decreased lung function, respiratory symptoms and emergency room asthma visits.

In animals, exposure to levels of NO2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO2.

**Sulfates**

Sulfates are chemical compounds which contain the sulfate ion (SO4 =), and are part of the mixture of solid materials which make up PM10. Most of the sulfates in the atmosphere are produced by oxidation of sulfur dioxide. Oxidation of sulfur dioxide yields sulfur trioxide (SO3) which reacts with water to form sulfuric acid, which contributes to acid deposition. The reaction of sulfuric acid with basic substances such as ammonia yields sulfates, a component of PM10 and PM2.5.

Most of the health effects associated with fine particles and sulfur dioxide at ambient levels are also associated with sulfates. Thus, both mortality and morbidity effects have been observed with an increase in ambient sulfate concentrations. However, efforts to separate the effects of sulfates from the effects of other pollutants have generally not been successful.

Clinical studies of asthmatics exposed to sulfuric acid suggest that adolescent asthmatics are possibly a subgroup susceptible to acid aerosol exposure. Animal studies suggest that acidic particles such as sulfuric acid aerosol and ammonium bisulfate are more toxic than non-acidic particles like ammonium sulfate. Whether the effects are attributable to acidity or to particles remains unresolved.

**Lead (Pb)**

Lead in the atmosphere is present as a mixture of a number of lead compounds. Leaded gasoline and lead smelters have been the main sources of lead emitted into the air. Due to the phasing out of leaded gasoline, there was a dramatic reduction in atmospheric lead in the Basin over the past two decades.

Fetuses, 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 quotient. In adults, increased lead levels are associated with increased blood pressure.

Lead poisoning can cause anemia, lethargy, seizures, and death. It appears that there are no direct effects of lead on the respiratory system. Lead can be stored in the bone from early-age environmental exposure, and elevated blood lead levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

**Table 3.2-1** presents the peak readings of criteria pollutants in the air basins of the SCAG Region.

## Toxic Air Contaminants

Toxic air contaminants (TACs), also referred to as hazardous air pollutants (HAPs), are generally defined as those contaminants that are known or suspected to cause serious health problems, but do not have a corresponding ambient air quality standard. Toxic air contaminants are emitted by a variety of industrial processes such as petroleum refining, electric utility and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle

**TABLE 3.2-1**
**PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS**

| Pollutant | Pollutant Standards | | 2004 Peak Criteria Reading | Days in Excess of Standards 2004 | | 2005 Peak Criteria Reading | Days in Excess of Standards 2005 | | 2006 Peak Criteria Reading | Days in Excess of Standards 2006 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | State | National | | State | National | | State | National | | State | National |
| **South Coast Air Basin** | | | | | | | | | | | |
| Ozone-hourly | 0.09 ppm | -- | 0.163 | 105 | 28 | 0.182 | 99 | 31 | 0.175 | 102 | 35 |
| Ozone-8 hour | 0.07 ppm | 0.08 | 0.145 | -- | 88 | 0.145 | -- | 83 | 0.142 | -- | 85 |
| PM10 | 50 µg/m³ | 150 µg/m³ | National 137.0 / State 133.0 | 70 | -- | 131.0 | 67 | -- | National 142.0 / State 135.0 | 69 | -- |
| Carbon Monoxide | 9 ppm | 9 ppm | 6.5 | 0 | 0 | 5.87 | 0 | 0 | 6.24 | 0 | 0 |
| Nitrogen Dioxide | 0.18 ppm | -- | 1.57 | 0 | -- | 1.36 | 0 | -- | 1.37 | 0 | -- |
| **Mojave Desert Air Basin** | | | | | | | | | | | |
| Ozone-hourly | 0.09 ppm | -- | 0.138 | 75 | 4 | 0.145 | 66 | 7 | 0.148 | 61 | 4 |
| Ozone-8 hour | 0.07 ppm | 0.08 | 0.119 | -- | 49 | 0.123 | -- | 55 | 0.124 | -- | 50 |
| PM10 | 50 µg/m³ | 150 µg/m³ | National 198.8 / State 83.0 | 2 | 2 | National 130.8 / State 70.0 | 3 | 0 | National 184.4 / State 77.0 | 4 | 2 |
| Carbon Monoxide | 9 ppm | 9 ppm | 1.72 | 0 | 0 | 1.63 | 0 | 0 | 1.60 | 0 | 0 |
| Nitrogen Dioxide | 0.18 ppm | -- | 0.103 | 0 | -- | 0.087 | 0 | -- | 0.082 | 0 | -- |
| **Salton Sea Air Basin** | | | | | | | | | | | |
| Ozone-hourly | 0.09 ppm | -- | 0.125 | 48 | 1 | 0.139 | 54 | 4 | 0.129 | 51 | 3 |
| Ozone-8 hour | 0.07 ppm | 0.08 | 0.106 | -- | 37 | 0.116 | -- | 43 | 0.109 | -- | 32 |
| PM10 | 50 µg/m³ | 150 µg/m³ | National 201.0 / State 195.0 | 36 | 1 | National 211.0 / State 220.0 | 38 | 2 | National 248.0 / State 261.0 | 39 | 3 |
| Carbon Monoxide | 9 ppm | 9 ppm | 10.33 | 1 | 1 | 8.98 | 0 | 0 | 9.76 | 1 | 1 |
| Nitrogen Dioxide | 0.18 ppm | -- | 0.108 | 0 | -- | 0.131 | 0 | -- | 0.101 | 0 | -- |
| **South Central Coast Air Basin** | | | | | | | | | | | |
| Ozone-hourly | 0.09 ppm | -- | 0.122 | 23 | 0 | 0.121 | 17 | 0 | 0.130 | 24 | 3 |
| Ozone-8 hour | 0.07 ppm | 0.08 | 0.102 | -- | 18 | 0.100 | -- | 12 | 0.104 | -- | 22 |
| PM10 | 50 µg/m³ | 150 µg/m³ | 146.0 | 10 | 0 | National 83.4 / State 86.6 | 2 | 0 | National 131.0 / State 135.0 | 5 | 0 |
| Carbon Monoxide | 9 ppm | 9 ppm | 2.62 | 0 | 0 | 1.66 | 0 | 0 | 1.81 | 0 | 0 |
| Nitrogen Dioxide | 0.18 ppm | -- | 0.071 | 0 | -- | 0.070 | 0 | -- | 0.063 | 0 | -- |

exhaust and may exist as particulate matter or as vapors (gases). Toxic air contaminants include metals, other particles, gases adsorbed on to particles, and certain vapors from fuels and other sources. The emission of toxic substances into the air can be damaging to human health and to the environment. Human exposure to these pollutants at sufficient concentrations and durations can result in cancer, poisoning, and rapid onset of sickness, such as nausea or difficulty in breathing. Other less measurable effects include immunological, neurological, reproductive, developmental, and respiratory problems. Pollutants deposited onto soil or into lakes and streams affect ecological systems and eventually human health through consumption of contaminated food.

The carcinogenic potential of TACs is a particular public health concern because many scientists currently believe that there is no "safe" level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of contracting cancer. It is currently estimated that about one in four deaths in the U.S. is attributable to environmental pollution (Doll and Peto, 1981). The proportion of cancer deaths attributable to air pollution has not been estimated using epidemiological methods.

### *Greenhouse Gases*

Global warming is the observed increase in average temperature of the earth's surface and atmosphere. The primary cause of global warming is an increase of greenhouse gases (GHGs) in the atmosphere. The six major GHGs are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), haloalkanes (HFCs), and perfluorocarbons (PFCs). GHGs absorb longwave radiant energy emitted by the earth, which warms the atmosphere. The GHGs also emit longwave radiation both upward to space and back down toward the surface of the earth. The downward part of this longwave radiation emitted by the atmosphere is known as the "greenhouse effect."

The current scientific consensus is that the majority of the observed warming over the last 50 years can be attributable to increased concentration of GHGs in the atmosphere due to human activities. Events and activities, such as the industrial revolution and the increased consumption of fossil fuels (e.g., gasoline, diesel, coal, etc.), have heavily contributed to the increase in atmospheric levels of GHGs. As reported by the California Energy Commission (CEC), California contributes 1.4 percent of the global and 6.2 percent of the national GHGs emissions (CEC, 2004). The World Resources Institute's GHG Protocol Initiative, the U.S. EPA, and the State of California all identify six GHGs generated by human activity that are believed to be contributors to global warming:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF6)

The different GHGs have varying global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, CO2 is assigned a GWP of 1. By comparison, CH4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO2 on an equal-mass basis. N2O has a GWP of 310, which means that it has a global warming effect 310 times greater than CO2 on an equal-mass basis. To account for their GWPs, GHG emissions are often reported as a CO2 equivalent (CO2e) in metric tonnes (an international measuring unit). The CO2e is calculated by multiplying the emission of each GHG by its GWP, and adding the results together to produce a single, combined emission rate representing all GHGs.

The California Air Resources Board (ARB) has developed a State GHG emissions inventory for years 1990 through 2004. In 2004, GHG emissions in the State were 496.95 million metric tonnes.[21,22] Transportation and energy industry sources accounted for the majority of these emissions. Transportation (i.e., civil aviation, road transportation, railways, and water-borne navigation) represented approximately 39 percent of total emissions and energy industries (e.g., electricity production, heat production, petroleum refining, and manufacturing of solid fuels) represented approximately 34 percent of total emissions. The other 27 percent of emissions come from various sources including, but not limited to, aviation, railways, and agriculture.

Existing GHG emissions for the SCAG region were calculated for construction sources[23], mobile sources[24], natural gas consumption[25], and electricity generation[26]. As shown in **Table 3.2-2**, existing SCAG emissions are estimated to be approximately 176.79 million metric tonnes of CO2e per year. Transportation and energy (i.e., electricity use and natural gas consumption) account for approximately 47 and 52 percent of emissions, respectively. Construction activity accounts for approximately one percent of emissions.

It is important to note a few limitations before comparing SCAG regional GHG emissions to the State emissions inventory prepared by ARB. First, 2004 is the latest year for which the ARB has estimated State emissions, and SCAG emissions are presented for 2008. However, the comparison provides a reasonable percentage estimate of State emissions that are generated in the SCAG region. Second, the ARB emissions inventory includes emission estimates from various sources that were not included in the SCAG analysis because every emission source analyzed by the ARB (e.g., mineral industry, livestock, manure management) could not be analyzed for the SCAG region due to methodological and data limitations. As a result, SCAG emissions are an underestimation when compared to the total State emissions.

With the above limitations in mind, the 176.79 million metric tonnes of CO2e per year calculated for the SCAG region represents approximately 36 percent of total State GHG emissions. A more meaningful comparison can be drawn by only analyzing emissions from construction, mobile, and energy sources. The State emissions inventory lists 338.06 million metric tonnes of CO2e per year from energy industries, road transportation, and construction. Compared to these emissions, the SCAG region generates approximately 52 percent of total state emissions.

## Regulatory Settings

Air quality is regulated at the national, state, and regional levels. The following summarizes relevant air quality regulations and regulatory agencies.

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21 ARB, *Draft California Greenhouse Gas Inventory Millions of Metric Tonnes of CO2 Equivalent – By IPCC Category*, August 22, 2007.

22 One metric tonne equals 1.1 tons.

23 Construction emissions were calculated using ARB's URBEMIS2007 Transportation and Land Use Emission Inventory Model.

24 Mobile source emissions were calculated using ARB's EMFAC2007 Motor Vehicle Emission Inventory Model and the California Climate Action Registry *General Reporting Protocol* (March 2007).

25 Natural gas emissions were calculated based on emission rates obtained from the California Climate Action Registry *General Reporting Protocol* (March 2007).

26 Electricity generation emissions were calculated indirectly as a function of regional electricity use. Emission rates obtained from the California Climate Action Registry *General Reporting Protocol* (March 2007).

**TABLE 3.2-2**
**EXISTING GREENHOUSE GAS EMISSIONS [1]**

| Area and Source | Carbon Dioxide Equivalent (Million Metric Tonnes per Year) [2] |
|---|---|
| **Imperial County** | |
| Construction | 0.04 |
| Mobile | 1.36 |
| Electricity | 0.59 |
| Natural Gas | 0.37 |
| Total | 2.36 |
| **Los Angeles County** | |
| Construction | 0.66 |
| Mobile | 42.28 |
| Electricity | 25.88 |
| Natural Gas | 24.38 |
| Total | 93.20 |
| **Orange County** | |
| Construction | 0.10 |
| Mobile | 13.2 |
| Electricity | 7.72 |
| Natural Gas | 8.65 |
| Total | 29.67 |
| **Riverside County** | |
| Construction | 0.46 |
| Mobile | 10.49 |
| Electricity | 5.15 |
| Natural Gas | 4.31 |
| Total | 20.41 |
| **San Bernardino County** | |
| Construction | 0.33 |
| Mobile | 13.13 |
| Electricity | 5.84 |
| Natural Gas | 4.29 |
| Total | 23.59 |
| **Ventura County** | |
| Construction | 0.09 |
| Mobile | 3.37 |
| Electricity | 2.13 |
| Natural Gas | 1.97 |
| Total | 7.56 |
| **SCAG Region** | **176.79** |
| **State of California** | **496.95**[3] |

NOTES:
1. The table does not include all sources of GHG emissions (e.g., industrial processes, agriculture, etc.).
2. One metric tonne equals 1.1 tons.
3. ARB, *Draft California Greenhouse Gas Inventory (Millions of Metric Tonnes of CO2 Equivalent – By IPCC Category*, August 22, 2007.

## Criteria Pollutants

The Federal Clean Air Act (CAA) and the California Clean Air Act (CCAA) set forth comprehensive requirements for air pollution control. Based on the CAA and CCAA, health-based air quality standards have been established by the U.S. EPA and the State of California for the following criteria pollutants: ozone, CO, NO2, PM10, PM2.5, SO2, and lead. The State standards, which also include standards for sulfate and visibility, are more stringent than the federal standards. The California and National Ambient Air Quality Standards (NAAQS) are summarized in **Table 3.2-3**.

**Table 3.2-3:**
**Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards [1] | | Federal Standards [2] | | |
|---|---|---|---|---|---|---|
| | | **Concentration [3]** | **Method [4]** | **Primary [3,5]** | **Secondary [3,6]** | **Method [7]** |
| Ozone (O3) | 1 Hour | 0.09 ppm (180 μg/m$^3$) | Ultraviolet Photometry | — | Same as Primary Standard | Ultraviolet Photometry |
| | 8 Hour | 0.070 ppm (137 μg/m$^3$) | | 0.08 ppm (157 μg/m$^3$) | | |
| Respirable Particulate Matter (PM10) | 24 Hour | 50 μg/m$^3$ | Gravimetric or Beta Attenuation | 150 μg/m$^3$ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mea | 20 μg/m$^3$ | | | | |
| Fine Particulate Matter (PM2.5) | 24 Hour | No Separate State Standard | | 35 μg/m$^3$ | Same as Primary Standard | Inertial Separation and Gravimetric Analysis |
| | Annual Arithmetic Mean | 12 μg/m | Gravimetric or Beta Attenuation | 15 μg/m | | |
| Carbon Monoxide (CO) | 8 Hour | 9.0 ppm (1 0mg/m$^3$) | Non-Dispersive Infrared Photometry (NDIR) | 9 ppm (10 mg/m$^3$) | None | Non-Dispersive Infrared Photometry (NDIR) |
| | 1 Hour | 20 ppm (23 mg/m$^3$) | | 35 ppm (40 mg/m$^3$) | | |
| | 8 Hour Lake Tahoe | 6 ppm (7 mg/m$^3$) | | — | — | — |
| Nitrogen Dioxide (NO2) * | Annual Arithmetic Mea | 0.030 ppm (56 μg/m3) | Gas Phase Chemiluminescence | 0.053 ppm (100 μg/m$^3$) | Same as Primary Standard | Gas Phase Chemiluminescence |
| | 1 Hour | 0.18 ppm (338 μg/m$^3$) | | — | | |
| Sulfur Dioxide (SO2) | Annual Arithmetic Mean | — | Ultraviolet Fluorescence | 0.030 ppm (80 μg/m$^3$) | — | Spectrophotometry (Pararosaniline Method) |
| | 24 Hour | 0.04 ppm (105 μg/m$^3$) | | 0.14 ppm (365 μg/m$^3$) | — | |
| | 3 Hour | — | | — | 0.5 ppm (1300 μg/m$^3$) | |
| | 1 Hour | 0.25 ppm (655 μg/m$^3$) | | — | — | — |
| Lead[8] | 30 Day Average | 1.5 μg/m$^3$ | Atomic Absorption | — | — | — |
| | Calendar Quarter | — | | 1.5 μg/m$^3$ | Same as Primary Standard | High Volume Sampler and Atomic Absorption |
| Visibility Reducing Particles | 8 Hour | Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape. | | No Federal Standards | | |
| Sulfates | 24 Hour | 25 μg/m$^3$ | Ion Chromatography | | | |
| Hydrogen Sulfide | 1 Hour | 0.03 ppm (42 μg/m$^3$ | Ultraviolet Fluorescence | | | |
| Vinyl Chloride | 24 Hour | 0.01 ppm (26 μg/m$^3$) | Gas Chromatography | | | |

NOTES: The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hr standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

1. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m$^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
3. Contact U.S. EPA for further clarification and current federal policies.
4. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
5. Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
6. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
7. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
8. Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.
9. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

## State Implementation Plans/Air Quality Management Plans

To comply with the CAA in achieving the National Ambient Air Quality Standards (NAAQS), the California Air Resources Board (ARB) develops State Implementation Plans (SIPs) for federal non-attainment and maintenance areas. In California, SIP development is a joint effort of the local air agencies and ARB working with federal, state, and local agencies (including the MPOs). Local Air Quality Management Plans (AQMPs) are prepared in response to federal and state requirements. Since the CCAA does not specify attainment dates but rather requires meeting the California standards the earliest practicable date, SIPs in California typically serve as the control strategy to meet the more stringent State standards.

In California, all SIPs have to go through three steps: air district action, ARB action, and finally EPA action. Each air district submits its respective AQMPs/SIPs to ARB. ARB is the official State agency that submits the SIPs to EPA for all federal non-attainment and maintenance areas in California.

Most of the SCAG region is classified as non-attainment for some criteria pollutants. The boundaries of the SCAG region federal non-attainment/maintenance areas are:

- Ventura County Portion of the South Central Coast Air Basin (SCCAB) - The entire county is a non-attainment area for 8-hour ozone.
- South Coast Air Basin (SCAB) - The entire basin is a non-attainment or maintenance area for $NO_2$; CO; PM10; and PM2.5; 8-hour ozone.
- Antelope Valley and Victor Valley portion of Mojave Desert Air Basin (MDAB) - Non-attainment areas for 8-hour Ozone.
- San Bernardino County Portion of MDAB –
  - Searles Valley (situated in the NW part of the county) is non-attainment for PM10.
  - San Bernardino County (excluding the Searles Valley area) within the MDAB is a non-attainment area for PM10.
- The Riverside County Portion of Salton Sea Air Basin (SSAB) - The entire Riverside County portion of SSAB (Coachella Valley) is a non-attainment area for PM10 and 8-hour ozone.
- The Imperial County Portion of SSAB - The entire Imperial County portion of SSAB is designated as non-attainment for 8-hour ozone and PM10.

The air districts in the SCAG region have recently or are developing attainment plans (AQMPs) to meet the federal 8-hour ozone standard. The 2007 AQMP for the SCAB included the attainment demonstration for PM2.5 (the SCAB is the only PM2.5 non-attainment area in the SCAG region). All areas of the SCAG region are in compliance with the federal PM10, CO, NO2, SO2, and lead standards.

## Transportation Conformity

Transportation conformity is required under CAA section 176(c) to ensure that federally supported highway and transit project activities are consistent with ("conform to") the purpose and requirements of the SIP. Conformity currently applies to areas that are designated non-attainment, and those re-designated to attainment after 1990 ("maintenance areas" with plans developed under CAA section 175A) for the following transportation-related criteria pollutants: ozone, particulate matter (PM2.5 and PM10), CO, and NO2. Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. The transportation conformity regulation is found in 40 CFR part 93 and provisions related to conformity SIPs are found in 40 CFR 51.390.

Conformity also requires all Transportation Control Measures (TCM) projects subject to reporting to be fully funded and on schedule. In the SCAG Region, there are two areas for which the ozone SIPS contain TCMs: SCAB and the Ventura County portion of SCCAB.

## Toxic Air Contaminants

Toxic air contaminants (TAC) are regulated under both state and federal laws.

### *Federal Regulation*

The 1970 Amendments to the CAA included a provision to address air toxics. Under Title III of the CAA, U.S. EPA establishes and enforces National Emissions Standards for Hazardous Air Pollutants (NESHAPs), which are nationally uniform standards oriented towards controlling particular hazardous air pollutants (HAPs). Title I, Section 112(c) of the CAA further directed U.S. EPA to develop a list of sources that emit any of 189 HAPs, and to develop regulations for these categories of sources. To date, EPA has listed 174 categories and developed a schedule for the establishment of emission standards.[27] Rather than promulgating NESHAPs for each pollutant, the CAA directs U.S. EPA to set source category, technology based, standards requiring companies to sharply reduce emissions of toxic air contaminants. These standards require industries to install Maximum Achievable Control Technology (MACT), which is defined as the control technology achieving the maximum degree of reduction in the emission of HAPs, taking into account cost and other factors. U.S. EPA is required to establish and phase in specific performance based standards for all of the industries that emit one or more of the pollutants in significant quantities.

### *California Regulation*

The ARB's statewide comprehensive air toxics program was established in the early 1980's. The Toxic Air Contaminant Identification and Control Act (AB 1807, Tanner 1983) created California's program to reduce exposure to air toxics. The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, Connelly 1987) supplements the AB 1807 program,

27 U.S. Environmental Protection Agency, Office of Compliance, Office of Enforcement and Compliance Assurance, *EPA Office of Compliance Sector Notebook Project: Air Transportation Industry*, October 1998.

by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

Under AB 1807, the ARB is required to use certain criteria in the prioritization for the identification and control of air toxics. In selecting substances for review, the ARB must consider criteria relating to "the risk of harm to public health, amount or potential amount of emissions, manner of, and exposure to, usage of the substance in California, persistence in the atmosphere, and ambient concentrations in the community" [Health and Safety Code section 39666(f)]. AB 1807 also requires the ARB to use available information gathered from the AB 2588 program to include in the prioritization of compounds. This report includes available information on each of the above factors required under the mandates of the AB 1807 program. AB 1807 and AB 2588 are described in more detail below.

### *AB 1807 Program*

In 1983, the California Legislature established a two-step process of risk identification and risk management to address the potential health effects from air toxic substances and protect the public health of Californians. During the first step (identification), the ARB and the Office of Environmental Health Hazard Assessment (OEHHA) determines if a substance should be formally identified as a TAC in California. During this process, the ARB and the OEHHA staff draft a report that serves as the basis for this determination. The ARB staff assesses the potential for human exposure to a substance and the OEHHA staff evaluates the health effects. After the ARB and the OEHHA staff hold several comment periods and workshops, the report is then submitted to an independent, nine-member Scientific Review Panel (SRP), who review the report for its scientific accuracy. If the SRP approves the report, they develop specific scientific findings which are officially submitted to the ARB. The ARB staff then prepares a hearing notice and draft regulation to formally identify the substance as a TAC. Based on the input from the public and the information gathered from the report, the Board will decide whether to identify a substance as a TAC.

In the second step (risk management), the ARB reviews the emission sources of an identified TAC to determine if any regulatory action is necessary to reduce the risk. The analysis includes a review of controls already in place, the available technologies and associated costs for reducing emissions, and the associated risk.

In 1993, the California Legislature amended the AB 1807 program for the identification and control of TACs (AB 2728). Specifically, AB 2728 required the ARB to identify the 189 federal hazardous air pollutants as TACs. For those substances that have not previously been identified under AB 1807 and identified under AB 2728, health effects values will need to be developed. This report will serve as a basis for that evaluation. For substances that were not identified as TACs and are on the TAC Identification List, this report will provide information to evaluate which substances may be entered into the air toxics identification process.

### *AB 2588 "Hot Spots" Program*

In September 1987, the California Legislature established the AB 2588 air toxics "Hot Spots" program. It requires facilities to report their air toxics emissions, ascertain health risks, and to notify nearby residents of significant risks. The emissions inventory and risk assessment information from this program has been incorporated into this report. In September 1992, the "Hot Spots" Act was amended by Senate Bill 1731 which required facilities that pose a significant health risk to the community to reduce their risk through a risk management plan.

### *California's Diesel Risk Reduction Program*

The ARB identified particulate emissions from diesel-fueled engines (diesel PM) as toxic air contaminants (TACs) in August 1998. Following the identification process, the ARB was required by law to determine if there is a need for further control, which led to the risk management phase of the program.

For the risk management phase, the ARB directed staff to form the Diesel Advisory Committee to assist in the development of a risk management guidance document and a risk reduction plan. With the assistance of the Advisory Committee and its subcommittees, the ARB developed the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles and the Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines. The Board approved these documents on September 28, 2000, paving the way for the next step in the regulatory process: the control measure phase.

During the control measure phase, specific statewide regulations designed to further reduce diesel PM emissions from diesel-fueled engines and vehicles have and continue to be evaluated and developed. The goal of each regulation is to make diesel engines as clean as possible by establishing state-of-the-art technology requirements or emission standards to reduce diesel PM emissions.

### *Greenhouse Gases*

Currently, there are no federal standards for GHGs emissions. Recently, however, the U.S. Supreme Court ruled that the harms associated with climate change are serious and well recognized, that the U.S. EPA must regulate GHGs as pollutants, and unless the agency determines that GHGs do not contribute to climate change, it must promulgate regulations for GHG emissions from new motor vehicles (Massachusetts et al. vs. Environmental Protection Agency [case No. 05-1120], April 2, 2007). However, no federal regulations have been set at this time.

Currently, control of GHGs is generally regulated at the state level and approached by setting emission reduction targets for existing sources of GHGs, setting policies to promote renewable energy and increase energy efficiency, and developing statewide action plans. To date, 12 states, including California, have set state GHG emission targets. Pertinent California regulation is summarized below.

### *AB 1493 - Vehicular Emissions of Greenhouse Gases*

California Assembly Bill 1493 (Pavley), enacted on July 22, 2002, required ARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. Regulations adopted by ARB will apply to 2009 and later model year vehicles. ARB estimates that the regulation will reduce climate change emissions from light duty passenger vehicle fleet by 18 percent in 2020 and 27 percent in 2030 (CARB 2004).

### *Executive Order S-3-05*

California Governor Arnold Schwarzenegger announced on June 1, 2005 through Executive Order S-3-05, state-wide GHG emission reduction targets as follows: 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 (CA 2005). Some literature equates these reductions to 11 percent by 2010 and 25 percent by 2020.

### *AB 32 - California Global Warming Solutions Act of 2006*

The purpose of AB 32 is to reduce statewide GHG emissions to 1990 levels by 2020. This enactment instructs the ARB to adopt regulations that reduce emissions from significant sources of GHGs and establish a mandatory GHG reporting and verification program by January 1, 2008. AB 32 requires the ARB to adopt GHG emission limits and emission reduction measures by January 1, 2011, both of which are to become effective on January 1, 2012. The ARB must also evaluate whether to establish a market-based cap and trade system. AB32 does not identify a significance level of GHG for CEQA/NEPA purposes, nor has the ARB adopted such a significance threshold. On December 6, 2007, ARB adopted 427 million metric tonnes of carbon dioxide equivalent (MMTCO2e) as the total statewide aggregated greenhouse gas 1990 emissions level and the 2020 emissions limit.

### *Executive Order S-01-07*

Executive Order S-01-07 was enacted by the Governor on January 18, 2007. Essentially, the order mandates: 1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and 2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California.

## Methodology

This section summarizes the methodology used to evaluate the potential air quality impacts of the proposed Plan.

The analysis evaluates the potential impacts of the RTP relative to: 1) criteria pollutants; 2) toxic air contaminants resulting from on-road mobile sources in the region; and 3) greenhouse gas emissions. The focus of the analysis is on-road mobile emissions, but as discussed below, stationary and other emissions are briefly summarized for purposes of comparison.

#### Criteria Pollutants

Regional mobile source emissions are based on an analytical process, which involves a computer-simulated forecast of emissions from the 2008 RTP out to year 2035. Concurrent with the RTP and this PEIR, air quality conformity analyses for mobile (on-road) emissions are being undertaken. In general, the same modeling methodologies were used in the preparation of the

PEIR analysis and the conformity analysis. Federal conformity regulations require emissions to be based on the latest planning assumptions in force at the time of the conformity determination. The latest planning assumptions must be derived from the population, employment, travel, and congestion estimates that have been most recently developed. Examples of assumptions are land use, vehicle age and fleet mix, and the most recent information regarding the implementation of control measures in approved State Implementation Plans (e.g., inspection and maintenance (I/M) and fuels programs, transportation control measures). Emission budgets for mobile source emissions are established for all relevant criteria pollutants for each Federal nonattainment area to ensure continued regional compliance with the Clean Air Act.

Mobile source emissions are a product of mobile source emission factors and vehicle activity data. The mobile source emission factors are based on the latest version of the ARB mobile source emissions inventory model, EMFAC2007. The emission factors accommodate certain performance assumptions including fuel efficiency, emissions control technologies and deterioration of control systems, and mobility assumptions (e.g., vehicle speed and idling). Vehicle miles traveled (VMT) are predicted by the SCAG travel demand model. Projected vehicle emissions expected from the Southern California transportation network in 2035 under the Plan were compared with those estimated for current (2008) conditions.

SCAG is responsible for ensuring that mobile emissions do not exceed the emission budgets. All other sources of emissions (e.g., stationary sources, ships, airplanes, trains, construction) are the responsibility of local air districts, the Air Resources Board, or the Environmental Protection Agency. These emissions are addressed in local Air Quality Management Plans and associated environmental documents. For purposes of comparison, this EIR provides a summary of the SCAQMP emissions anticipated from these sources (for purposes of this PEIR the horizon year was extrapolated to 2035 using a straight line projection based on trend data).

The projections for stationary and other sources were prepared based on SCAG projections, but at the time the full effect of the growth policies contained within the RTP had not been included. Nonetheless, it is believed that the extrapolated AQMP projections to the 2035 RTP horizon year provide a reasonable estimate of 2035 emissions. Total growth projections for employment, population and households were not affected by the growth policies, only the distributions were affected. In addition, by 2035 it is anticipated that many factors will have changed (reduced dependence on oil and/or reduced availability of oil) such that emissions will be substantially different from those contained in this PEIR. However, for purposes of comparison in 2035, the straight-line projection method of increasing emissions from horizon year data was considered appropriate for a meaningful PEIR analysis.

Short-term construction impacts on localized air quality are briefly discussed. These impacts result from construction activities (of both Plan projects and associated growth) which include construction equipment emissions, dust from grading and earthmoving operations, and emissions from workers' vehicles traveling to and from construction sites. Quantification of these emissions is undertaken within the AQMP, and is included within the stationary and area source emissions summarized and extrapolated from the SCAQMD's 2007 AQMP.

**Toxic Air Contaminants**

The quantification of changes in cancer risk impacts resulting from vehicle operation in the vicinity of each of the selected freeway corridors in the 2008 RTP was performed using an EPA-approved pollutant dispersion model in conformance with SCAQMD diesel exhaust risk assessment procedures.[28] Guidance published by OEHHA was used in the design of the scope of analysis.[29] Based on the OEHHA guidance, the analyses of health effect impacts were limited to evaluations of changes in cancer risks from the inhalation pathway. The OEHHA procedures state that "the potential cancer risk from inhalation exposure to diesel PM will outweigh the potential non-cancer health impacts" and that "potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multipathway cancer risk from the speciated compounds." As clarified in this reference, "the surrogate for whole diesel exhaust is diesel PM." On the basis of these statements, the assessments of risk associated with diesel exhaust emissions from operation of freeway segments conducted here were limited to the cancer impacts from the inhalation route only. Because diesel exhaust PM emissions contribute roughly 90% of airborne cancer exposure from on-road vehicle use, as confirmed by Table 4, the evaluation of changes in cancer risk impacts from exposure to the gasoline exhaust toxic pollutants was also limited to the inhalation pathway.

**Greenhouse Gas Emissions**

Greenhouse gas emissions were estimated using the EMFAC 2007 model for mobile sources, the UBEMIS2007 model for construction emissions, and indirectly for stationary sources using estimates of electricity and natural gas use and associated emission rates of CO2 from the California Climate Action Registry (see Appendix B for a more detailed discussion of this methodology).

## Comparison with the No Project

The analysis of air quality includes a comparison between the expected future conditions with the Plan and the expected future conditions if no Plan were adopted. This evaluation is not included in the determination of the significance of impacts; however, it provides a meaningful perspective on the expected effects and benefits of the 2008 RTP.

## Determination of Significance

The methodology for determining significance applies the significance criteria below to compare the expected future conditions with the Plan to existing conditions (2008).

28 Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions, South Coast Air Quality Management District, December 2002, *http:/www/aqmd.gov/handbook/hra_guide.doc*.

29 Appendix D: Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, Air Toxic Hot Spots Program Risk Assessment Guidelines, California Office of Environmental Health Hazard Assessment, October 2003; *http://www.oehha.ca.gov/air/hot_spots/pdf/HRAfinalapps.pdf*.

## Significance Criteria

For purposes of this regional analysis, the following criteria for determining significance have been applied:

- Projected long-term emissions of criteria pollutants are considered significant if they are substantially greater than current emission levels.
- Projected short-term emissions (construction) are considered to be significant if potential RTP projects would exceed the thresholds established by the local air districts (see Table 3.2-11).
- Projected long-term emissions of toxic air contaminants (diesel particulate matter from heavy-duty diesel trucks) are considered significant if they are equal to or greater than current emission levels.
- Localized concentrations of toxic air contaminants at sensitive receptors (short-term and/or long-term) are considered significant if they exceed existing conditions.
- Projected long-term emissions would be considered to be cumulatively significant if they are not consistent with the local air quality management plans and state implementation plans.
- For purposes of this PEIR, any increase in Greenhouse Gas (GHG) emissions compared to 2008 is considered significant.

# Impacts and Mitigation Measures

Analysis of the potential air quality impacts of the 2008 RTP was conducted based on detailed modeling of on-road sources; regional emissions from stationary and other sources are summarized from the SCAQMP and associated EIR. A screening level Health Risk Assessment was conducted for the 2008 PEIR in accordance with SCAQMD, ARB and USEPA guidelines. Because Plan and cumulative emissions are interrelated, cumulative emissions are discussed together with Plan emissions.

All mitigation measures should be included in project-level analysis as appropriate. The project proponent or local jurisdiction shall be responsible for ensuring adherence to the mitigation measures prior to construction. For regionally significant projects SCAG shall be provided with documentation of compliance with mitigation measures through its Intergovernmental Review Process in which all regionally significant projects, plans, and programs must be consistent with regional plans and policies.

On-going and subsequent planning work being pursued by SCAG will comprehensively address climate change. This work will design approaches to achieve defined sustainability targets. In addition SCAG, as part of its air quality planning responsibilities, is currently preparing a white paper on future air quality attainment strategies that will expand the range of measures available to control pollutants.

**Impact 3.2-1: Under the Plan, long-term emissions of PM10 and PM2.5 would increase substantially, when compared to existing conditions (2008). PM10 would increase in the**

**SCAB, San Bernardino portion of MDAB and Imperial County portion of SSAB, and PM2.5 emissions would increase in the SCAB; PM10 would increase in Los Angeles, Orange, Riverside and San Bernardino Counties, PM2.5 would increase in Los Angeles and Riverside Counties, as a result of on-road mobile sources. The increase in regional emissions of PM10 and PM2.5 would be considered a significant cumulative impact. Emissions of ROG, NOx, CO, and SOx would decrease when compared to 2008; this would be a beneficial impact.**

Direct, long-term impacts were assessed and are described in detail below. Projected long-term emissions of criteria pollutants are considered significant if they are substantially greater than the current emission levels (2008 base year).

## Criteria Pollutant Emissions Analysis

To assess the effectiveness of the improvements proposed in the 2008 RTP, estimated air emissions for the year 2035 under the Plan were compared with the 2008 conditions. The calculated emissions were compiled for each non-attainment area and county in the SCAG region.

## 2008 RTP Compared to Current Conditions

**Table 3.2-4** summarizes emissions by nonattainment areas in the region. Under the Plan, emissions of ROG, NOx, and CO would decrease, when compared to 2008. SOx would remain approximately the same as 2008. These reductions are considered a **beneficial** impact. Under the 2008 RTP, all nonattainment areas would experience reduced levels of criteria pollutants except PM10 and PM2.5. However, PM10 and PM2.5 would increase in the SCAB (13 percent and 11 percent respectively). PM10 would increase in the San Bernardino County portion of the MDAB (50 percent) and Imperial County portion of SSAB (40 percent). The increase in PM10 is associated with increased re-entrained road dust. Tailpipe emissions of PM10 and PM2.5 decrease between 2008 and 2035.

**Table 3.2-5** summarizes the current and projected criteria pollutant emissions estimated for the 2008 RTP as compared to the current conditions by county. As shown in Table 3.2-5, under the Plan emissions of ozone precursors, NOx and ROG, would experience a dramatic improvement over existing conditions. However PM10 and PM2.5 would increase in Los Angeles (6 percent and 10 percent) and Riverside (41 percent and 33 percent) counties, and PM10 would increase in Orange (8 percent) and San Bernardino (17 percent) Counties.

## 2008 RTP Compared to No Project

In addition to comparing the impacts of the RTP to existing conditions, the analysis includes a comparison between the expected future conditions with the Plan and the expected future conditions if no Plan were adopted. This evaluation is not included in the determination of the significance of impacts; however, it provides a meaningful perspective on the expected effects and benefits of the 2008 RTP.

**Table 3.2-6** summarizes the differences between No Project and Plan projected criteria pollutant emissions estimated for the 2008 RTP by nonattainment area. When compared to the No Project condition emissions, the 2008 RTP would result in less or equivalent emissions. **Table 3.2-7** summarizes the differences between No Project and Plan projected criteria pollutant emissions estimated for the 2008 RTP by county. When compared to the No Project emissions, the 2008 RTP would result in fewer or the same emissions of all criteria pollutants for all six counties in the SCAG region.

**Table 3.2-7** summarizes the differences between No Project and Plan projected criteria pollutant emissions estimated for the 2008 RTP by county. When compared to the No Project emissions, the 2008 RTP would result in fewer emissions of all criteria pollutants (with the exception of SOx which would be the same in Imperial and Ventura under Plan and No Project conditions) for all six counties.

### *Mitigation Measures*

Emissions of particulate matter are directly related to growth and VMT. Regardless of how clean a vehicle operates, the vast majority of PM10 and PM2.5 emissions from on-road sources are generated from re-entrained dust on paved roads and is a function of VMT. Mitigation measures that reduce VMT are proposed. Additional measures to control fugitive dust and transportation-related PM10 and PM2.5 are outlined in the SCAQMD 2007 Air Quality Management Plan (AQMP) and include control methods, such as watering, chemical stabilization, paving, revegetation, track-out control, construction project signage, sweeping and motor vehicle controls. Mitigation measures are hereby incorporated by reference from the following air quality management plans:

- 2007 South Coast Air Quality Management Plan (AQMP)[30]

  South Coast Air Quality Management District Mitigation Measures and Control Efficiencies for the following:[31]

  - Off-road Engines
  - On-road Engines
  - Harbor Craft
  - Ocean-going Vessels
  - Locomotives
  - Fugitive Dust
- Mojave Desert Air Quality Management Plan
- Antelope Valley Air Quality Management Plan
- Imperial County Air Quality Management Plan

30 Source: http://www.aqmd.gov/aqmp/AQMPintro.htm.

31 Source: http://www.aqmd.gov/ceqa/handbook/mitigation/MM_intro.html.

**TABLE 3.2-4**
**CRITERIA POLLUTANT EMISSIONS BY NONATTAINMENT AREA – 2008 VS 2035 PLAN (IN TONS PER DAY)**

| Nonattainment Area | | ROG Summer | ROG Annual | NOx Summer | NOx Annual | NOx Winter | CO Winter | PM10 Annual | PM2.5 Annual | SOx Annual |
|---|---|---|---|---|---|---|---|---|---|---|
| SCAB | *Existing* | 201 | | 420 | | | 1907 | 120 | 18 | 2 |
| | *Plan* | 76 | | 113 | | | 563 | 135 | 20 | 2 |
| | *Difference* | -125 | | -307 | | | -1344 | 15 | 2 | 0 |
| | % Difference | -62% | | -73% | | | -70% | **13%** | **11%** | 0% |
| Coachella Portion of SSAB | *Existing* | 8 | | 37 | | | | 3 | 0 | 0 |
| | *Plan* | 3 | | 11 | | | | 3 | 1 | 0 |
| | *Difference* | -4 | | -26 | | | | 0 | 1 | 0 |
| | % Difference | -55% | | -70% | | | | 0% | 0% | 0% |
| Ventura County Portion of SCCAB | *Existing* | 12 | | 17 | | | | | | |
| | *Plan* | 4 | | 5 | | | | | | |
| | *Difference* | -7 | | -12 | | | | | | |
| | % Difference | -63% | | -71% | | | | | | |
| Western MDAB | *Existing* | 21 | | 69 | | | | | | |
| | *Plan* | 8 | | 23 | | | | | | |
| | *Difference* | -13 | | -46 | | | | | | |
| | % Difference | -62% | | -67% | | | | | | |
| San Bernardino County Portion of MDAB | *Existing* | | 16 | | 83 | | | 4 | | |
| | *Plan* | | 6 | | 24 | | | 6 | | |
| | *Difference* | | -10 | | -59 | | | 2 | | |
| | % Difference | | -63% | | -71% | | | **50%** | | |
| Imperial County Portion of SSAB | *Existing* | 6 | | 18 | | | | 5 | | |
| | *Plan* | 4 | | 8 | | | | 7 | | |
| | *Difference* | -2 | | -10 | | | | 2 | | |
| | % Difference | -38% | | -56% | | | | **40%** | | |

**TABLE 3.2-5**
**CRITERIA POLLUTANT EMISSIONS BY COUNTY – 2008 VS 2035 PLAN (IN TONS PER DAY)**

| County | | ROG Summer | ROG Annual | NOx Summer | NOx Annual | NOx Winter | CO Winter | PM10 Annual | PM2.5 Annual | SOx Annual |
|---|---|---|---|---|---|---|---|---|---|---|
| Los Angeles | *Existing* | 117 | 117 | 240 | 247 | 266 | 1,132 | 68 | 10 | 1 |
| | *Plan* | 40 | 40 | 59 | 60 | 63 | 310 | 71 | 11 | 1 |
| | *Difference* | -77 | -77 | -181 | -187 | -203 | -822 | 3 | 1 | 0 |
| | % Difference | -66% | -66% | -75% | -76% | -76% | -73% | **4%** | **10%** | 0% |
| Imperial | *Existing* | 6 | 5 | 18 | 17 | 18 | 47 | | | 0 |
| | *Plan* | 4 | 3 | 8 | 8 | 8 | 28 | | | 0 |
| | *Difference* | -2 | -2 | -10 | -9 | -10 | -19 | | | 0 |
| | % Difference | -33% | -40% | -56% | -53% | -56% | -40% | | | 0% |
| Orange | *Existing* | 38 | 38 | 67 | 68 | 74 | 370 | 24 | 4 | 0 |
| | *Plan* | 15 | 15 | 18 | 18 | 19 | 107 | 26 | 4 | 0 |
| | *Difference* | -23 | -23 | -49 | -50 | -55 | -263 | 2 | 0 | 0 |
| | % Difference | -61% | -61% | -73% | -74% | -74% | -71% | **8%** | 0% | 0% |
| Riverside | *Existing* | 32 | 30 | 105 | 103 | 110 | 281 | 17 | 3 | 0 |
| | *Plan* | 15 | 14 | 33 | 32 | 34 | 109 | 24 | 4 | 0 |
| | *Difference* | -17 | -16 | -72 | -71 | -76 | -172 | 7 | 1 | 0 |
| | % Difference | -53% | -53% | -69% | -69% | -69% | -61% | **41%** | **33%** | 0% |
| San Bernardino | *Existing* | 40 | 37 | 142 | 143 | 150 | 378 | 12 | 2 | 0 |
| | *Plan* | 16 | 15 | 44 | 43 | 44 | 133 | 14 | 2 | 0 |
| | *Difference* | -24 | -22 | -98 | -100 | -106 | -245 | 2 | 0 | 0 |
| | % Difference | -60% | -59% | -70% | -70% | -71% | -65% | **17%** | 0% | 0% |
| Ventura | *Existing* | 12 | 12 | 19 | 20 | 22 | 106 | | | 0 |
| | *Plan* | 4 | 4 | 5 | 5 | 5 | 30 | | | 0 |
| | *Difference* | -8 | -8 | -14 | -15 | -17 | -76 | | | 0 |
| | % Difference | -67% | -67% | -74% | -75% | -77% | -72% | | | 0% |

*Los Angeles County excludes Antelope Valley*
*Riverside County includes the SCAB, MDAB, and Coachella Valley portions*
*San Bernardino County includes the SCAB and MDAB portions*

**TABLE 3.2-6**
**CRITERIA POLLUTANT EMISSIONS BY NONATTAINMENT AREA – 2035 NO PROJECT VS 2035 PLAN (IN TONS PER DAY)**

| Nonattainment Area | | ROG Summer | ROG Annual | NOx Summer | NOx Annual | NOx Winter | CO Winter | PM10 Annual | PM2.5 Annual | SOx Annual |
|---|---|---|---|---|---|---|---|---|---|---|
| SCAB | *No Project* | 77 | | 116 | | | 572 | 135 | 20 | 3 |
| | *Plan* | 76 | | 113 | | | 563 | 135 | 20 | 2 |
| | *Difference* | -1 | | -3 | | | -9 | 0 | 0 | -1 |
| | % Difference | -1% | | -3% | | | -2% | 0% | 0% | -33% |
| Coachella Portion of SSAB | *No Project* | 4 | | 11 | | | | 4 | 1 | 0 |
| | *Plan* | 3 | | 11 | | | | 3 | 1 | 0 |
| | *Difference* | -1 | | 0 | | | | -1 | 0 | 0 |
| | % Difference | -25% | | 0% | | | | -25% | 0% | 0% |
| Ventura County Portion of SCCAB | *No Project* | 4 | | 5 | | | | | | |
| | *Plan* | 4 | | 5 | | | | | | |
| | *Difference* | 0% | | 0 | | | | | | |
| | % Difference | 0% | | 0% | | | | | | |
| Western MDAB | *No Project* | 8 | | 21 | | | | | | |
| | *Plan* | 8 | | 23 | | | | | | |
| | *Difference* | 0 | | 2 | | | | | | |
| | % Difference | 0% | | **10%** | | | | | | |
| San Bernardino County Portion of MDAB | *No Project* | | 6 | | 26 | | | 7 | | |
| | *Plan* | | 6 | | 24 | | | 6 | | |
| | *Difference* | | 0 | | -2 | | | -1 | | |
| | % Difference | | 0% | | -8% | | | -14% | | |
| Imperial County Portion of SSAB | *No Project* | 4 | | 9 | | | | 8 | | |
| | *Plan* | 4 | | 8 | | | | 7 | | |
| | *Difference* | 0 | | -1 | | | | -1 | | |
| | % Difference | 0% | | -11% | | | | -13% | | |

**TABLE 3.2-7**
**CRITERIA POLLUTANT EMISSIONS BY COUNTY – 2035 NO PROJECT VS 2035 PLAN (IN TONS PER DAY)**

| County | | ROG Summer | ROG Annual | NOx Summer | NOx Annual | NOx Winter | CO Winter | PM10 Annual | PM2.5 Annual | SOx Annual |
|---|---|---|---|---|---|---|---|---|---|---|
| Los Angeles | *No Project* | 41 | 40 | 60 | 61 | 64 | 313 | 71 | 11 | 1 |
| | *Plan* | 40 | 40 | 59 | 60 | 63 | 310 | 71 | 11 | 1 |
| | *Difference* | -1 | 0 | -1 | -1 | -1 | -3 | 0 | 0 | 0 |
| | % Difference | -2% | 0% | -2% | -2% | -2% | -1% | 0% | 0% | 0% |
| Imperial | *No Project* | 4 | 3 | 9 | 8 | 8 | 28 | | | 0 |
| | *Plan* | 4 | 3 | 8 | 8 | 8 | 28 | | | 0 |
| | *Difference* | 0 | 0 | -1 | 0 | 0 | 0 | | | 0 |
| | % Difference | 0% | 0% | -11% | 0% | 0% | 0% | | | 0% |
| Orange | *No Project* | 15 | 15 | 18 | 18 | 19 | 108 | 26 | 4 | 0 |
| | *Plan* | 15 | 15 | 18 | 18 | 19 | 107 | 26 | 4 | 0 |
| | *Difference* | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 |
| | % Difference | 0% | 0% | 0% | 0% | 0% | -1% | 0% | 0% | 0% |
| Riverside | *No Project* | 16 | 14 | 34 | 34 | 35 | 115 | 23 | 4 | 0 |
| | *Plan* | 15 | 14 | 33 | 32 | 34 | 109 | 24 | 4 | 0 |
| | *Difference* | -1 | 0 | -1 | -2 | -1 | -6 | 1 | 0 | 0 |
| | % Difference | -6% | 0% | -3% | -6% | -3% | -5% | **4%** | 0% | 0% |
| San Bernardino | *No Project* | 17 | 16 | 47 | 47 | 48 | 141 | 14 | 2 | 1 |
| | *Plan* | 16 | 15 | 44 | 43 | 44 | 133 | 14 | 2 | 1 |
| | *Difference* | -1 | -1 | -3 | -4 | -4 | -8 | 0 | 0 | 0 |
| | % Difference | -6% | -6% | -6% | -9% | -8% | -6% | 0% | 0% | 0% |
| Ventura | *No Project* | 4 | 4 | 5 | 5 | 5 | 30 | | | 0 |
| | *Plan* | 4 | 4 | 5 | 5 | 5 | 30 | | | 0 |
| | *Difference* | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| | % Difference | 0% | 0% | 0% | 0% | 0% | 0% | | | 0% |

*Los Angeles County excludes Antelope Valley*
*Riverside County includes the SCAB, MDAB, and Coachella Valley portions*
*San Bernardino County includes the SCAB and MDAB portions*

**MM-AQ.1:** Pursuant to CAA Section 108(f)(1)(A), Transportation Control Measures (TCMs) from the 2007 AQMP include the following sixteen measures:

I. Programs for improved use of public transit;

II. Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;

III. Employer-based transportation management plans, including incentives;

IV. Trip-reduction ordinances;

V. Traffic flow improvement programs that achieve emission reductions;

VI. Fringe and transportation corridor parking facilities, serving multiple occupancy vehicle programs or transit service;

VII. Programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use;

VIII. Programs for the provision of all forms of high-occupancy, shared-ride services, such as the pooled use of vans;

IX. Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;

X. Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;

XI. Programs to control extended idling of vehicles;

XII. Programs to reduce motor vehicle emissions, consistent with Title II of the CAA, which are caused by extreme cold start conditions;

XIII. Employer-sponsored programs to permit flexible work schedules;

XIV. Programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;

XV. Programs for new construction and major reconstruction of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation, when economically feasible and in the public interest; and

XVI. Programs to encourage the voluntary removal from use and the marketplace of pre- 1980 model year light duty vehicles and pre-1980 model light duty trucks.

The 2008 RTP has been prepared to facilitate implementation of the transportation control measures outlined in the 2007 AQMP. The 2008 RTP incorporates both the capital and noncapital improvements recommended by the AQMP.

**MM-AQ.2:** ARB has adopted a series of measures designed to attain federal air quality standards for PM2.5 and 8-hour ozone. ARB's strategy, outlined in the South Coast SIP, includes the following elements:

- Set technology forcing new engine standards;
- Reduce emissions from the in-use fleet;
- Require clean fuels, and reduce petroleum dependency;
- Work with US EPA to reduce emissions from federal and state sources; and
- Pursue long-term advanced technology measures.
- Proposed new transportation–related SIP measures include[32]:

**On-road Sources**

- Improvements and Enhancements to California's Smog Check Program
- Expanded Passenger Vehicle Retirement
- Modifications to Reformulated Gasoline Program
- Cleaner In-Use Heavy-Duty Trucks
- Ship Auxiliary Engine Cold Ironing and Other Clean Technology
- Cleaner Ship Main Engines and Fuel
- Port Truck Modernization
- Accelerated Introduction of Cleaner Line-Haul Locomotives
- Clean Up Existing Commercial Harbor Craft

**Off-road Sources**

- Cleaner Construction and Other Equipment
- Cleaner In-Use Off-Road Equipment
- Agricultural Equipment Fleet Modernization
- New Emission Standards for Recreational Boats
- Off-Road Recreational Vehicle Expanded Emission Standards

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32 California Air Resources Board. April 26, 2007. *Proposed New SIP Measures – Descriptions.* Retrieved on December 2007 from http://www.arb.ca.gov/planning/sip/2007sip/apr07draft/sipmeas.pdf,

**Significance after Mitigation**

Even with implementation of all feasible mitigation measures and incorporation of measures as described above, regional emissions of PM10 and PM2.5 would increase substantially in the region. Therefore, the project would have a **significant and unavoidable impact** on regional air quality. It must be noted, however, that the State Implementation Plans for the region account for the increased fugitive dust (as well as tail pipe emissions) such that the RTP conforms to the attainment demonstrations as required by the federal CAA.

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**Impact 3.2-2: Long-term (operational) localized impacts resulting from freeway operations under the Plan would be reduced compared to today but would likely continue to exceed the project specific cancer risk threshold of one in one million. The cumulative impact is beneficial. The continuation of a pre-existing problem is not an impact of the plan or cumulative development.**

Toxic air contaminants (TACs) include airborne substances other than the criteria pollutants that are known to cause cancer or otherwise harm human health. TAC emissions are also regulated by the local air quality management districts. Much of the effort toward controlling TACs has concentrated on point source emissions from businesses handling hazardous materials. However, mobile sources are responsible for approximately half of the total lifetime cancer risk attributed to air toxics. **Table 3.2-8** summarizes PM10 emissions from heavy-duty truck vehicle exhaust by county. Heavy-duty truck PM10 exhaust emissions include most of the diesel-related TAC emissions. As shown in the table, PM10 emissions from heavy-duty trucks would be expected to decrease from 2008 levels for each county. As a result of the anticipated decline in TAC emissions, the 2008 RTP would potentially have a **beneficial** impact with respect to regional TAC emissions.

**TABLE 3.2-8**
**PM10 EMISSIONS EXHAUST ONLY FOR HEAVY-DUTY TRUCKS PER COUNTY (TONS PER DAY)**

| Scenario | Los Angeles | Imperial | Orange | Riverside | San Bernardino | Ventura |
|---|---|---|---|---|---|---|
| 2008 Existing | 5.24 | 0.56 | 1.00 | 3.26 | 4.75 | 0.30 |
| 2035 No Project | 2.09 | 0.27 | 0.51 | 1.38 | 2.22 | 0.16 |
| 2035 Plan | 2.03 | 0.27 | 0.50 | 1.37 | 2.05 | 0.16 |

Los Angeles including Antelope Valley
*Riverside County includes SCAB and MDAB portions of Riverside and the SSAB - Coachella Valley Portion)*
*San Bernardino County includes SCAB and MDAB portions of San Bernardino*
*Note: PM Exhaust includes engine exhaust, including running, idle, and start exhaust*

Localized impacts are addressed for the operational phase of the 2008 RTP. Mobile sources are sources of carcinogenic pollutants and are responsible for diesel exhaust. Areas near roadways typically register elevated concentrations of air toxics, and these areas are known as “hot spots.” Exposure to such “hot spots” may lead to adverse health effects. The proximity to roadways is an important factor in assessing exposure. Typically, concentrations drop off dramatically (around 90 percent) after the first quarter mile from the roadway.

Currently, there is a wide range of variability of concentrations throughout the SCAG region. The highest pollutant concentrations are found at the Ports, LAX, and along major corridors. The cancer risk in many of these areas is greater than the local air districts' acceptable risk of one in a million. To determine the health impacts to the general public living near sections of freeway that would be affected under the 2008 RTP, a screening risk assessment was conducted to estimate increased cancer risks in areas near a sample of projects. The results indicate that cancer risk resulting from operation of freeway sections would be reduced compared to today but would likely continue to exceed the acceptable threshold of one in a million at locations close to freeways. This impact would be considered **less than significant**. The analysis indicates that cancer risk levels in 2035 with implementation of the 2008 RTP would be substantially lower than cancer risk in 2008, primarily as a result of improvements in motor vehicle exhaust controls. The analysis also indicates that risk levels in 2035 without the 2008 RTP (the No Project) would be slightly higher than with the 2008 RTP. For the analysis of freeway segment operations, the cancer risk values reported by the model represent the increased chance of contracting cancer from exposure to freeway emissions if a person lived at the same location for a period of 70 years and if freeway emissions did not change over the 70 years from forecasted levels. The risk values reported at the maximum exposed residence by model runs for 2008, No Project and Plan for each of the six freeway segments studied are presented in **Table 3.2-9**. The maximum exposed residences identified from the modeling results were typically those found closest to the freeway segments. Analysis of modeling results also revealed that cancer risks declined dramatically with increasing distance away from the freeways. The distances at which estimated cancer risks drop by 50 percent and 90 percent are presented in **Table 3.2-10**.

### *Mitigation Measures*

See mitigation measures for Impact 3.2-1.

#### Significance after Mitigation

Although toxic air contaminant concentrations at sensitive receptors located closest to regional freeways would remain above acceptable levels they would be significantly reduced compared to today, therefore the impact of the 2008 RTP and cumulative development would be **less than significant**.

**TABLE 3.2-9**
**INCREASED CANCER RISK AT MAXIMUM EXPOSED RESIDENCE FROM VEHICLE OPERATION BY PLANNING SCENARIO AND FREEWAY CORRIDOR**

| | Increased Cancer Risk over 70-Year Exposure (per million) | | | | | |
|---|---|---|---|---|---|---|
| **Planning Scenario** | **I-405 (Orange)** | **I-710 (Los Angeles)** | **I-8 (Imperial)** | **SR 60 (San Bernardino)** | **SR 91 (Riverside)** | **US 101 (Ventura)** |
| 2008 Existing | 915 | 563 | 85 | 174 | 479 | 160 |
| 2035 No project | 225 | 206 | 27 | 57 | 120 | 55 |
| 2035 Plan | 222 | 174 | 24 | 51 | 108 | 54 |

**SOURCE: Southern California Association of Governments, 2007**

**TABLE 3.2-10**
**DISTANCES AT WHICH CANCER RISKS DROP BY 50% AND 90%**

| Freeway Corridor | 50% Reduction Distance | 90% Reduction Distance |
|---|---|---|
| I-405 (Orange County) | 330 ft. | 1,440 ft. |
| I-710 (Los Angeles County) | 330 ft. | 1,080 ft. |
| I-8 (Imperial County) | 280 ft. | 1,990 ft. |
| SR 60 (San Bernardino County) | 415 ft. | 1,090 ft. |
| SR 91 (Riverside County) | 220 ft. | 590 ft. |
| US 101 (Ventura County) | 440 ft. | 1,415 ft. |

**SOURCE: Southern California Association of Governments, 2007**

**Impact 3.2-3: Emissions of short-term criteria pollutants would increase under the Plan as a result of construction of Plan projects and associated development in the region.**

The 2008 RTP would involve substantial construction to implement the proposed Plan projects. In addition, construction of the development projects that comprise regional growth would also generate substantial emissions. While each project would result in only short-term emissions, the construction industry itself comprises one component of stationary and area source emissions addressed in the AQMPs (see **Table 3.2-16**, Stationary and Area Source Emissions for SCAB emissions).

Construction activities in the region would create air emissions from the following activities: (1) demolition; (2) site preparation operations (grading/excavation); (3) fuel combustion from the operation of construction equipment; (3) delivery and hauling of construction materials and supplies to and from sites; (4) the use of asphalt or other oil based substances during the final construction phases of projects; and (5) travel by construction workers to and from sites.

Construction emissions are site specific and are based on the type and magnitude of development that would be accommodated under the project, the timeline for construction, the mix of construction equipment required to build the project, and emission factors from the SCAQMD *CEQA Air Quality Handbook* and US EPA's AP-42. Emissions of NOx, VOC, and PM10 depend upon number and type of operating vehicles and the number of hours of operation. Fugitive emissions depends upon the amount of soil disturbed, type of soil, duration, type of activity (grading, excavation, etc.), haul trips and other factors.

Most improvements in transit and system management (signal synchronization, striping, etc.) do not involve construction and are not expected to generate short-term impacts. However, a large number of the projects in the 2008 RTP would involve construction activities (new goods movement capacity enhancements, arterials, rail systems). It is very likely that some of these projects would be under concurrent construction throughout the region. Short-term construction impacts generated from the implementation of the 2008 RTP are expected to be **significant**. The AQMD has developed thresholds of significance for individual construction projects within their jurisdiction as follows (see **Table 3.2-12)**:

**TABLE 3.2-11**
**SCAQMD AIR QUALITY SIGNIFICANCE THRESHOLDS FOR CONSTRUCTION**[33]

| | Mass Daily Thresholds[a] |
|---|---|
| **Pollutant** | **Construction** [b] |
| NOx | 100 lbs/day |
| VOC | 75 lbs/day |
| PM10 | 150 lbs/day |
| PM2.5 | 55 lbs/day |
| SOx | 150 lbs/day |
| CO | 550 lbs/day |
| Lead | 3 lbs/day |

a SOURCE: SCAQMD CEQA Handbook (AQMD, 1993)
b Construction thresholds apply to both the South Coast Air Basin and Coachella Valley (Salton Sea and Mojave Desert Air Basins).
Key: lbs/day = pounds per day $\mu g/m^3$ = microgram per cubic meter
ppm = parts per million greater than or equal to

These thresholds are established in the 1993 *CEQA Air Quality Handbook* prepared by the AQMD. Other air management districts within the SCAG region have adopted similar thresholds for individual construction projects for criteria pollutants. Project-level analysis conducted for CEQA purposes would estimate construction emissions for each project based on project specifics. Mitigation measures to reduce air quality impacts would be established in project-specific environmental documents. The construction of highways or arterials would be expected to generate a significant amount of construction activity and therefore exceed the significance thresholds established in the *CEQA Handbook*. These impacts would occur in localized areas depending on the construction site locations. Individual projects would be required to implement mitigation measures to reduce construction emissions. Other construction impacts include potential construction-related traffic impacts due to congestion from lane closures. These impacts should be addressed at the project level analysis.

The overall impact of the 2008 RTP due to construction of transportation-related projects would create a **significant** impact.

### *Mitigation Measures*

Mitigation measures include the mitigation measures included in Impact 3.2-1. Also, compliance with SCAQMD Rule 403 (Fugitive Dust) will reduce emissions of fugitive dust from construction activities.[34]

In addition, the following air quality mitigation measures sets forth a program of air pollution control strategies designed to reduce the project's air quality impacts from construction activities.

**Land Clearing/Earth-Moving:**

**MM–AQ.3:** Apply water or dust suppressants to exposed earth surfaces to control emissions.

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[33] Source: http://www.aqmd.gov/ceqa/handbook/signthres.doc.

[34] Source: http://www.aqmd.gov/rules/siprules/sr403.pdf.

**MM-AQ.4:** All excavating and grading activities shall cease during second stage smog alerts and periods of high winds.

**MM-AQ-5:** All trucks hauling dirt, sand, soil, or other loose materials off-site shall be covered or wetted or shall maintain at least two feet of freeboard (i.e., minimum vertical distance between the top of the load and the top of the trailer).

**Paved Surfaces:**

**MM-AQ.6:** All construction roads that have high traffic volumes, shall be surfaced with base material or decomposed granite, or shall be paved or otherwise be stabilized.

**MM-AQ.7:** Public streets shall be cleaned, swept or scraped at frequent intervals or at least three times a week if visible soil material has been carried onto adjacent public roads.

**MM-AQ.8:** Construction equipment shall be visually inspected prior to leaving the site and loose dirt shall be washed off with wheel washers as necessary.

**Unpaved Surfaces:**

**MM-AQ.9:** Water or non-toxic soil stabilizers shall be applied as needed to reduce off-site transport of fugitive dust from all unpaved staging areas and other unpaved surfaces.

**MM-AQ.10:** Traffic speeds on all unpaved surfaces shall not exceed 25 mph.

**Other Construction Mitigation Measures**

**MM-AQ.11:** Low sulfur or other alternative fuels shall be used in construction equipment where feasible.

**MM-AQ.12:** Deliveries related to construction activities that affect traffic flow shall be scheduled during off-peak hours (e.g. 10:00 A.M. and 3:00 P.M.) and coordinated to achieve consolidated truck trips. When the movement of construction materials and/or equipment impacts traffic flow, temporary traffic control shall be provided to improve traffic flow (e.g., flag person).

**MM-AQ.13:** To the extent possible, construction activity shall utilize electricity from power poles rather than temporary diesel power generators and/or gasoline power generators.

**MM-AQ.14:** Revegetate exposed earth surfaces following construction.

**Significance after Mitigation**

After implementation of all feasible mitigation measures and incorporation of project features as described above, activities related to construction of RTP Plan projects, as well as associated regional growth would exceed construction emission thresholds for regional NOx, CO, PM10, SO2, and ROG. Therefore, construction of the 2008 RTP projects and associated growth would have a **significant** and unavoidable impact on regional air quality.

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**Cumulative Impact 3.2-4: Cumulative development would result in on-road emissions discussed in previous impacts as well as train, airplane, ship and stationary and area sources of emissions. All emissions are anticipated to be consistent with applicable AQMPs and SIPs and on-road emissions within regional conformity emission budgets. Thus, consistency with applicable plans would be a less than significant impact. Nonetheless, such cumulative increases in emissions would be significant.**

The regional cumulative analysis assessed the impacts of the 2008 RTP, including consideration of potential indirect effects in conjunction with other plans, programs, projects and policies that affect ambient air quality. Projected long-term emissions are considered to be cumulatively significant if they are not consistent with the local air quality management plans and state implementation plans. Consistency is demonstrated through the conformity analysis.

Regional emissions conformity is achieved if the projected emission inventories are within the budget emissions for each air basin for each milestone year (or if no budgets have been established by the interim build/no build or less than base year tests). In addition to the regional emissions analysis, conformity must show: 1) that the implementation of the Transportation Control Measures (TCM) contained in the SIPs are on schedule; 2) that the Financial Constraint Determination has been adequately prepared; and 3) that the required Interagency Consultation and Public Involvement has been adequately implemented.

The emissions budgets reflected in the AQMPs/SIPs function as the applicable emission budgets for the ozone conformity analysis for all non-attainment areas in the SCAG region. The conformity determinations based on the emission budgets for each air basin in the SCAG region, and conducted as part of the 2008 RTP development process, provide reasonable analysis of cumulative air quality impacts of the Plan. The RTP should conform to the emissions budgets established in each applicable SIP/AQMP. Federal conformity regulations require emissions to be based on the Latest Planning Assumptions which include the latest vehicle data (fleet, age, activity) and latest socio-economic data. A conformity determination must be made for each nonattainment area in the region.

A regional analysis estimates the emissions from the implementation of the 2008 RTP and compares them to the emission budgets identified in the AQMPs/SIPs. If the estimated emissions from the 2008 RTP are greater than the emissions budget then the plan would not conform. In the absence of an emission budget, an interim test, such as the build/no build test is applied. In order to pass the build/no-build test, it must be demonstrated that emissions in the build scenario are less than or equal to the no-build scenario depending upon the non-attainment designation.

The applicable emissions budgets in the SCAG region are established by air basin, by air district, by pollutant and by years of analysis (milestone, attainment, and planning horizon years). The conformity analysis is prepared separately from this PEIR and can be found in Appendices of the 2008 RTP. The analysis concludes that the plan conforms to federal and state requirements for meeting attainment goals throughout the SCAG region.

Therefore, cumulative regional air quality impacts are considered to be **less than significant** with respect to consistency with applicable plans.

For purposes of comparison of on-road mobile emissions with other emission sources in the region, and to account for cumulative emissions from growth and other sources the following tables present estimated existing and 2035 emissions (based on data contained in the 2007 AQMP and associated EIR for the year 2030 extrapolated to 2035) for the following emission sources in SCAB (which represents about 70% of emissions in the region): Trains (**Table 3.2-12**), Aircraft (**Table 3.2-13**), Ships and Commercial Boats (**Table 3.2-14**), Other Mobile Sources -- such as farm equipment, off-road vehicles, fuel handling, etc. (**Table 3.2-15**), and Stationary and Area Sources which includes all other emission sources including residential, commercial and industrial emissions and construction emissions, including RTP projects (**Table 3.2-16**).

Forecasts of emissions for trains and aircraft were obtained from the 2007 SCAQMP.[35] According to documentation on the SCAQMD website[36] the train emission estimates reflect projected emission reductions from the 1998 South Coast MOU and the 2005 CARB/Railroad MOU with two major locomotive operators. The demographic forecasts (i.e., population, housing employment by industry, etc.) used to project growth were developed by SCAG for the 2007 AQMP for 2002, 2005 and five year increments to 2030.

The aircraft emissions are based on operations at 48 airports located within the South Coast District boundaries. The FAA's Emissions and Dispersion Modeling System (EDMS) was used to calculate the emissions from commercial aircraft. Weighted generic emission factors were combined with landing and take off activity data to estimate emissions for general aviation military and air taxi operations where aircraft specific data was not readily available. SCAG's airport specific projections of million air passengers (MAP) were used to support estimates of emission inventories in 2010, 2020 and 2030.

35 Final 2007 AQMP, Appendix III, Base and Future Year Emission Inventories, June 2007.
36 http:/www.aqmd.gov/aqmp/07aqmp/draftfinal/chapter03.pdf.

**TABLE 3.2-12**
**FINAL 2007 AQMP FORECAST OF ANNUAL AVERAGE TRAIN EMISSIONS IN THE SOUTH COAST AIR BASIN (TONS/DAY)**

| Year | TOG | VOC | CO | NOx | SOx | TSP | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| 2008 | 2.97 | 2.48 | 7.06 | 28.95 | 0.14 | 0.86 | 0.85 | 0.78 |
| 2023 | 3.19 | 2.66 | 9.92 | 27.63 | 0.03 | 0.90 | 0.89 | 0.82 |
| 2030 | 3.41 | 2.85 | 11.99 | 32.86 | 0.03 | 0.95 | 0.95 | 0.87 |
| 2035* | 3.58 | 2.99 | 13.73 | 37.19 | 0.03 | 0.99 | 1.00 | 0.91 |

* Calculated based on the annualized rate of change observed between 2023 and 2030.

**TABLE 3.2-13**
**FINAL 2007 AQMP FORECAST OF ANNUAL AVERAGE AIRCRAFT EMISSIONS IN THE SOUTH COAST AIR BASIN (TONS/DAY)**

| Year | TOG | VOC | CO | NOx | SOx | TSP | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| 2008 | 9.07 | 8.10 | 58.31 | 17.42 | 1.68 | 0.97 | 0.91 | 0.89 |
| 2023 | 14.64 | 13.08 | 85.14 | 29.34 | 2.69 | 1.28 | 1.19 | 1.17 |
| 2030 | 17.63 | 15.75 | 98.23 | 35.67 | 3.21 | 1.42 | 1.33 | 1.30 |
| 2035* | 20.13 | 17.98 | 108.80 | 41.01 | 3.64 | 1.53 | 1.44 | 1.40 |

* Calculated based on the annualized rate of change observed between 2023 and 2030.

**TABLE 3.2-14**
**FINAL 2007 AQMP FORECAST OF ANNUAL AVERAGE SHIP AND COMMERCIAL BOAT EMISSIONS IN THE SOUTH COAST AIR BASIN (TONS/DAY)**

| Year | TOG | VOC | CO | NOx | SOx | TSP | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| 2008 | 4.31 | 3.61 | 10.35 | 76.95 | 20.10 | 4.18 | 4.05 | 3.90 |
| 2023 | 4.92 | 4.13 | 14.57 | 116.19 | 33.05 | 5.94 | 5.72 | 5.55 |
| 2030 | 6.13 | 5.13 | 17.69 | 152.49 | 48.64 | 8.31 | 8.00 | 7.77 |
| 2035* | 7.17 | 5.99 | 20.32 | 185.17 | 64.10 | 10.56 | 10.17 | 9.88 |

* Calculated based on the annualized rate of change observed between 2023 and 2030.

**TABLE 3.2-15**
**FINAL 2007 AQMP FORECAST OF ANNUAL AVERAGE OTHER MOBILE SOURCES (NOT INCLUDING AIRCRAFT, RAIL & SHIP) EMISSIONS IN THE SOUTH COAST AIR BASIN (TONS/DAY)**

| Year | TOG | VOC | CO | NOx | SOx | TSP | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| 2008 | 150.97 | 138.37 | 904.94 | 208.24 | 0.25 | 15.39 | 14.90 | 12.99 |
| 2023 | 108.10 | 100.46 | 1,009.67 | 94.74 | 0.33 | 11.18 | 10.33 | 8.23 |
| 2030 | 118.11 | 110.04 | 1,108.64 | 82.51 | 0.39 | 13.62 | 12.39 | 9.61 |
| 2035* | 125.82 | 117.44 | 1,185.22 | 74.75 | 0.44 | 15.68 | 14.11 | 10.74 |

* Calculated based on the annualized rate of change observed between 2023 and 2030.

**TABLE 3.2-16
FINAL 2007 AQMP FORECAST OF ANNUAL AVERAGE STATIONARY & AREA SOURCE EMISSIONS IN THE SOUTH COAST AIR BASIN
(TONS/DAY)**

| Year | TOG | VOC | CO | NOx | SOx | TSP | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|---|
| 2008 | 476.84 | 245.08 | 177.40 | 86.80 | 16.60 | 447.24 | 231.87 | 65.19 |
| 2023 | 504.10 | 276.23 | 186.06 | 74.38 | 16.54 | 513.00 | 265.99 | 73.39 |
| 2030 | 527.34 | 291.47 | 192.01 | 75.99 | 16.78 | 544.12 | 282.21 | 77.42 |
| 2035* | 544.59 | 302.87 | 196.38 | 77.16 | 16.95 | 567.50 | 294.40 | 80.43 |

* Calculated based on the annualized rate of change observed between 2023 and 2030.

Ship emissions are based on separate estimates prepared for ocean-going vessels and harborcraft. ARB updated the marine vessel emissions inventory in 2005 based on 2004 activity data of port of calls by ocean-going vessels. Separate emission estimates were prepared for different modes of operation (i.e., hotelling, maneuvering and transit), engine type (main or auxiliary) and fuel type. Growth rates were extrapolated from changes in 1997-2003 installed power by vessel type and port. The harborcraft inventory was updated in 2004 using vessel population data from the U.S. Coast Guard and the California Department of Fish and Game. CARB adjusted emission factors from the OFFROAD model to account for harborcraft engine cycles. Growth rates are air district specific.

The other mobile source category includes emissions for nine separate sources. In addition to aircraft, rail and ships, the category includes recreational boats, off-road recreational vehicles, off-road farm equipment, farm equipment, fuel storage and handling and truck stops. **Table 3.2-16** provides a summary of the other mobile source category not including aircraft, rail and ship emissions, which are separately presented in **Tables 3.2-13 to 3.2-15**.

Since no forecast for 2035 is currently available for these emissions, the annualized growth rate between 2023 and 2030 was used to project inventory estimates in 2035. It should be noted that this forecast is approximate, as it does not separately account for the effects of fleet turnover, growth and projected controls.

The SCAQMD divides stationary sources into two separate subcategories: point and area. Point sources generally include large emitters with one or more emission sources at a permitted facility with an identified location (e.g., power plants, manufacturing facilities, etc.).[37] Area sources generally include the smaller emission sources that are distributed throughout the region (e.g., home heating, gasoline dispensing, etc.). For 2002, reported data were used for point sources emitting more than 4 tons per year of VOC, NOx, SOx and $PM_{2.5}$ and CO above 100 tons per year. Emissions for a facility were included in the point source category if any of these thresholds were exceeded.

The area source emission estimates were jointly developed by CARB and the SCAQMD for approximately 350 source categories. Special studies were conducted to improve the accuracy

[37] http:/www.aqmd.gov/aqmp/07aqmp/draftfinal/chapter03.pdf.

of several of these categories (e.g., consumer products, architectural coatings, fugitive dust, gasoline dispensing, etc.). In general these studies updated the emission factors to account for the benefits of new rules and base year activity estimates to account for the results of more recent surveys (e.g., sales, product use, etc.)

Industry growth factors for 2002, 2005 and five year increments through 2030 were provided by SCAG. SCAG's demographic forecasts (e.g., housing units, population, etc.) were used as growth surrogates for many of the area source categories. **Table 3.2-16** provides a listing of total stationary and area source annual average emission forecasts for 2008, the base year of the RTP, selected interim years and 2035. Values for 2023 and 2030 are presented as they represent the farthest projection years. Since no forecast for 2035 is currently available, the annualized growth rate between 2023 and 2030 was used to project inventory estimates in 2035. It should be noted that this forecast is approximate, as it does not separately account for the effects of growth and control factors.

### *Mitigation Measures*

Mitigation measures for Impact 3.2-1 would also address this impact.

#### Significance after Mitigation

After implementation of all feasible mitigation measures the region is anticipated to be able to meet applicable conformity budgets. Thus the impact of consistency with applicable plans would be **less than significant**. Nonetheless, the level of increase in emissions anticipated for the region is considered to be **cumulatively significant** for all pollutants except NOx.

Therefore, construction of the 2008 RTP would have a **significant** and unavoidable impact on regional air quality.

**Impact 3.2-5. The 2008 RTP would result in increased trips and VMT as well as increased growth in the region compared to today, resulting in increases in Greenhouse Gas (GHG) emissions.**

Greenhouse gas (GHG) emissions associated with the RTP are presented in **Table 3.2-17** for 2020 and 2035. GHG emissions were calculated for construction activity[38], mobile sources[39],

[38] Construction emissions were calculated using ARB's URBEMIS2007 Transportation and Land Use Emission Inventory Model.

[39] Mobile source emissions were calculated using ARB's EMFAC2007 Motor Vehicle Emission Inventory Model and the California Climate Action Registry *General Reporting Protocol* (March 2007).

**TABLE 3.2-17**
**2008 RTP GREENHOUSE GAS EMISSIONS BY COUNTY, 2008, 2020, 2035 [1]**

| Area and Source | Carbon Equivalent (Million Metric Tonnes per Year) [2] | | | | |
|---|---|---|---|---|---|
| | Existing (2008) | Future No Project (2020) | 2008 RTP (2020) | Future No Project (2035) | 2008 RTP (2035) |
| **Imperial County** | | | | | |
| Construction | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| Mobile | 1.36 | 1.90 | 1.87 | 2.45 | 2.37 |
| Electricity | 0.59 | 0.93 | 1.06 | 1.17 | 1.16 |
| Natural Gas | 0.37 | 0.59 | 0.67 | 0.74 | 0.73 |
| Total | 2.36 | 3.46 | 3.64 | 4.40 | 4.30 |
| **Los Angeles County** | | | | | |
| Construction | 0.66 | 0.65 | 0.73 | 0.66 | 0.73 |
| Mobile | 42.28 | 46.05 | 45.27 | 51.19 | 49.9 |
| Electricity | 25.88 | 27.79 | 27.94 | 29.73 | 30.12 |
| Natural Gas | 24.38 | 26.25 | 26.39 | 28.11 | 28.50 |
| Total | 93.2 | 100.74 | 100.33 | 109.69 | 109.25 |
| **Orange County** | | | | | |
| Construction | 0.10 | 0.10 | 0.11 | 0.10 | 0.11 |
| Mobile | 13.20 | 14.50 | 14.30 | 15.80 | 15.60 |
| Electricity | 7.72 | 8.50 | 8.43 | 8.84 | 8.90 |
| Natural Gas | 8.65 | 9.55 | 9.46 | 9.93 | 10.00 |
| Total | 29.67 | 32.65 | 32.3 | 34.67 | 34.61 |
| **Riverside County** | | | | | |
| Construction | 0.46 | 0.46 | 0.42 | 0.46 | 0.43 |
| Mobile | 10.49 | 13.38 | 13.29 | 18.10 | 16.54 |
| Electricity | 5.15 | 7.17 | 7.14 | 9.54 | 9.30 |
| Natural Gas | 4.31 | 6.02 | 6.00 | 8.03 | 7.84 |
| Total | 20.41 | 27.03 | 26.85 | 36.13 | 34.11 |
| **San Bernardino County** | | | | | |
| Construction | 0.33 | 0.33 | 0.27 | 0.33 | 0.28 |
| Mobile | 13.13 | 16.85 | 16.42 | 22.68 | 20.41 |
| Electricity | 5.84 | 7.40 | 7.40 | 9.44 | 9.08 |
| Natural Gas | 4.29 | 5.44 | 5.44 | 6.94 | 6.67 |
| Total | 23.59 | 30.02 | 29.53 | 39.39 | 36.44 |
| **Ventura County** | | | | | |
| Construction | 0.09 | 0.09 | 0.09 | 0.05 | 0.06 |
| Mobile | 3.37 | 3.75 | 3.69 | 4.26 | 4.21 |
| Electricity | 2.13 | 2.44 | 2.42 | 2.69 | 2.71 |
| Natural Gas | 1.97 | 2.26 | 2.25 | 2.49 | 2.51 |
| Total | 7.56 | 8.54 | 8.45 | 9.49 | 9.49 |
| **Total Emissions** | 176.79 | 202.44 | 201.10 | 233.77 | 228.20 |
| | | | | | |
| **2008 RTP Compared to No Project** | | | (1.34) | | (5.57) |
| **2008 RTP Compared to Existing** | | | 24.31 | | 51.41 |

NOTES:
1. The table does not include all sources of GHG emissions (e.g., industrial processes, agriculture, etc.).
2. Please refer to Appendix B for a complete description of the methodology used to obtain GHG emissions.

natural gas consumption[40], and electricity generation[41]. The 2008 RTP would result in: 201.10 million metric tonnes of CO2e in 2020 and 228.20 million metric tonnes of CO2e in 2035. This

40 Natural gas emissions were calculated based on emission rates obtained from the California Climate Action Registry *General Reporting Protocol* (March 2007).

would be an increase over existing conditions. **Appendix B** contains a list of Greenhouse Gas mitigation measures recommended by the Attorney General and how they are addressed by the RTP and this PEIR. Appendix B also contains a more detailed description of the methodology used to calculate greenhouse gas emissions. The detailed calculations (over 700 pages) are on file and available for review at SCAG offices.

As previously discussed, the purpose of AB 32 is to reduce statewide GHG emissions to 1990 levels by 2020. Since the SCAG region contributes at least 39 percent of existing GHG emissions in the State, it is vital that SCAG regional GHG emissions be reduced in order for the State to meet this goal. Therefore, for purposes of this analysis, any increase in GHG emissions from existing conditions to RTP conditions would result in a significant impact. GHG emissions in 2020 and 2035 with the 2008 RTP would be substantially greater than existing GHG emissions for the SCAG region. Therefore, unmitigated SCAG GHG emissions would not be consistent with AB 32, and the RTP could result in a significant global warming impact without incorporation of mitigation measures.

**Comparison to the No Project**

As shown in **Table 3.2-17**, Future (2020) No Project conditions would result in 202.44 million metric tonnes of CO2e and Future (2035) No Project conditions would result in 233.77 million metric tonnes of CO2e. The 2008 RTP would result in slightly fewer emissions than under the No Project condition: 201.10 million metric tonnes of CO2e in 2020 and 228.20 million metric tonnes of CO2e in 2035. RTP GHG emissions would be less than Future No Project emissions in both 2020 and 2035. This is due to decreased regional vehicle miles traveled associated with the RTP when compared to No Project conditions.

### *Mitigation Measures*

GHG emissions are generally associated with the combustion of fossil fuel to power motor vehicles and provide energy. As such, the most effective way to reduce GHG emissions is to reduce energy use and associated fossil fuel combustion. Section 3.5 Energy provides a comprehensive list of mitigation measures that would reduce fossil fuel combustion in the SCAG region. Additional measures are as follows:

**MM-AQ.15:** Project sponsors should, where feasible, implement policies for sustainable airport development, management and airfield design to reduce air pollution and GHG emissions from operations, including cargo operations, ground support and access to and from airports (see Los Angeles World Airports Sustainability Vision and Principles and the Green LA Action Plan, hereby incorporated by reference).

**MM.AQ-16:** Project sponsors should, where feasible, implement a green construction policy that could include:

[41] Electricity generation emissions were calculated indirectly as a function of regional electricity use. Emission rates obtained from the California Climate Action Registry *General Reporting Protocol* (March 2007).

- Ensuring that all off-road construction vehicles should be alternative fuel vehicles, or diesel powered vehicles with Tier 3 or better engines or retrofitted/repowered -to meet equivalent emissions standards as Tier 3 engines;
- Using the minimum feasible amount of GHG emitting construction materials;
- Using cement blended with the maximum feasible amount of flyash or other materials that reduce GHG emissions
- Using asphalt with light colored additives and chemical additives that increase reflectivity and therefore reduce contribution to the heat island effect
- Requiring recycling of construction debris to maximum extent feasible
- Incorporating planting of shade trees into construction projects where feasible

**MM.AQ-17:** Local governments should set specific limits on idling time for commercial vehicles, including delivery and construction vehicles.

**Significance after Mitigation**

The degree to which the proposed energy mitigation measures will be implemented is difficult to estimate. Improvements in air pollutant emission standards and increased use of alternative fuels would reduce GHG emissions. However, it is unlikely that mitigation measures would reduce GHG emissions below existing (let alone to 1990 levels as required by AB 32) due to anticipated population growth. As such, the 2008 RTP would result in a **significant** and unavoidable global warming impact.

# References – Air Quality

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