3.3 AIR QUALITY

This section of the Program Environmental Impact Report (PEIR) describes the air quality in the SCAG region, discusses the potential impacts of the proposed 2016 Regional Transportation Plan/Sustainable Communities Strategies ("2016 RTP/SCS," "Project," or "Plan") on air quality, identifies mitigation measures for the impacts, and evaluates the residual impacts. Air quality was evaluated in accordance with Appendix G of the 2015 State California Environmental Quality Act (CEQA) Guidelines. Air quality within the SCAG region was evaluated at a programmatic level of detail, in relation to Air Quality Management Plans for the five air quality districts and the general plans of the six counties and 191 cities within the SCAG region; a review of published and unpublished literature germane to the SCAG region, as well as a review of SCAG's 2012 RTP/SCS PEIR.[1] This analysis focuses on air pollution from on-road motor vehicles in two perspectives: daily emissions and pollutant concentrations. The analysis is based upon air quality modeling, performed by SCAG, using EMFAC2014. Air quality modeling that produces criteria pollutant emissions for the SCAG region and by county is based on SCAG's transportation modeling and network built for the existing conditions and the Plan.

Air quality in the four air basins in the SCAG region—South Coast Air Basin (SCAB), Mojave Desert Air Basin (MDAB), Salton Sea Air Basin (SSAB), and South Central Coast Air Basin (SCCAB) (Ventura County portion)—is a function of the topography, climate, population, and land use. While improved from the 1970s, Southern California has some of the worst air quality in the nation. The American Lung Association's *State of the Air Report*, released in 2015, ranks the Los Angeles-Long Beach metropolitan area as fifth worst in the nation for people at risk for 24-hour $PM_{2.5}$, fifth worst for annual $PM_{2.5}$, and worst for most ozone-polluted cities.[2] Air quality is discussed in greater detail in **Appendix C, *Air Quality and Greenhouse Gas and Climate Change Technical Report***.

Both ozone and particulate matter are known to have negative public health impacts especially for sensitive populations, like children, the elderly, and those with respiratory or cardiovascular health problems. Therefore, the potential for the 2016 RTP/SCS to adversely affect public health was evaluated using cancer risk from diesel particulate matter as a corollary for respiratory health. The analysis of cancer risk was evaluated using the Hot Spots Analysis and Reporting Program (HARP) (version 2) or HARP2 model, consistent with the guidance provided by the California Office of Environmental Health Hazard Assessment (OEHHA) for Human Health Risk Assessment (**Appendix D, *Health Risk Assessment*** [HRA]).[3] Similarly, the analysis acknowledges applicable California legislation and initiatives to improve public health, particularly respiratory health in light of *Research Results on Land Use, Transportation, and Community Design:*[4]

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1 Southern California Association of Governments. April 2012. Final Program Environmental Report: 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy. Available at: http://rtpscs.scag.ca.gov/Pages/Final-2012-PEIR.aspx

2 American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

3 Office of Environmental Health Hazard Assessment. Accessed 19 October 2015. *Air Toxicology and Epidemiology*. Available at: http://oehha.ca.gov/air/hot_spots/hotspots2015.html

4 Active Living Research. Accessed 7 September 2015. *Research Results on Land Use, Transportation, and Community Design.* Available at: http://activelivingresearch.org/land-use-transportation-and-community-design-research-summary-slides

- Residents in walkable neighborhoods are more likely to meet physical activity guidelines.
- Public transit users are more likely to meet Surgeon General recommendations for physical activity. Greater health benefits can be achieved by increasing the amount (duration, frequency, or intensity) of physical activity.

Consistent with the environmental justice analysis in the 2016 RTP/SCS, this PEIR considers the potential benefits and impacts on sensitive receptors and low-income and minority populations located in the vicinity of transportation facilities (e.g., the potential to increase or decrease diesel particulate emissions).

Definitions

Concentrations: The amount of pollutant material per volumetric unit of air, measured in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The following discussion identifies the pollutants included in this analysis.

Criteria Pollutants: Health-based air quality standards have been established by California and the federal government for the following criteria pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), particulate matter 10 microns or less in diameter (PM_{10}), and lead (Pb). California also includes standards for hydrogen sulfide, vinyl chloride, sulfates, and visibility.

The following describes the criteria pollutants and summarizes the health effects of each criteria pollutant:[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. 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 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.

[5] South Coast Air Quality Management District. February 2013. *Final Environmental Impact Report for the 2012 Air Quality Management Plan*. Available at: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-(february-2013)/final-ceqa-eir/2012-program-environmental-impact-report-ch-3-2.pdf?sfvrsn=2

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 preterm births and heart abnormalities.

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 Southern California over the past three 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 bone tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

Nitrogen Dioxide and Nitric Oxide (NO_x): NO_2 is a reddish-brown gas with a bleach-like odor. Nitric oxide (NO) is a colorless gas, formed from the nitrogen and oxygen 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 NO_2. NO_2 is responsible for the brownish tinge of polluted air. The two gases, NO and NO_2, are referred to collectively as NO_x. In the presence of sunlight, NO_2 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 (HNO_3), which reacts further to form nitrates, components of $PM_{2.5}$ and PM_{10}.

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 NO_2 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 NO_2 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 subgroups. More recent studies have found associations between NO_2 exposures and cardiopulmonary mortality, decreased lung function, respiratory symptoms, and emergency room asthma visits.

In animals, exposure to levels of NO_2 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 NO_2.

Ozone (O_3): Ozone, 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 (e.g., from 0.03 ppm to 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 that accounts for its damaging effects on materials, plants, and human health at the earth's surface.

The propensity of ozone for reacting with organic materials causes it to be damaging to living cells. 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 that includes 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: 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 [PM_{10}]) consists of suspended particles or droplets 10 micrometers or smaller in diameter. Some sources of PM_{10}, like pollen and windstorms, are naturally occurring. However, in populated areas, most PM_{10} is caused by road dust, diesel soot, combustion products, abrasion of tires and brakes, and construction activities. Sources of fine particulate matter (particulate matter less than about 2.5 micrometers in diameter [$PM_{2.5}$]) include fuel combustion from automobiles, power plants, wood burning, industrial processes, and diesel-powered vehicles such as buses and trucks. These fine particles are also formed in the atmosphere when gases such as sulfur dioxide, NO_X, and ROGs are transformed in the air by chemical reactions.

$PM_{2.5}$ and PM_{10} pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. $PM_{2.5}$ and PM_{10} can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections. Children, the elderly, exercising adults, and those suffering from asthma are especially vulnerable to adverse health effects of PM_{10} and $PM_{2.5}$.

A consistent correlation between elevated ambient fine particulate matter (PM_{10} and $PM_{2.5}$) 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 ($PM_{2.5}$) and increased mortality, reduction in lifespan, 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. In addition to children, the elderly, and people with preexisting respiratory and/or cardiovascular disease appear to be more susceptible to the effects of PM_{10} and $PM_{2.5}$.

Sulfates: Sulfates (SO_x) are chemical compounds which contain the sulfate ion and are part of the mixture of solid materials which make up PM_{10}. Most of the sulfates in the atmosphere are produced by oxidation of SO_2. Oxidation of sulfur dioxide yields sulfur trioxide (SO_3) 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 PM_{10} and $PM_{2.5}$.

Most of the health effects associated with fine particles and SO_2 at ambient levels are also associated with SO_x. Thus, both mortality and morbidity effects have been observed with an increase in ambient SO_x concentrations. However, efforts to separate the effects of SO_x 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 nonacidic particles like ammonium sulfate. Whether the effects are attributable to acidity or to particles remains unresolved.

A key criteria pollutant, SO_2 (sulfur dioxide), is a type of sulfate. SO_2 is a colorless gas with a sharp odor. It reacts in the air to form sulfuric acid (H_2SO_4), which contributes to acid precipitation, and sulfates, which are components of PM_{10} and $PM_{2.5}$. Most of the SO_2 emitted into the atmosphere is produced by burning sulfur containing fuels.

Exposure of a few minutes to low levels of SO_2 can result in airway constriction in some asthmatics. All asthmatics are sensitive to the effects of SO_2. 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 SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

Animal studies suggest that despite SO_2 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 SO_2 levels. In these studies, efforts to separate the effects of SO_2 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.

Vinyl Chloride: Vinyl chloride is a colorless, flammable gas at ambient temperature and pressure. It is also highly toxic and is classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as A1 (confirmed carcinogen in humans) and by the International Agency for Research on Cancer (IARC) as 1 (known to be a human carcinogen). At room temperature, vinyl chloride is a gas with a sickly sweet odor that is easily condensed. However, it is stored as a liquid. Due to the hazardous nature of vinyl chloride to human health there are no end products that use vinyl chloride in its monomer form. Vinyl chloride is a chemical intermediate, not a final product. It is an important industrial chemical chiefly used to produce polymer polyvinyl chloride (PVC). The process involves vinyl chloride liquid fed to polymerization reactors where it is converted from a monomer to a polymer PVC. The final product of the polymerization process is PVC in either a flake or pellet form. Billions of pounds of PVC are sold on the global market each year. From its flake or pellet form, PVC is sold to companies that heat and mold the PVC into end products such as PVC pipe and bottles.

Visibility*:* With the exception of Lake County, which is designated in attainment, all of the air districts in California are currently designated as unclassified with respect to the California Ambient Air Quality Standards (CAAQS) for visibility reducing particles. (A pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.)

Since deterioration of visibility is one of the most obvious manifestations of air pollution and plays a major role in the public's perception of air quality, the state of California has adopted a standard for visibility or visual range. Until 1989, the standard was based on visibility estimates made by human observers. The standard was changed to require measurement of visual range using instruments that measure light scattering and absorption by suspended particles. The visibility standard is based on the distance that atmospheric conditions allow a person to see at a given time and location. Visibility reduction from air pollution is often due to the presence of sulfur and nitrogen oxides, as well as particulate matter. Visibility degradation occurs when visibility reducing particles are produced in sufficient amounts such that the extinction coefficient is greater than 0.23 inverse kilometers (to reduce the visual range to less than 10 miles) at relative humidity less than 70 percent, 8-hour average (from 10:00 a.m. to 6:00 p.m.) according to the state standard.

Volatile organic compounds (VOCs)*:* Reactive organic gases (ROGs) are referred to as reactive organic compounds (ROCs) or volatile organic compounds (VOCs). ROGs are compounds composed primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Adverse effects on human health are not caused directly by ROGs, but rather by reactions of ROGs to form secondary air pollutants, including ozone. ROGs themselves are not criteria pollutants; however, they contribute to formation of ozone. It should be noted that there are no state or national ambient air quality standards for VOCs because they are not classified as criteria pollutants. VOCs are regulated, however, because limiting VOC emissions reduces the rate of photochemical reactions that contribute to the formation of ozone. VOCs are also transformed into organic aerosols in the atmosphere, contributing to higher PM_{10} and lower visibility levels.

Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations of VOCs because of interference with oxygen uptake. In general, ambient VOC concentrations in the atmosphere are suspected to cause coughing, sneezing, headaches, weakness, laryngitis, and bronchitis, even at low concentrations. Some hydrocarbon components classified as VOC emissions are thought or known to be hazardous. Benzene, for example, one hydrocarbon component of VOC emissions, is known to be a human carcinogen.

Emissions: The quantity of pollutants released into the air, measured in pounds per day (ppd) or tons per day (tpd).

Toxic Air Contaminants (TACs): 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. TACs are also defined as an air pollutant that may increase a person's risk of developing cancer and/or other serious health effects; however, the emission of a toxic chemical does not automatically create a health hazard. Other factors, such as the amount of the chemical, its toxicity, how it is released into the air, the weather, and the terrain, all influence whether the emission could be hazardous to human health. Toxic air contaminants can result from manufacturing industries, automobile repair facilities, and diesel particulate emissions associated with heavy-duty equipment operations. TACs 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 exhaust and may exist as PM_{10} and $PM_{2.5}$ or as vapors (gases). TACs include metals, other particles, gases absorbed by particles, and certain vapors from fuels and other sources.

TACs increase the likelihood of health problems and can cause ecological impacts. The resultant health effects depend on the pollutant, exposure level, site conditions, and characteristics of the populations affected. 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.

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule in 2007 on the Control of Hazardous Air Pollutants from Mobile Sources,[6] and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/). In addition, EPA identified seven

6 *Federal Register*. 26 February 2007. 72(37): 8430.

compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While the Federal Highway Administration (FHWA) considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. The 2007 EPA rule mentioned above requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines.[7]

Air Dispersion*:* Air dispersion is defined as how air pollutants travel through ambient air. Toxic Air Contaminants/Mobile Source Air Toxics (TACs/MSATs) impact those located closest to the emission sources more than those located further away. A California law passed in 2003 (Public Resources Code Section 21151.8) prohibits the siting of a school within 500 feet of a freeway unless "the school district determines, through analysis based on appropriate air dispersion modeling, that the air quality at the proposed site is such that neither short-term nor long-term exposure poses significant health risks to pupils." The U.S. EPA has issued a number of regulations that will dramatically decrease MSATs through cleaner fuels and cleaner engines.

Diesel Particulate Matter (diesel PM)*:* According to the California Air Resources Board (CARB), most toxic air emissions are from motor vehicles and the particulate matter from the exhaust of diesel-fueled engines.[8] In 1998, the OEHHA completed a comprehensive health assessment of diesel exhaust. This assessment formed the basis for a decision by the CARB to formally identify particles in diesel exhaust as a TAC that may pose a threat to human health.[9]

Diesel particulate matter is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is commonly found throughout the environment and is estimated by EPA's National Scale Assessment to contribute to the human health risk in New England. Diesel exhaust is composed of two phases, either gas or particle, and both phases contribute to the risk. The gas phase is composed of many of the urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, and polycyclic aromatic hydrocarbons. The particle phase also has many different types of particles that can be classified by size or composition. The size of diesel particulates that are of greatest health concern are those that are in the categories of fine, and ultra-fine particles. The composition of these fine and ultrafine particles may be composed of elemental carbon with absorbed compounds such as organic compounds, sulfate, nitrate, metals, and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines: the on-road diesel engines of trucks, buses, and cars and the off-road diesel engines that include locomotives, marine vessels, and heavy-duty equipment.[10] People living and working in urban and industrial areas are more likely to be exposed to this pollutant. Those spending time on or near roads and freeways, truck loading and unloading operations, operating diesel-powered

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7 Federal Highway Administration. 6 December 2012. *Memorandum. Information: Interim Guidance on Mobile Source Air Toxic Analysis in NEPA*. Available at: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/aqintguidmem.cfm

8 California Air Resources Board. Accessed 8 September 2015. *Reducing Toxic Air Pollutants in California's Communities*. Available at: http://www.arb.ca.gov/toxics/brochure.pdf

9 Office of Environmental Health Hazard Assessment. Accessed 8 September 2015. *Health Effects of Diesel Exhaust*. Available at: http://oehha.ca.gov/public_info/facts/dieselfacts.html

10 U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. April 24, 2014. Available at: http://www.epa.gov/region1/eco/airtox/diesel.html

machinery, or working near diesel equipment face exposure to higher levels of diesel exhaust and face higher health risks.[11]

The most common exposure pathway is breathing the air that contains the diesel particulate matter. The fine and ultrafine particles are respirable, which means that they can avoid many of the human respiratory system defense mechanisms and enter deeply into the lung. In the National Scale Assessment, there are several steps used to characterize public health risks. For diesel particulate matter, not all of the steps could be completed but a qualitative assessment was provided that provided modeling estimates of population exposures. The estimated population exposure concentrations for diesel particulate matter were the highest exposure concentrations in all of the New England states. EPA has medium confidence in the overall NATA estimate for diesel particulate exposure based on the emissions and exposure modeling. Exposure to diesel particulate matter comes from both on road and off road engine exhaust that is either directly emitted from the engines or aged through lingering in the atmosphere.[12]

Diesel exhaust causes health effects from both short-term or acute exposures and also long-term chronic exposures, such as repeated occupational exposures. The type and severity of health effects depends upon several factors including the amount of chemical you are exposed to and the length of time you are exposed. Individuals also react differently to different levels of exposure. There is limited information on exposure to just diesel particulate matter but there is enough evidence to indicate that inhalation exposure to diesel exhaust causes acute and chronic health effects.[13]

Acute exposure to diesel exhaust may cause irritation to the eyes, nose, throat, and lungs and some neurological effects such as lightheadedness. Acute exposure may also elicit a cough or nausea as well as exacerbate asthma. Chronic exposure in experimental animal inhalation studies have shown a range of dose-dependent lung inflammation and cellular changes in the lung, and there are also diesel exhaust immunological effects. Based upon human and laboratory studies, there is considerable evidence that diesel exhaust is a likely carcinogen. Human epidemiological studies demonstrate an association between diesel exhaust exposure and increased lung cancer rates in occupational settings.[14] The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. Numerous studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks and premature deaths among those suffering from respiratory problems. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can also reduce lung function in children. For the average Californian, 70 percent of cancer risk from breathing toxic air pollutants stem from diesel exhaust particles.[15]

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11 Office of Environmental Health Hazard Assessment. Accessed 8 September 2015. *Health Effects of Diesel Exhaust*. Available at: http://oehha.ca.gov/public_info/facts/dieselfacts.html

12 U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. April 24, 2014. Available at: http://www.epa.gov/region1/eco/airtox/diesel.html

13 U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. April 24, 2014. Available at: http://www.epa.gov/region1/eco/airtox/diesel.html

14 U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. April 24, 2014. Available at: http://www.epa.gov/region1/eco/airtox/diesel.html

15 Office of Environmental Health Hazard Assessment. Accessed 8 September 2015. *Health Effects of Diesel Exhaust*. Available at: http://oehha.ca.gov/public_info/facts/dieselfacts.html

EPA's National Scale Assessment uses several types of health hazard information to provide a quantitative "threshold of concern" or a health benchmark concentration at which it is expected that no adverse health effects occur at exposures to that level. Health effects information on carcinogenic, short- and long term non-carcinogenic end points are used to establish selective protective health levels to compare to the modeled exposures levels. Unfortunately the exposure response data in human studies are considered too uncertain to develop a carcinogenic unit risk for EPA's use. There is a Reference Concentration (RFC) that is used as a health benchmark protective of chronic noncarcinogenic health effects, but it is for diesel exhaust and not specifically set for diesel particulate matter, which is what was modeled in NATA. The RFC for diesel exhaust, which includes diesel particulate matter is 5 $\mu g/m^3$. This value is similar to the National Ambient Air Quality Standard established for fine particulate matter, which is 15 μ/m^3.[16]

3.3.1 REGULATORY FRAMEWORK

Federal

Federal Clean Air Act

Congress passed the first major Clean Air Act (CAA) in 1970 (42 U.S. Code [USC] Sections 7401 et seq.). This Act gives the EPA broad responsibility for regulating motor vehicle emissions from many sources of air pollution from mobile to stationary sources. Pursuant to the CAA, the EPA is authorized to regulate air emissions from mobile sources like heavy-duty trucks, agricultural and construction equipment, locomotives, lawn and garden equipment, and marine engines; and stationary sources such as power plants, industrial plants, and other facilities. The CAA sets National Ambient Air Quality Standards (NAAQS) for the six most common air pollutants to protect public health and public welfare. These pollutants include particulate matter, ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. For each pollutant, the EPA designates an area as attainment for meeting the standard or nonattainment for not meeting the standard. A maintenance designation entails an area that was previously designated as nonattainment but is currently designated as attainment. The CAA directs states to develop state implementation plans (SIPs), applicable to appropriate industrial sources in the state, in order to achieve these standards.

CAA Section 112(f) and 112(d): National Emission Standards for Hazardous Air Pollutants (NESHAPs)

Section 112 of the CAA addresses emissions of hazardous air pollutants. Prior to 1990, CAA established a risk-based program under which only a few standards were developed. The 1990 CAAA revised Section 112 to first require issuance of technology-based standards for major sources and certain area sources. "Major sources" are defined as a stationary source or group of stationary sources that emit or have the potential to emit 10 tons per year or more of a hazardous air pollutant or 25 tons per year or

[16] U.S. Environmental Protection Agency. 24 April 2014. *Diesel Particulate Matter*. April 24, 2014. Available at: http://www.epa.gov/region1/eco/airtox/diesel.html

more of a combination of hazardous air pollutants. An "area source" is any stationary source that is not a major source.[17]

For major sources, Section 112 requires that EPA establish emission standards that require the maximum degree of reduction in emissions of hazardous air pollutants. These emission standards are commonly referred to as "maximum achievable control technology" or MACT standards. Eight years after the technology-based MACT standards are issued for a source category, EPA is required to review those standards to determine whether any residual risk exists for that source category and, if necessary, revise the standards to address such risk.[18]

The Risk and Technology Review (RTR) is a combined effort to evaluate both risk and technology as required by the CAA after the application of MACT standards. Section 112(f) of the CAA requires EPA to complete a report to Congress that includes a discussion of methods the EPA would use to evaluate the risks remaining after the application of MACT standards. These are known as residual risks. EPA published the Residual Risk Report to Congress (PDF) in March 1999. Section 112(f)(2) directs EPA to conduct risk assessments on each source category subject to MACT standards, and to determine if additional standards are needed to reduce residual risks. Section 112(d)(6) of the CAA requires EPA to review and revise the MACT standards, as necessary, taking into account developments in practices, processes and control technologies.[19]

National Ambient Air Quality Standards (NAAQS)

The federal CAA required the U.S EPA to establish NAAQS. The NAAQS set primary standards and secondary standards for specific air pollutants (**Table 3.3.1-1, *National Ambient Air Quality Standards***). Primary standards define limits for the intention of protecting public health, which include sensitive populations such as asthmatics, children, and the elderly. Secondary Standards define limits to protect public welfare to include protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

[17] U.S. Environmental Protection Agency. 13 March 2015. *Summary of the Clean Air Act*. Available at: http://www2.epa.gov/laws-regulations/summary-clean-air-act

[18] U.S. Environmental Protection Agency. 13 March 2015. *Summary of the Clean Air Act*. Available at: http://www2.epa.gov/laws-regulations/summary-clean-air-act

[19] U.S. Environmental Protection Agency. Accessed 18 August 2015. *Risk and Technology Review*. Available at: http://www.epa.gov/ttn/atw/rrisk/rtrpg.html

TABLE 3.3.1-1
NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant		Primary/Secondary	Averaging Time	Level
Carbon monoxide		Primary	8 hours	9 ppm
			1 hour	35 ppm
Lead		Primary and secondary	Rolling 3-month average	0.15 µg/m^3
Nitrogen dioxide		Primary	1 hour	100 ppb
		Primary and secondary	Annual	53 ppb
Ozone		Primary and secondary	8 hours	0.075 ppm
Particulate matter	$PM_{2.5}$	Primary	Annual	12 µg/m^3
		Secondary	Annual	15 µg/m^3
		Primary and secondary	24 hours	35 µg/m^3
	PM_{10}	Primary and secondary	24 hours	150 µg/m^3
Sulfur dioxide		Primary	1 hour	75 ppb
		Secondary	3 hours	0.5 ppm

SOURCE:
California Air Resources Board. 4 June 2013. *Ambient air quality standards*. Available at: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

State Implementation Plan (SIP)/ Air Quality Management Plans (AQMPs)

A SIP is required by the EPA to ensure compliance with the NAAQS. States must develop a general plan to maintain air quality in areas of attainment and a specific plan to improve air quality for areas of nonattainment. SIPs are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations, and federal controls. The SIP verifies that the state has a proper air quality management program that adheres to or strives to reach the most up to date emissions requirements. The 1990 amendments to the federal CAA set deadlines for attainment based on the severity of an area's air pollution problem. In adherence to CAA Section 172, states must adopt additional regulatory programs for nonattainment areas. Particularly in California, the SIP not only complies with NAAQS, but also the more stringent CAAQS.

AQMPs are required to ensure compliance with the state and federal requirements. AQMPs contain scientific information and use analytical tools to demonstrate a pathway towards achieving attainment for the criteria air pollutants. Within the SCAG region, five air districts—SCAQMD, Mojave Desert Air Quality Management District (MDAQMD), Imperial County Air Pollution Control District (ICAPCD), Antelope Valley Air Quality Management District (AVAQMD), and the Ventura County Air Pollution Control District (VCAPCD)—are responsible for developing the AQMPs.[20] The approval process begins when the regional air districts submit their AQMPs to the CARB. CARB is the lead agency and responsible agency for submitting the SIP to the EPA. CARB forwards SIP revisions to the EPA for

[20] Southern California Association of Governments. Accessed 7 April 2015. *Air Quality Management Plans.* Available at: http://www.scag.ca.gov/programs/Pages/ManagementPlans.aspx

approval and publication in the *Federal Register*. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220, lists all of the items included in the California SIP.

Transportation Conformity

Transportation conformity is required under federal 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 nonattainment, and those redesignated to attainment after 1990 ("maintenance areas" with plans developed under CAA Section 175A) for the following transportation-related criteria pollutants: ozone, particulate matter ($PM_{2.5}$ and PM_{10}), CO, and NO_2. 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. Conformity requires reporting on the timely implementation of Transportation Control Measures (TCMs) in ozone nonattainment areas designated as serious or worse, thus reinforcing the link between AQMP/SIPs and the transportation planning process. TCMs are expected to be given funding priority and to be implemented on schedule, and in the case of any delays, any obstacles to implementation have been or are being overcome. In the SCAG region, there are two areas for which the ozone SIPs contain TCMs: SCAB and the Ventura County portion of SCCAB. (It is noted that the Ventura County SIP does not claim emission reduction credits from TCM projects. They have been included to assist transportation and air quality agencies to identify projects that have the potential of reducing vehicle emissions, vehicle trips, and vehicle miles traveled.)

Federal CAA Rules

The mobile and stationary sources of emissions are subject to different rules and regulations. For the mobile sources, the rules apply to cars, trucks, buses, recreational vehicles, engines, generators, farm and construction machines, lawn and garden equipment, marine engines, and locomotives. In addition, the compositions of fuels used to operate mobile sources are regulated to help reduce harmful emissions. For stationary resources including factories and chemical plants, pollution control equipment are installed to meet specific emission limits set under the CAA. The New Source Review (NSR) and Prevention of Significant Deterioration (PSD) require large industrial operators such as coal-fired power, acid, glass, and cement plants and petroleum refineries to make modifications to existing facilities or install new controls resulted in emissions of pollutants on new facilities to reduce degradation and harm against public health. EPA works with its federal partners through CAA to ensure compliance with rules through active monitoring and to make sure that the regulated community obeys environmental laws/regulations through on-site inspections and record reviews that lead to enforcement in order to meet environmental regulatory requirements.

Mobile Source Air Toxics (MSAT) Modeling and Programs

MOVES2014. In 2010, the EPA released the emission model, the Motor Vehicle Emissions Simulator (MOVES). On February 8, 2011, EPA issued guidance on "Using the MOVES and Emission Factors (EMFAC) Models in NEPA Evaluation" that recommended a two-year grace period be applied to project-level emissions analysis for NEPA purposes. At the end of this grace period, that is, beginning December 20, 2012, Lead Agencies should use MOVES to conduct emissions analysis for NEPA purposes. To prepare for this transition, FHWA is updating the September 2009 Interim Guidance to incorporate the analysis conducted using MOVES. Based on FHWA's analysis using MOVES2010 diesel particulate matter (diesel PM) has become the dominant MSAT of concern. MOVES2014, the latest version of MOVES, was released in October 2014, and incorporates the Tier 3 Rule and other EPA rulemakings since the last MOVES release.

The U.S. EPA has adopted several mobile source emission control programs such as:[21]

Control of Hazardous Air Pollutants from Mobile Sources. In February 2007, EPA finalized this rule to reduce hazardous air pollutants from mobile sources. The rule limits the benzene content of gasoline and reduces toxic emissions from passenger vehicles and gas cans. EPA estimates that in 2030 this rule would reduce total emissions of mobile source air toxics by 330,000 tons and VOC emissions (precursors to ozone and PM2.5) by over 1 million tons.

Heavy-Duty Onboard Diagnostic Rule (74 FR 8310). In February 2009, the EPA published a final rule, requiring that these advanced emissions control systems be monitored for malfunctions via an onboard diagnostic system (OBD), similar to those systems that have been required on passenger cars since the mid-1990s. This final rule will require manufacturers to install OBD systems that monitor the functioning of emission control components and alert the vehicle operator to any detected need for emission related repair.

Small SI and Marine SI Engine Rule (73 FR 25098). Published October 2008, these exhaust emission standards applied starting in 2010 for new marine spark-ignition (SI) engines, including first-time EPA standards for sterndrive and inboard engines. The exhaust emission standards applied starting in 2011 and 2012 for different sizes of new land based, spark-ignition engines at or below 19 kilowatts (kW). These small engines are used primarily in lawn and garden applications. Estimated annual nationwide reductions are anticipated to be 604,000 tons of volatile organic hydrocarbon emissions, 132,200 tons of NO_X emissions, and 5,500 tons of directly emitted particulate matter ($PM_{2.5}$) emissions.

Locomotive and Commercial Marine Rule (66 FR 5002). Published May 2008, the controls apply to all types of locomotives, including line-haul, switch, and passenger, and all types of marine diesel engines below 30 liters per cylinder displacement, including commercial and recreational, propulsion and auxiliary. The near-term program, which started in 2009, includes new emission limits for existing locomotives and marine diesel engines that apply when they are remanufactured, and take effect as soon as certified remanufacture systems are available. The long-term emissions standards for newly-built locomotives and marine diesel engines are based on the application of high-efficiency catalytic after-treatment technology. These standards take effect in 2015 for locomotives and in 2014 for marine diesel engines.

Clean Air Nonroad Diesel Rule (65 FR 6698). Published June 2004, this comprehensive national program regulates nonroad diesel engines and diesel fuel as a system. New engine standards took effect in the 2008 model year, phasing in over a number of years. These standards are based on the use of advanced exhaust emission control devices.

Heavy-duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (66 FR 5002). Published January 2001, the EPA established a comprehensive national control program to

[21] U.S. Environmental Protection Agency. 26 June 2014. *Mobile Source Air Toxics*. Available at: http://www.epa.gov/otaq/toxics.htm

regulate the heavy-duty vehicle and its fuel as a single system. As part of this program, new emission standards took effect in model year 2007, and apply to heavy-duty highway engines and vehicles. These standards are based on the use of high-efficiency catalytic exhaust emission control devices or comparably effective advanced technologies.

New Source Performance Standards (NSPS) for Stationary Engines. Nonroad diesel engines are used in excavators and other construction equipment, farm tractors and other agricultural equipment, heavy forklifts, airport ground service equipment, and utility equipment such as generators, pumps, and compressors.[22] The first set of emission regulations, known as Tier 1, was published in 1996. With each successive tier of regulations, the permitted levels of nitrogen oxides and particulate matter, the two main pollutants from diesel engines, have gone down significantly. Tier 4 is a more than 95 percent reduction in tailpipe emission levels compared with nonregulated amounts. Tier 4 final requirements, which require manufactures to produce new engines with advanced emission control technologies, will be phased-in for all engines by 2017.[23]

State

California Clean Air Act of 1988

The California CAA of 1988 (Chapter 1568, Statutes of 1988) requires all air pollution control districts in the state to aim to achieve and maintain state ambient air quality standards for ozone, carbon monoxide, and nitrogen dioxide by the earliest practicable date and to develop plans and regulations specifying how the districts will meet this goal. There are no planning requirements for the state PM_{10} standard. The CARB, which became part of the California Environmental Protection Agency (Cal/EPA) in 1991, is responsible for meeting state requirements of the federal CAA, administrating the California CAA, and establishing the CAAQS. The California CAA, amended in 1992, requires all AQMDs in the state to achieve and maintain the CAAQS. The CAAQS are generally stricter than national standards for the same pollutants, but there is no penalty for nonattainment. California has also established state standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles, for which there are no national standards.

California Ambient Air Quality Standards

The federal CAA permits states to adopt additional or more protective air quality standards if needed. California has set standards for certain pollutants, such as particulate matter and ozone, which are more protective of public health than respective federal standards (**Table 3.3.1-2, *California Ambient Air Quality Standards***). California has also set standards for some pollutants that are not addressed by federal standards.

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22 U.S. Environmental Protection Agency. 11 August 2014. *Nonroad Diesel Engines*. Available at: http://www.epa.gov/otaq/nonroad-diesel.htm

23 Natekar, Aniruddha, and Matthew Menzel. Accessed 8 September 2015. *The Impact of Tier 4 Emission Regulations on the Power Generation Industry.* Available at: https://www.cumminspower.com/www/literature/technicalpapers/PT-9010-Tier4EmissionRegImpact.pdf

TABLE 3.3.1-2
CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant		Averaging Time	Level
Carbon monoxide		8 hours	9 ppm
		1 hour	20 ppm
Lead		30-day average	1.5 μg/m^3
Nitrogen dioxide		1 hour	0.18 ppm
		Annual	0.03 ppm
Ozone		8 hours	0.07 ppm
		1 hour	0.09 ppm
Particulate matter	$PM_{2.5}$	Annual	12 μg/m^3
	PM_{10}	24 hours	50 μg/m^3
		Annual	20 μg/m^3
Sulfur dioxide		1 hour	0.25 ppm
		24 hours	0.04 ppm
Sulfates		24 hours	25 μg/m^3
Hydrogen sulfide		1 hour	0.03 ppm
Vinyl chloride		24 hours	0.01 ppm
Visibility Reducing Particles		Extinction coefficient of 0.23 per km – visibility of 10 miles or more due to particles when relative humidity is less than 70 percent[24]	

SOURCE:
California Air Resources Board. 4 June 2013. *Ambient air quality standards*. Available at: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

Toxic Air Contaminant Identification and Control Act

The Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807, Chapter 1047, Statutes of 1983) created the California Air Toxics Program in 1983. It established a two-step process of risk identification and risk management to address potential health effects associated with public exposure to toxic substances in the air. In the risk identification step, CARB and the OEHHA determine if a substance should be formally identified, or "listed," as a TAC in California. Since inception of the program, a number of such substances have been identified and listed. In 1993, legislative amendments were enacted for the program to identify the 189 federal hazardous air pollutants (HAPs) as TACs.

In the risk management step, CARB reviews emission sources of an identified TAC to determine whether regulatory action is needed to reduce the risk. Based on results of that review, CARB has promulgated a number of airborne toxic control measures (ATCMs), both for mobile and stationary sources. In 2004,

24 South Coast Air Quality Management District. February 2013. *Final 2012 AQMP*. Available at: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan

CARB adopted an ATCM to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel PM and other TACs. The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given time. These diesel-related measures are critical in reducing the statewide cancer risk and creating healthier communities.

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

The California Air Toxics Program is supplemented by the Air Toxics "Hot Spots" program, which became law (AB 2588, Statutes of 1987) in 1987. In 1992, the AB 2588 program was amended by Senate Bill 1731 to require facilities that pose a significant health risk to the community to perform a risk reduction audit and reduce their emissions through implementation of a risk management plan. Under this program, which is required under the Air Toxics "Hot Spots" Information and Assessment Act (Section 44363 of the California Health and Safety Code), facilities are required to report their air toxics emissions, assess health risks, and notify nearby residents and workers of significant risks when present. In March 2015, the OEHHA adopted "The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments" in accordance with the Health and Safety Code, Section 44300. The Final Guidance Manual incorporates the scientific basis from three earlier developed Technical Support Documents to assess risk from exposure to facility emissions. The 2015 OEHHA Final Guidance has key changes including greater age sensitivity in particular for children, decreased exposure durations, and higher breathing rate profiles. Because cancer risk could be up to three times greater using this new guidance, it may result in greater mitigation requirements, more agency backlog, and increased difficulty in getting air permits. Regardless of the change in calculation methodology, actual emissions and cancer risk within South Coast Air Basin has declined by more than 50 percent since 2005.

The CARB provides a computer program, the Hot Spots Analysis and Reporting Program (HARP), to assist in a coherent and consistent preparation of an HRA. HARP2, an update to HARP, was released in March 2015. HARP2 has a more refined risk characterization in HRA and CEQA documents and incorporates the 2015 OEHHA Final Guidance. As of June 2015, HARP2 is not required by OEHHA on the state level, but it is required by SCAQMD.[25]

Multiple Air Toxics Exposure Study (MATES-IV)

To date, the most comprehensive study of air toxics in the South Coast Air Basin (SCAB) is the Multiple Air Toxics Exposure Study (MATES-IV), conducted by Southern California Air Quality Management District (SCAQMD) in 2015. MATES combines monitoring of ambient air toxics, emissions inventories, and computer modeling to estimate the cancer risk from air pollution. The monitoring program measured over 30 air pollutants, including both gases and particulates. SCAQMD's MATES IV found that the average cancer risk from air pollution across the region declined from 1,194 in 1 million during MATES III in 2005 to 418 in 1 million in 2012–2013 using similar methods of analysis. The risk reduction follows a trend of declining toxic emissions in the region since the first MATES study was conducted in 1987. MATES IV found that mobile sources are responsible for 90 percent of the risk.

[25] South Coast Air Quality Management District. Risk Assessment Procedures for Rules 1401, 1401.1 and 212. June 5, 2015. Available at: http://www.aqmd.gov/docs/default-source/planning/risk-assessment/riskassprocjune15.pdf?sfvrsn=2

California Air Resources Board Mobile Source Programs

Emission Reduction Plan for Ports and Goods Movement

The CARB approved the 2006 Emission Reduction Plan for Ports and Goods Movement in California. The Plan is an essential component of California's effort to reduce community exposure to air pollution and to meet new federal air quality standards for ozone and fine particulate matter ($PM_{2.5}$). The plan goals are to:[26]

(1) Reduce total statewide international and domestic goods movement emissions to the greatest extent possible and at least back to 2001 levels by year 2010.
(2) Reduce the statewide diesel PM health risk from international and domestic goods movement 85 percent by year 2020.
(3) Reduce NO_x emissions from international goods movement in the South Coast 30 percent from projected year 2015 levels, and 50 percent from projected year 2020 levels based on preliminary targets for attaining federal air quality standards.
(4) Apply the emission reduction strategies for ports and goods movement statewide to aid all regions in attaining air quality standards.
(5) Make every feasible effort to reduce localized risk in communities adjacent to goods movement facilities as expeditiously as possible.

CARB Small Offroad Engine (SORE) Exhaust Emission Standards

SORE engines include off-road spark-ignition engines that produce 19 kW gross power or less (less than 25 horsepower), including lawn and garden, industrial, logging, airport ground support, and commercial utility equipment; golf carts; and specialty vehicles. These emission standards apply to HC, NO_x, CO, and PM emissions with increasingly stricter standards from 1995 to 2013.[27]

CARB Offroad Compression-Ignition Diesel Engine Exhaust Emission Standards

These engines include new compression-ignition engines (a.k.a. diesel engines) that are found in a wide variety of off-road applications such as farming, construction, and industrial. Some familiar examples include tractors, excavators, dozers, scrapers, portable generators, transport refrigeration units (TRUs), irrigation pumps, welders, compressors, scrubbers, and sweepers. This category, however, does not include locomotives, commercial marine vessels, marine engines over 37 kW, or recreational vehicles. These standards adhere to the tier system as set by the U.S. EPA.[28]

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[26] California Air Resources Board. 20 April 2006. *Emission Reduction Plan for Ports Goods Movement in California*. Available at: http://www.arb.ca.gov/planning/gmerp/plan/final_plan.pdf

[27] California Air Resources Board. Accessed 28 August 2015. *Small Off-Road Engine Exhaust Emission Standards*. Available at: http://www.arb.ca.gov/msprog/offroad/sore.pdf

[28] California Air Resources Board. 30 November 2012. *New Off-Road Compression-Ignition (Diesel) Engines and Equipment.* Available at: http://www.arb.ca.gov/msprog/offroad/orcomp/orcomp.htm

CARB On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation

This regulation requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses must meet PM filter requirements beginning January 1, 2012. Lighter and older heavier trucks must be replaced starting January 1, 2015. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent. The regulation applies to nearly all privately and federally owned diesel fueled trucks and buses and to privately and publicly owned school buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. Amendments were approved in April 2014.[29]

CARB Smartway/Phase I Heavy Duty Vehicle Greenhouse Gas Regulation

This regulation applies to GHG emissions from heavy-duty trucks and engines sold in California. It establishes GHG emissions limits on truck and engine manufacturers and harmonizes with the recently adopted U.S. EPA rule for new trucks and engines nationally. Existing heavy-duty vehicle regulations in California include engine criteria emission standards, tractor-trailer GHG requirements to implement SmartWay strategies (i.e., the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation), and in-use fleet retrofit requirements such as the Truck and Bus Regulation.[30]

Executive Order (EO) B-32-15, Sustainable Freight Transport Initiative

On July 17, 2015, Governor Brown issued Executive Order B-32-15, which directs the Secretary of the California State Transportation Agency, the Secretary of Cal/EPA, and the Secretary of the Natural Resources Agency to lead other relevant state departments including the CARB, the California Department of Transportation, the California Energy Commission, and the Governor's Office of Business and Economic Development to improve freight efficiency, transition to zero-emission technologies, and increase competitiveness of California's freight system. These state agencies will develop an integrated freight action plan by July 2016.[31]

California Wellness Plan (2014)

The California Department of Public Health published a statewide Wellness Plan in 2014. The Plan acknowledges that many factors contribute to an individual's health. These factors include the physical environment (housing, neighborhood, healthy food access and environment), educational attainment and employment, economic status, social support, social norms and attitudes, culture, literacy, race/ethnicity. The physical environment is also an indicator of exposure to toxins and transportation where individuals are affected on a daily basis by the air quality of their surroundings.[32]

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29 California Air Resources Board. 11 May 2015. *Truck and Bus Regulation*. Available at: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm

30 California Air Resources Board. 9 December 2014. *Phase 1 GHG*. Available at: http://www.arb.ca.gov/msprog/onroad/phaselghg/phaselghg.htm

31 California Air Resources Board. 10 August 2015. *Sustainable Freight Transport*. Available at: http://www.arb.ca.gov/gmp/sfti/sfti.htm

32 California Department of Public Health. 2014. *Wellness Plan*. Available at: http://www.cdph.ca.gov/programs/cdcb/Documents/CDPH-CAWellnessPlan2014%20(Agency%20Approved).FINAL.2-27-14(Protected).pdf

CARB Air Quality and Land Use Handbook

In April 2005, the California Air Resources Board published the Air Quality and Land Use Handbook as a informational and advisory guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. Studies have shown that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for much of the overall cancer risk from airborne toxics in California. Reducing diesel particulate emissions is one of CARB's highest public health priorities and the focus of a comprehensive statewide control program that is reducing diesel PM emissions each year. This document highlights the potential health impacts associated with proximity to air pollution sources so planners explicitly consider this issue in planning processes.[33]

Regional

The SCAG region is comprised of four air basins and five air districts. The four air basins are SCAB, MDAB, SSAB, and the Ventura County portion of SCCAB. The five air districts are MDAQMD, AVAQMD, VCAPCD, SCAQMD, and ICAPCD.

MDAQMD Federal 8-hour Ozone Attainment Plan (2008)

The U.S. EPA designated the Western Mojave Desert non-attainment area as non-attainment for the 8-hour ozone NAAQS pursuant to the provisions of the CAA. A portion of the MDAQMD is included in the Western Mojave Desert non-attainment area. The MDAQMD has adopted state and federal attainment plans for the region within its jurisdiction. The portion of the MDAQMD designated as a federal 8-hour ozone non-attainment area will be in attainment of the 8-hour NAAQS for ozone by 2021.[34]

AVAQMD Federal 8-hour Ozone Attainment Plan (2008)

The AVAQMD has adopted a single attainment plan for ozone. The AVAQMD Federal 8-hour Ozone Attainment Plan, adopted in May 2008, demonstrates that the AVAQMD will meet the primary required federal ozone planning milestones by June 2021, presents the progress the AVAQMD will make towards meeting all required ozone planning milestones, and discusses the newest 0.075 part per million 8-hour ozone NAAQS.[35]

VCAPCD Air Quality Management Plan (2008)

This plan presents a strategy for attaining the federal 8-hour ozone standard of 0.08 parts per million. It contains control measures to reduce emissions and bring the County into attainment of the standard.

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33 California Air Resources Board. April 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*. Available at: http://www.arb.ca.gov/ch/handbook.pdf

34 Mojave Desert Air Quality Management District. 2008. *MDAQMD Federal 8-hour Ozone Attainment Plan.* Available at: http://www.mdaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=40

35 Antelope Valley Air Quality Management District. 20 May 2008. *AVAQMD Federal 8-hour Ozone Attainment Plan*.

The County is designated as an ozone nonattainment area for both the state and federal standards. New plans are updated and written as required by federal law.[36]

SCAQMD 2012 Air Quality Management Plans (AQMP)

The most recent update to the AQMP was adopted in 2012 by the SCAQMD Board and the CARB.[37] The AQMP demonstrates attainment of the federal 24-hour $PM_{2.5}$ standard by 2014 in the SCAB through adoption of all feasible measures. The current AQMP also updates the EPA-approved 8-hour ozone control plan with new measures designed to reduce reliance on the CAA Section 182(e)(5) long-term measures for NO_x and VOC reductions. In addition, the AQMP addresses several state and federal planning requirements, incorporating new scientific information, primarily in the form of updated emissions inventories, ambient measurements, and new meteorological air quality models.

SCAQMD is in the development process for the 2016 AQMP, which will be a comprehensive and integrated plan primarily focused on addressing the ozone standards. The Plan will be a regional and multiagency effort (SCAQMD, CARB, SCAG, and U.S. EPA). State and federal planning requirements include developing control strategies, attainment demonstrations, reasonable further progress, and maintenance plans. The 2016 AQMP will incorporate the latest scientific and technical information and planning assumptions, including the latest applicable growth assumptions, transportation control measures and strategies, and updated emission inventory methodologies for various source categories.[38]

ICAPCD Air Plans

At a public meeting held on December 18, 2014, CARB approved the Imperial County 2013 SIP for the 2006 24-hour $PM_{2.5}$ Moderate Nonattainment Area. At a public meeting held on November 18, 2010, CARB approved the 2009 Imperial County 1997 8-Hour Ozone Modified Air Quality Management Plan and 2009 Reasonably Available Control Technology SIP. In 2009, the EPA determined that the County attained the 1997 8-hour ozone standard.[39]

Fugitive Dust Regulations: SCAQMD, AVAQMD, and MDAQMD Rule 403; VCAPCD Rule 55, Fugitive Dust; ICAPCD Rule 800, ICAPCD Rule 801

The SCAQMD, AVAQMD, and MDAQMD have adopted Rule 403, *Fugitive Dust*, which requires the implementation of best available fugitive dust control measures during construction and operational activities capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and mobile equipment traveling on paved and unpaved roads. Similarly, VCAPCD has adopted Rule 55, *Fugitive Dust*, and ICAPCD has adopted Rule 800, *General*

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[36] Ventura County Air Pollution Control District. Accessed 8 September 2015. *Destination Clean Air*. Available at: http://www.vcapcd.org/pubs/PublicInformation/DestinationCleanAir.pdf

[37] South Coast Air Quality Management District. 2014. *Air Quality Management Plan (AQMP)*. Available at: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan

[38] South Coast Air Quality Management District. 2014. *Air Quality Management Plan (AQMP)*. Available at: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan

[39] California Air Resources Board. 21 April 2015. *Imperial County Air Quality Management Plans*. Available at: http://www.arb.ca.gov/planning/sip/planarea/imperial/imperialsip.htm

Requirements for Control of Fine Particulate Matter (PM10), and Rule 801, *Construction and Earthmoving Activities,* to reduce fugitive dust.

SCAQMD, AVAQMD Rule 1401; MDAQMD Rule 1320; VCAPCD Rule 36; ICAPCD Rule 207 and SCAQMD, AVAQMD Rule 1402; MDAQMD Rule 1520; VCAPCD Rule 73; ICAPCD Rule 403

The SCAQMD has adopted two rules for TACs to limit cancer and non-cancer health risks from facilities located within its jurisdiction. Rule 1401, New Source Review of Toxic Air Contaminants, regulates new or modified facilities; and Rule 1402, Control of Toxic Air Contaminants from Existing Sources, regulates facilities that are already in operation. Rule 1402 incorporates requirements of the AB 2588 program, including implementation of risk reduction plans for significant risk facilities. In 2015, SCAQMD revised Rule 1401 and 1402 to include more equipment types and industry categories. Under the revised Rule 1401, no permit would be issued for new and modified equipment unless the cancer risk is less than ten in a million using Toxics Best Available Control Technology (TBACT) or less than one in a million without TBACT or if near a school. For Rule 1402, existing facilities under AB 2588 must reduce facility-wide risk if maximum individual cancer risk is greater than 25 in a million. AVAQMD, MDAQMD, VCAPCD, and ICAPCD have adopted similar rules to limit health risks from toxic air contaminants from new, modified, and existing sources.

3.3.2 EXISTING CONDITIONS

While improved from the 1970s, Southern California has some of the worst air quality in the nation. The American Lung Association's *State of the Air Report*, released in 2015, ranks the Los Angeles-Long Beach metropolitan area as fifth worst in the nation for people at risk for 24-hr $PM_{2.5}$, fifth worst for annual $PM_{2.5}$, and worst for most ozone-polluted cities.[40] Both ozone and particulate matter are known to have negative public health impacts especially for sensitive populations, children, the elderly, and those with respiratory or cardiovascular health problems. Cancer risk from diesel particulate matter is evaluated in the HRA (**Appendix D**). Low-income and minority populations are more at risk because they are more likely to live near major sources of pollution such as power plants or large freeways.

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 Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura. The section includes information on topography, climate, and meteorology for the air basins in the SCAG region and existing air quality. As previously discussed, the SCAG region includes four air basins and five air districts.

Topography, Climate, and Meteorology

The SCAG region has a greatly varied topography from lakes to mountains, valleys, hills, basins, and urban areas. The topography and meteorological conditions define the climate of the region because air quality is a function of the rate and location of pollutant emissions. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients, along with local topography, influence the

40 American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

movement and dispersal of pollutants and thereby provide the link between air pollutant emissions and air quality. Southern California has strong temperature inversions in the lower atmosphere that can trap pollutants near the surface. Meteorology affects air quality trends that may mask emission reduction benefits. Meteorology also affects different pollutants differently. Warm and sunny weather, which is typical of Southern California, leads to higher ozone days because sunlight aids the chemical reactions that form ozone. On the other hand, windy weather will spread primary particulate matter from direct emissions leading to high PM concentrations in the air. Secondary PM, including particulate nitrates and sulfates, is more prevalent in the air during cold, calm, and humid weather conditions. Rain and wind reduce PM concentration in the air.[41] The local topography and climate conditions are described in greater detail specific to each air basin as listed below. These air basins are geographically defined because the travel of air pollution can be trapped by natural barriers like mountains unless the prevailing winds are powerful enough to disperse it to other areas. [42]

South Coast Air Basin (SCAB)

The SCAB incorporates approximately 12,000 square miles, consisting of Orange County and the urbanized areas of San Bernardino, Riverside, and Los Angeles Counties. In May 1996, the boundaries of the SCAB were changed by the CARB to include the Beaumont-Banning area. 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 semipermanent 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.[43]

The vertical dispersion of air pollutants in the SCAB is hampered by the presence of persistent temperature inversions. High-pressure systems, such as the semipermanent 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.[44]

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 miles per hour, smog potential is greatly reduced.[45]

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41 *The California Almanac of Emissions and Air Quality*. 2013. Available at: http://www.arb.ca.gov/aqd/almanac/almanac13/almanac2013all.pdf

42 South Coast Air Quality Management District. Accessed 24 August 2015. *Southern California Air Basins*. Available at: http://www.aqmd.gov/docs/default-source/default-document-library/map-of-jurisdiction.pdf

43 South Coast Air Quality Management District. April 1993. *CEQA Air Quality Handbook*. P. A8-1.

44 South Coast Air Quality Management District. April 1993. *CEQA Air Quality Handbook*. P. A8-2.

45 South Coast Air Quality Management District. April 1993. *CEQA Air Quality Handbook*. P. A8-2.

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 MDAB is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes.[46] Many of the lower mountains that dot the vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada Mountains to the north; air masses pushed onshore in Southern California by differential heating are channeled through the MDAB. The MDAB is separated from the Southern California coastal and central California valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these air masses. The Antelope Valley is bordered in the northwest by the Tehachapi Mountains, separated from the Sierra Nevada in the north by the Tehachapi Pass (3,800 feet elevation). The Antelope Valley is bordered in the south by the San Gabriel Mountains, bisected by Soledad Canyon (3,300 feet). The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriel Mountains by the Cajon Pass (4,200 feet). A lesser channel lies between the San Bernardino Mountains and the Little San Bernardino Mountains (the Morongo Valley).

The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 feet) between the San Bernardino and San Jacinto Mountains.

During the summer, the MDAB is generally influenced by a Pacific subtropical high cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time the reach the desert. Most desert moisture arrives from infrequent warm, moist, and unstable air masses from the south. The MDAB averages between 3 and 7 inches of precipitation per year (from 16 to 30 days with at least 0.01 inch of precipitation). The MDAB is classified as a dry-hot desert climate, with portions classified as dry-very hot desert, to indicate at least three months have maximum average temperatures over 100.4 degrees Fahrenheit (° F).

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.[47]

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46 Mojave Desert Air Quality Management District. February 2009. *CEQA and Federal Conformity Guidelines*.

47 Imperial County Air Pollution Control District. 13 July 2010. *Final 2009 1997 8-Hour Ozone Modified Air Quality Management Plan.*

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 and 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.

Climatic conditions in the SSAB are governed by the large-scale sinking and warming of air in the semipermanent 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 humidity, 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.

The combination of subsiding air, protective mountains, and distance from the ocean severely limits precipitation. Rainfall is highly variable, with heavy precipitation occurring from single storms followed by periods of dry air. Humidity is typically low throughout the year, ranging from 28 percent in summer to 52 percent in winter.

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 over 31 mph are observed 0.6 percent of the time, and 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. 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.

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.

South Central Coast Air Basin (SCCAB)

The SCAG region includes the Ventura County portion of the SCCAB. Ventura County is made up of coastal mountain ranges, the coastal shore, the coastal plain, and several inland valleys.[48] 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.

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[48] Ventura County Air Pollution Control District. November 1996. *1994 Air Quality Management Plan*.

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. 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. 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 semiarid, average humidity levels are relatively high due to the marine influence. Coastal 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.

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 buildup of pollutants over several days.

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.

Regional Air Quality

In Southern California, the American Lung Association consistently gives counties within the SCAG region failing grades in the amount of ozone and particulate pollution in the air. The American Lung Association has assigned grades to each of the Counties in the SCAG region for 2015 (**Table 3.3.2-1, *American Lung Association Report Card for SCAG Region***). Grades were calculated from a weighted average based on the total number of days in each air quality index level. The weighted average was derived by counting the number of days in each unhealthful range in each year (2011–2013), multiplying the total in each range by the assigned standard weights, and calculating the average. All six counties in the SCAG region received a failing grade for ozone, which means there were a significant number of unhealthy air days relative to the ozone standard. For ozone, an "F" grade was set to generally correlate with the number of unhealthy air days that would place a county in nonattainment for the ozone standard. For short-term particle pollution, fewer unhealthy air days are required for an F than for nonattainment under the PM2.5 standard. For $PM_{2.5}$, the national standard allows 2 percent of days in a three-year period to exceed 35 $\mu g/m^3$, which is roughly 21 unhealthy days in three years, but the

American Lung Association uses a more restrictive 1 percent or 99th percentile limit to protect the public from short term spikes in pollution.

TABLE 3.3.2-1
AMERICAN LUNG ASSOCIATION REPORT CARD FOR SCAG REGION

County	Ozone Grade	Particle Pollution Grade
Imperial	F	D
Los Angeles	F	F
Orange	F	F
Riverside	F	F
San Bernardino	F	D
Ventura	F	B

SOURCE:
American Lung Association. 2015. *State of the air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

Particle Pollution

In December 2009, the U.S. EPA linked fine particle pollution ($PM_{2.5}$) to public health impacts. The U.S. EPA determined that fine particle pollution could cause early death, cardiovascular harm, respiratory harm, cancer, and reproductive and developmental harm. In the short term, particle pollution reduces lung function and increases lung tissue inflammation in young, healthy adults. Short-term exposure increases emergency room visits for patients with acute respiratory illnesses, increases number of heart attacks, increases school absenteeism, increases hospitalization of children with asthma, and can even result in deaths on days of high levels of particle pollution.[49] Asthma in the SCAG region ranges from 28 to 74 per 10,000 people (**Table 3.3.2-2, *Population-Weighted Asthma Rate per 10,000***). Asthma rates are a good indicator of population sensitivity to environmental stressors because asthma is both caused by and exacerbated by pollutants.

TABLE 3.3.2-2
POPULATION WEIGHTED ASTHMA RATE PER 10,000

County	Asthma Rate per 10,000
Imperial	74
Los Angeles	44
Orange	28
Riverside	40
San Bernardino	57
Ventura	34
SCAG region	**42**

SOURCE:
CalEnviroScreen - age-adjusted rate of emergency department (ED) visits for asthma per 10,000 (averaged over 2007-2009).

49 American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

In 2013, the World Health Organization's International Agency for Research on Cancer linked long-term exposure to particle pollution to increased risk of developing lung cancer. Other studies have shown long-term particle pollution exposure increases hospitalization of children with asthma living near busy roads with heavy truck traffic, reduces lung function in children and teenagers, damages small airways of the lungs, increases risk of death from cardiovascular disease, and increases risk of lower birth weight and infant mortality.[50]

Particle pollution particularly has a detrimental effect on sensitive populations including children, elderly, and those with respiratory or cardiovascular illnesses. In March 2015, OEHHA amended their Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments to consider the impact of age, breathing rates, and exposure levels into their cancer risk calculation methodology.

Figure 3.3.2-1, *Annual Average Concentration of $PM_{2.5}$*, shows the average annual exposure to $PM_{2.5}$in the SCAG region for years 2009 to 2011. Similar to the 2012 RTP/SCS PEIR, south Los Angeles County, northeast Orange County, southwest San Bernardino County, and northwest Riverside County experienced the highest average annual exposure to $PM_{2.5}$. The metropolitan area by El Centro and Calexico in Imperial County also show high average annual exposure to $PM_{2.5}$. Average concentrations in these high exposure areas range from 11.0 to 13.9 micrograms of $PM_{2.5}$ per cubic meter of air. This is below the federal 15 $\mu g/m^3$ standard, but partially above the state standard of 12 $\mu g/m^3$, hence resulting in the nonattainment designations in parts of Imperial, Los Angeles, and Riverside Counties and complete nonattainment for $PM_{2.5}$ in Orange and San Bernardino Counties.

Ozone

Ozone is formed when sunlight reacts with NOx, VOCs, and/or CO. These compounds are typically found in vehicle exhaust, but can also be released into the atmosphere from other sources like chemical solvents, power plants, gas stations, paints, and refineries. In February 2013, the U.S. EPA published the "Integrated Science Assessment for Ozone and Related Photochemical Oxidants." The report concluded that ozone pollution causes respiratory harm, is likely to cause early death and cardiovascular harm, may cause harm to the central nervous system, and may cause reproductive and developmental harm.[51] High levels of ozone can result in premature death and stroke, acute breathing problems like shortness of breath, wheezing, and coughing, asthma attacks, increase in risk of respiratory infection, increase susceptibility to pulmonary inflammation, and increase in hospitalization and emergency room visits for those with asthma, chronic obstructive pulmonary disease, cardiovascular disease and lung disease. Long term ozone exposure is connected to higher risk of death from respiratory diseases, higher risk of hospitalization for children with asthma especially those that are also low income, higher risk of developing asthma, lower birth weight and decreased lung function in newborns.[52] Similar to particle pollution, ozone has a detrimental effect on sensitive populations including children, elderly, and those with respiratory or cardiovascular illnesses.

[50] American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

[51] American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

[52] American Lung Association. 2015. *State of the Air 2015*. Available at: http://www.stateoftheair.org/2015/assets/ALA_State_of_the_Air_2015.pdf

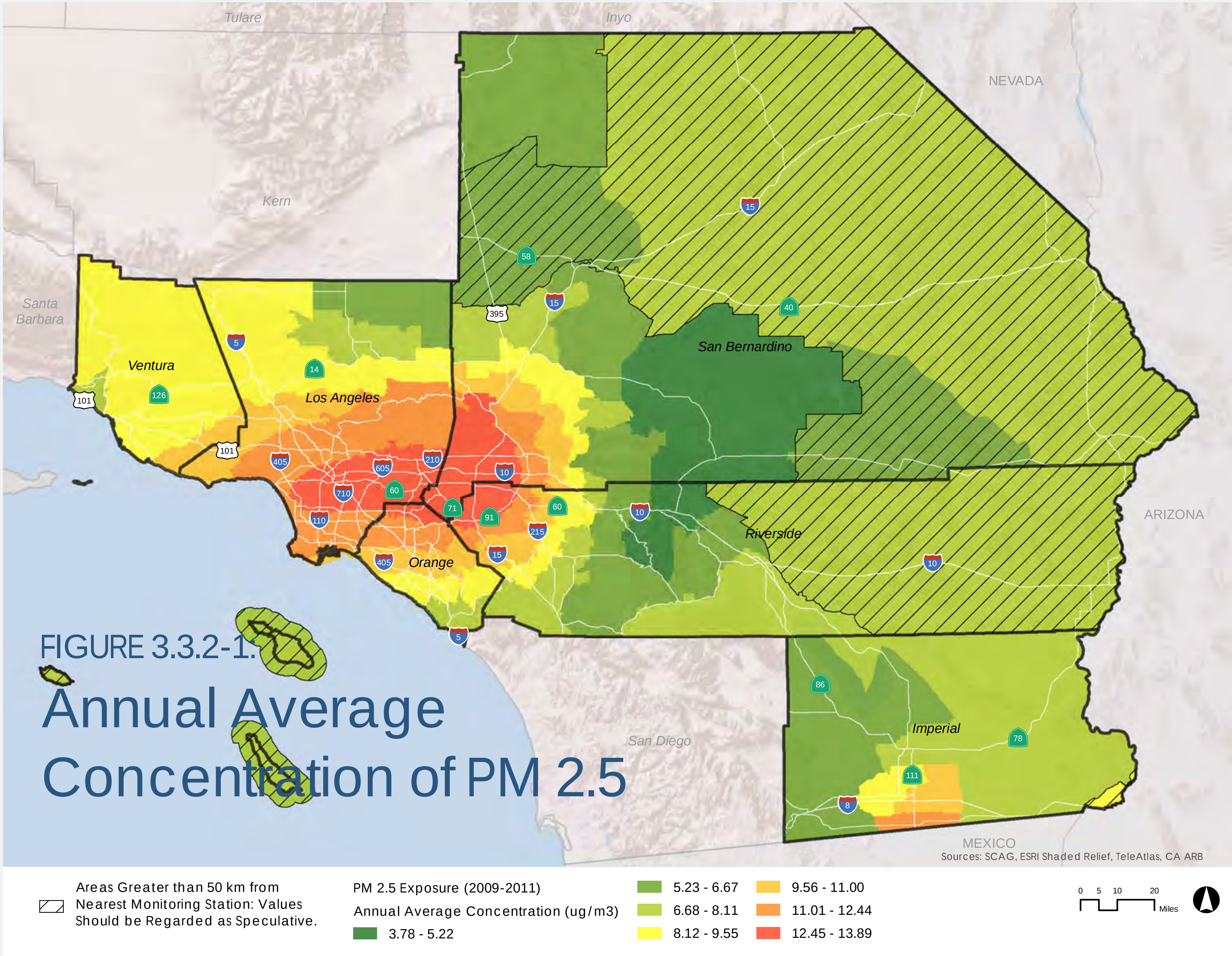


FIGURE 3.3.2-1:

Annual Average Concentration of PM 2.5

Figure 3.3.2-2, *Average Daily Ozone Exposure in Excess of the National 8 Hour Standard*, shows the average daily O_3 exposure in the SCAG region that is in excess of the national 8-hour standard (0.075 ppm) in the SCAG region for years 2009 to 2011. Although the region as a whole largely experiences average daily ozone exposure exceeding the federal standard, the highest concentration of ozone exposure can be seen mostly in southwest San Bernardino and northwest Riverside Counties, and also in northwest Los Angeles County.

Sensitive Receptors

There are many sensitive receptors located throughout the SCAG region (**Figure 3.3.2-3, *Sensitive Receptors***, and **Table 3.2.2-3, *Sensitive Receptors by County***). Some persons, such as those with respiratory illnesses or impaired lung function due to other illnesses, people with cardiovascular diseases or diabetes, the elderly over 65 years of age, and children under 14 years of age, can be particularly sensitive to emissions of criteria pollutants. These are the populations most at risk to poor air quality. Facilities and structures where sensitive people live or spend considerable amounts of time are known as sensitive receptors. Land uses identified by SCAQMD in the CEQA Air Quality Handbook to be sensitive receptors include residences, schools, playgrounds, child care centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes.

TABLE 3.3.2-3
SENSITIVE RECEPTORS BY COUNTY

County	Total Sensitive Receptors Count
Imperial	37,329
Los Angeles	1,749,992
Orange	589,844
Riverside	621,196
San Bernardino	556,706
Ventura	219,644

SOURCE:
Sapphos Environmental, Inc. GIS modeling, 2015.

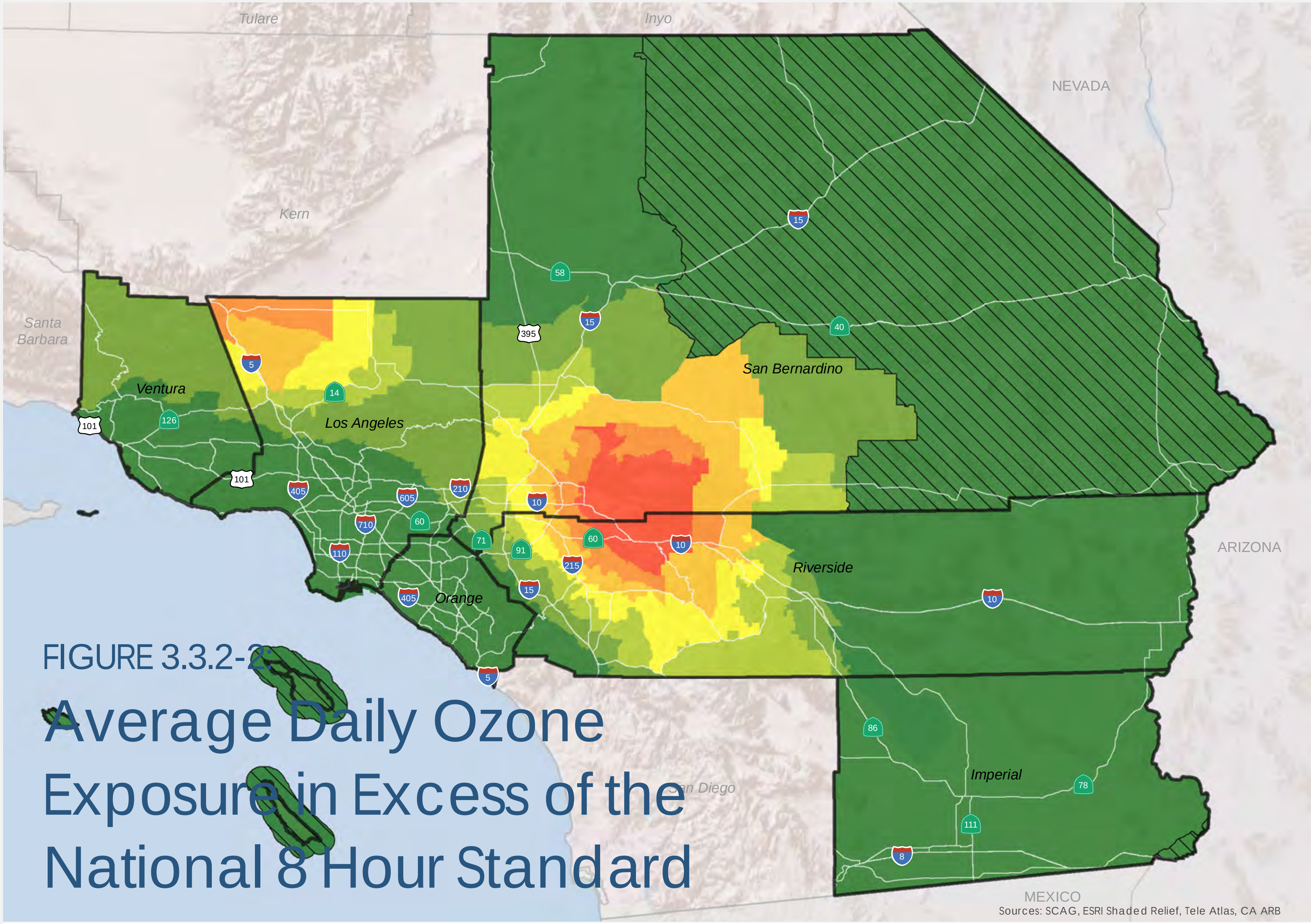
Attainment Status

NAAQS

The federal CAA sets NAAQS for the main criteria air pollutants: NO_x, VOC, $PM_{2.5}$, PM_{10}, SO_x, CO, and lead. Attainment and nonattainment of the NAAQS is variable throughout the counties within the SCAG region (**Table 3.3.2-4, *2015 Nonattainment in Counties in the SCAG Region for All Criteria Pollutants by County by NAAQS***).

FIGURE 3.3.2-2:

Average Daily Ozone Exposure in Excess of the National 8 Hour Standard



Areas Greater than 50 km from Nearest Monitoring Station: Values Should be Regarded as Speculative.

Average Daily Ozone Exposure in Excess of the National 8 Hour Standard (0.075 ppm)(2009-2011)

- 0.00 - 0.18
- 0.19 - 0.36
- 0.37 - 0.54
- 0.55 - 0.72
- 0.73 - 0.90
- 0.911 - 1.08
- 1.09 - 1.26

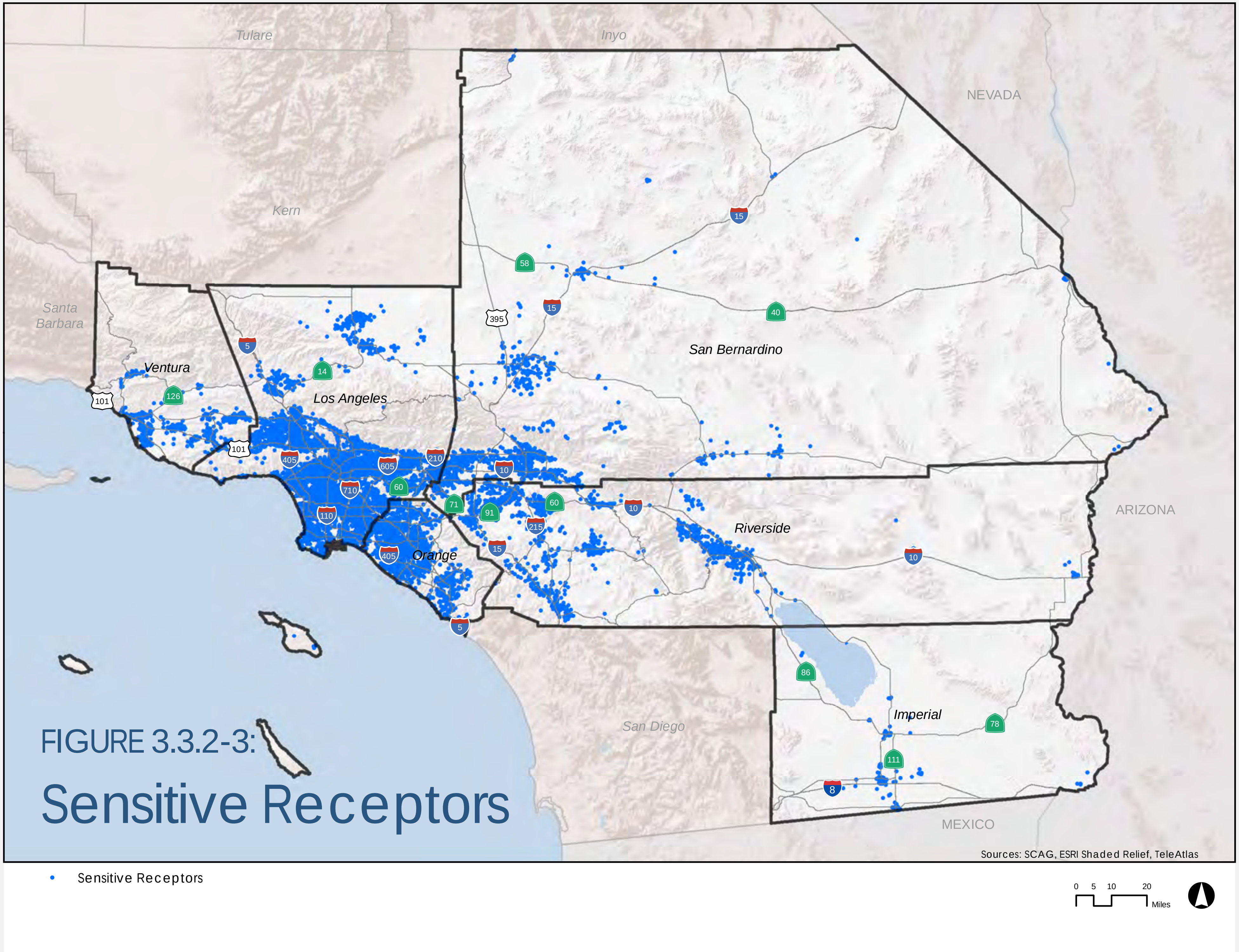


FIGURE 3.3.2-3:
Sensitive Receptors

TABLE 3.3.2-4
2015 NONATTAINMENT AREAS IN THE SCAG REGION FOR ALL CRITERIA POLLUTANTS BY COUNTY BY NAAQS

Imperial County	
PM-10 (1987)	Imperial Valley, CA - (Serious)
PM-2.5 (2006)	Imperial Co, CA - (Moderate)
PM-2.5 (2012)	Imperial Co, CA - (Moderate)
8-Hr Ozone (2008)	Imperial County, CA - (Marginal) (Proposed by U.S. EPA to be reclassified to Moderate)
Los Angeles County	
Lead (2008)	Los Angeles County-South Coast Air Basin, CA
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate) (requested by SCAQMD to be reclassified to Serious)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA - (Severe 15)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
Orange County	
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
Riverside County	
PM-10 (1987)	Coachella Valley, CA - (Serious)
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
8-Hr Ozone (2008)	Riverside Co, (Coachella Valley), CA - (Severe 15)
San Bernardino County	
PM-10 (1987)	San Bernardino Co, CA - (Moderate)
PM-10 (1987)	Trona, CA - (Moderate)
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA - (Moderate)
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA - (Moderate)
8-Hr Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA - (Severe 15)
8-Hr Ozone (2008)	Los Angeles-South Coast Air Basin, CA - (Extreme)
Ventura County	
8-Hr Ozone (2008)	Ventura County, CA - (Serious)

SOURCE:
U.S. Environmental Protection Agency. 30 January 2015. *U.S. EPA green book. Current nonattainment counties for all criteria pollutants*. Available at: http://www.epa.gov/oaqps001/greenbk/ancl.html

CAAQS

CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations. California has set standards for certain pollutants, such as particulate matter and ozone, which are more protective of public health than respective federal standards. California has also set standards for some pollutants that are not addressed by federal standards such as visibility reducing particles and vinyl chloride (**Table 3.3.2-5, *CAAQS Area Designations***).

TABLE 3.3.2-5
CAAQS AREA DESIGNATIONS

County	Ozone	$PM_{2.5}$	PM_{10}	CO	NO_2	SO_2	Sulfates	HS	Pb	Visibility Reducing Particles
Imperial	N	City of Calexico (N), Remainder of County (A)	N	A	A	A	A	U	A	U
Los Angeles	N	South Coast Air Basin (N), Mojave Desert Air Basin (U)	N	A	A	A	A	U	A	U
Orange	N	N	N	A	A	A	A	U	A	U
Riverside	N	South Coast Air Basin (N), Mojave Desert Air Basin (U), Salton Sea Air Basin (A)	N	A, Mojave Desert Air Basin (U)	A	A	A	U	A	U
San Bernardino	N	N	N	A	A	A	A	U, Searles Valley Planning Area (N)	A	U
Ventura	N	A	N	A	A	A	A	U	A	U

NOTE:
Designation Categories: A = Attainment; N = Nonattainment; T = Nonattainment-Transitional; U = Unclassified
SOURCE:
California Air Resources Board. 9 January 2015. *Area designations (activities and maps).* Available at: http://www.arb.ca.gov/desig/changes.htm#summaries

Existing Criteria Pollutant Emissions

The existing conditions (base year 2012) of the criteria pollutant emissions for the six counties in the SCAG region are shown in **Table 3.3.2-6, *Criteria Pollutant Emissions by County—Existing Conditions (Base Year 2012)***.

TABLE 3.3.2-6
CRITERIA POLLUTANT EMISSIONS BY COUNTY—EXISTING CONDITIONS (BASE YEAR 2012)

	(Tons/Day)								
	ROG		NOx			CO	PM10	PM2.5	SOx
County	Summer	Annual	Summer	Annual	Winter	Winter	Annual	Annual	Annual
Imperial	4	4	10	11	11	28	1	0	0
Los Angeles	103	101	179	194	190	851	17	9	1
Orange	28	28	42	46	45	225	5	2	0
Riverside	26	23	66	70	69	183	5	3	0
San Bernardino	32	28	81	86	84	225	6	3	0
Ventura	9	8	12	14	14	70	1	1	0

SOURCE:
SCAG Transportation Modeling, 2015.

The SCAG region is encompassed by the CARB's air quality monitoring program. The air monitoring stations collect ambient level measurements for criteria pollutants. The data generated are used to define the nature and severity of pollution in California; determine which areas of California are in attainment or non-attainment; identify pollution trends in the state; support agricultural burn forecasting; and develop air models and emission inventories.[53] There are 64 active air monitoring stations in the SCAG region: nine in Imperial County, 15 in Los Angeles County, five in Orange County, 15 in Riverside County, 14 in the San Bernardino County, and six in Ventura County. These monitoring stations are shown in **Figure 3.3.2-4, *Air Quality Basins and Monitoring Stations***.[54]

Health Risk Assessment

The HRA (**Appendix D** to the PEIR) assesses the potential carcinogenic risk to persons potentially exposed to harmful diesel exhaust emissions near freeways within the SCAG region. Using EMFAC 2014, only exhaust diesel particulate matter (DPM, modeled as $PM_{2.5}$ and PM_{10}) and select toxics (i.e., acetaldehyde, benzene, 1,3-butadiene, and formaldehyde) are modeled because these pollutants have carcinogenic health effects. Cancer risk will be used as a corollary for overall health effects in this assessment. Discussed in more detail in **Appendix D** and **Section 4.0, *Alternatives***, of this PEIR, and the ***Air Quality and Greenhouse Gas Emissions Technical Report*** (**Appendix C**), the model simulates five conditions: a base year condition representing Existing Conditions, a future condition with the 2016 RTP/SCS, and three future conditions assuming if the 2016 RTP/SCS were not adopted. Comparison between the existing conditions and Plan is described in **Section 3.3.4, *Impact Analysis*.**

The emissions and cancer risk are evaluated along 16 different transportation corridors that were determined according to proximity to sensitive receptors and population, traffic, and vehicle miles traveled (VMT). Heavy duty diesel trucks (HDDT) comprise the majority of DPM emissions. An AERMOD

53 California Air Resources Board. 1 July 2015. *Ambient Air Quality Monitoring*. Available at: http://www.arb.ca.gov/aaqm/aaqm.htm

54 California Air Resources Board. 24 September 2014. *Quality Assurance Air Monitoring Site Information*. Available at: http://www.arb.ca.gov/qaweb/site.php

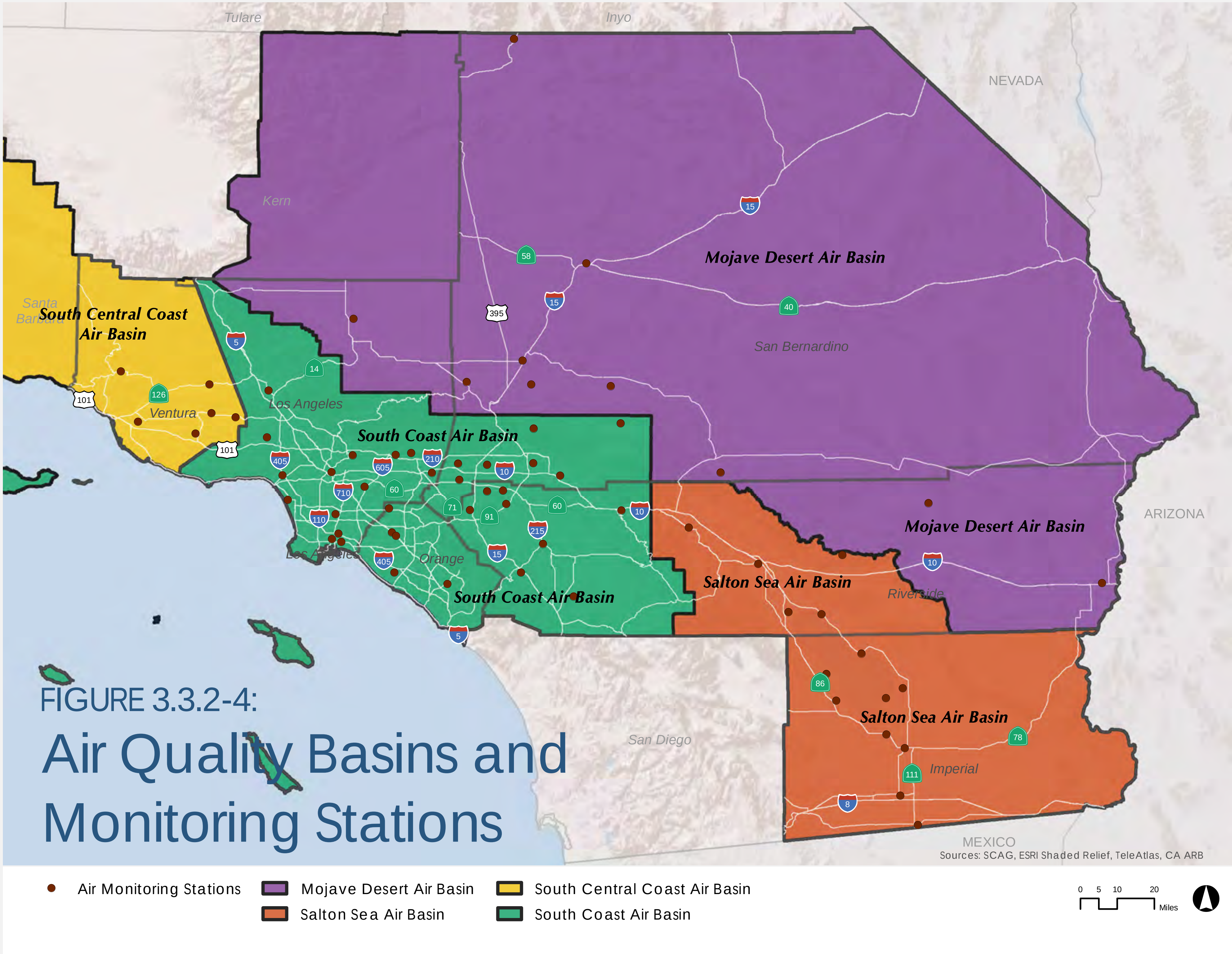


FIGURE 3.3.2-4:
Air Quality Basins and Monitoring Stations

Q:\1315\SCAG\ArcProjects\AQ_AbDistSta.mxd | Date: 11/12/2015 dispersion model was used to project the DPM concentrations are pre-identified receptors out to 1,000 meters away from the freeway. Cancer risk from the DPM was escalated by 5 percent to account for other select toxics. (This percentage was identified as a good approximation in a MOVES2014 analysis.) Risk calculations are included for worker, residential, and sensitive receptors. **Table 1-1, *Summary Maximum Exposed Individual Residential 30-year Exposure Cancer Risk***, in the HRA (**Appendix D**), contains a summary of the cancer risk per million exposed persons for each of the five scenarios and 16 freeway segments.

Ambient Air Quality

The five air districts in the SCAG region each monitor air quality conditions in their region. The characterization of the ambient air quality in relation to criteria pollutants was based on peak readings of criteria pollutants in the SCAG air basins (**Table 3.3.2-7, *Peak Criteria Pollutants Readings for the SCAG Region Air Basins***). The data shows that O_3, $PM_{2.5}$, and PM_{10} readings consistently exceeded the standards in each of the air basins.

TABLE 3.3.2-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS

Pollutant	Period	Pollutant Standards		2011 Peak Criteria Reading	Days in Excess of Standards 2011		2012 Peak Criteria Reading	Days in Excess of Standards 2012		2013 Peak Criteria Reading	Days in Excess of Standards 2013	
		CA	Federal		CA	Federal		CA	Federal		CA	Federal
South Coast Air Basin												
Ozone (O_3)	1-hour	0.09 ppm (180 µg/m³)	—	0.160	90	16	0.147	97	12	0.151	70	5
	8-hour	0.07 ppm (137 µg/m³)	0.075 ppm (147 µg/m³)	0.136	125	106	0.112	140	111	0.122	119	88
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m³	150 µg/m³	CA 119.7 Federal 152.9	23	0	CA 90.9 Federal 104.8	97	0	CA 199.2 Federal 286	86	2
Fine Particulate Matter ($PM_{2.5}$)	24-hour	—	35 µg/m³	CA 97.4 Federal 94.6	—	17	CA 182.2 Federal 58.7	—	17	CA 170.8 Federal 60.3	—	13
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)	4.67	0	0	3.96	0	0	—	0	0
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (339 µg/m³)	100 ppb (188 µg/m³)	CA 109 Federal 109.6	0	1	CA 97 Federal 97.8	0	0	CA 104 Federal 104.6	0	1
Mojave Desert Air Basin												
Ozone (O_3)	1-hour	0.09 ppm (180	—	0.132	57	1	0.119	44	0	0.120	22	0

TABLE 3.3.2-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS

Pollutant	Period	Pollutant Standards CA	Pollutant Standards Federal	2011 Peak Criteria Reading		Days in Excess of Standards 2011 CA	Days in Excess of Standards 2011 Federal	2012 Peak Criteria Reading		Days in Excess of Standards 2012 CA	Days in Excess of Standards 2012 Federal	2013 Peak Criteria Reading		Days in Excess of Standards 2013 CA	Days in Excess of Standards 2013 Federal
		$\mu g/m^3$)													
	8-hour	0.070 ppm (137 $\mu g/m^3$)	0.075 ppm (147 $\mu g/m^3$)	CA 0.114	Federal 0.113	138	95	CA 0.108	Federal 0.108	123	81	CA 0.097	Federal 0.097	105	66
Respirable Particulate Matter (PM_{10})	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	CA 138.7	Federal 143.4	18	0	CA 96.6	Federal 181.6	18	1	CA 173.4	Federal 305.2	26	1
Fine Particulate Matter ($PM_{2.5}$)	24-hour	—	35 $\mu g/m^3$	CA 50	Federal 50	—	1	CA 49.5	Federal 67.7	—	2	CA 76.2	Federal 76.2	—	6
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	1.51		0	0	1.83		0	0	—		0	0
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (339 $\mu g/m^3$)	100 ppb (188 $\mu g/m^3$)	CA 77	Federal 77	0	0	CA 146	Federal 146	0	7	CA 84	Federal 84.9	0	0
Salton Sea Air Basin															
Ozone (O_3)	1-hour	0.09 ppm (180 $\mu g/m^3$)	—	0.124		29	0	0.126		27	1	0.113		20	0

TABLE 3.3.2-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS

Pollutant	Period	Pollutant Standards		2011 Peak Criteria Reading		Days in Excess of Standards 2011		2012 Peak Criteria Reading		Days in Excess of Standards 2012		2013 Peak Criteria Reading		Days in Excess of Standards 2013	
		CA	Federal			CA	Federal			CA	Federal			CA	Federal
	8-hour	0.070 ppm (137 μg/m^3)	0.075 ppm (147 μg/m^3)	CA 0.099	Federal 0.098	81	59	CA 0.101	Federal 0.100	93	58	CA 0.104	Federal 0.104	89	53
Respirable Particulate Matter (PM_{10})	24-hour	50 μg/m^3	150 μg/m^3	CA 324	Federal 396.9	93	2	CA 387.3	Federal 406.2	103	2	CA 385.7	Federal 255.2	144	3
Fine Particulate Matter ($PM_{2.5}$)	24-hour	—	35 μg/m^3	CA 103.5	Federal 80.3	—	3	CA 78.5	Federal 64.7	—	2	CA 70.8	Federal 36.3	—	1
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	9.01		0	0	4.47		0	0	—		0	0
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (339 μg/m^3)	100 ppb (188 μg/m^3)	CA 130	Federal 130	0	2	CA 91	Federal 91	0	0	CA 156	Federal 156.9	0	2
South Central Coast Air Basin															
Ozone (O_3)	1-hour	0.09 ppm (180 μg/m^3)	—	0.110		4	0	0.106		4	0	0.104		3	0
	8-hour	0.070 ppm (137 μg/m^3)	0.075 ppm (147 μg/m^3)	CA 0.091	Federal 0.090	30	11	CA 0.088	Federal 0.087	52	22	CA 0.089	Federal 0.089	23	7

TABLE 3.3.2-7
PEAK CRITERIA POLLUTANTS READINGS FOR THE SCAG REGION AIR BASINS

Pollutant	Period	Pollutant Standards		2011 Peak Criteria Reading		Days in Excess of Standards 2011		2012 Peak Criteria Reading		Days in Excess of Standards 2012		2013 Peak Criteria Reading		Days in Excess of Standards 2013	
		CA	Federal			CA	Federal			CA	Federal			CA	Federal
Respirable Particulate Matter (PM_{10})	24-hour	50 μg/m^3	150 μg/m^3	CA 140.4	Federal 134.2	68	0	CA 186.4	Federal 180.9	69	3	CA 595.6	Federal 218.1	95	1
Fine Particulate Matter ($PM_{2.5}$)	24-hour	—	35 μg/m^3	CA 34.6	Federal 34.6	—	0	CA 41.9	Federal 41.9	—	4	CA 39.6	Federal 39.6	—	2
Carbon Monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	1.89		0	0	1.11		0	0	—		0	0
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm (338 μg/m^3)	100 ppb (190 μg/m^3)	CA 90	Federal 90	0	0	CA 58	Federal 58	0	0	CA 139	Federal 139	0	1

SOURCE:
California Air Resources Board. Accessed 8 May 2015. *Top 4 summary: select pollutant, years, & area*. Available at: http://www.arb.ca.gov/adam/topfour/topfour1.php

3.3.3 THRESHOLDS OF SIGNIFICANCE

The 2016 RTP/SCS would have a significant impact related to air quality if it would have the potential to:

- Conflict with or obstruct implementation of the applicable air quality plan
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under applicable NAAQS or CAAQS
- Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially
- Expose a substantial number of people to objectionable odors

The methodology for determining the significance of air quality impacts compares the existing conditions to the future conditions with the Project (2016 RTP/SCS), as required in CEQA Section 15126.2(a).

Analysis of the potential air quality impacts of the Plan was conducted based on SCAG's Regional Travel Demand Model, evaluation of relevant AQMPs/SIPs, and a mobile source HRA (**Appendix D**).

3.3.4 IMPACT ANALYSIS

Even though public health is not a CEQA issue area, this impact analysis was conducted from a public health lens as air quality is closely related to public health. The analysis relies primarily on the results of the HRA, as a corollary for public health. EPA has established a cancer risk threshold that has been accepted by the air districts within the SCAG region. Diesel particulate matter has been documented to affect respiratory health especially in the very young and senior populations. OEHHA has established a model for calculating the cancer risk that is primarily driven by diesel particulate matter. Therefore, SCAG prepared an HRA to evaluate the cancer risk associated with the Plan. Particular emphasis was placed on selecting transportation corridors that evaluated impacts to at risk populations. The results of that analysis have been used to characterize the impacts to public health with respect to the changes in air quality.

IMPACT Air-1: Potential to conflict with or obstruct implementation of the applicable air quality plan.

Less than Significant Impact

The 2016 RTP/SCS would result in a less than significant impact to air quality related to the potential to conflict with or obstruct implementation of the adopted SIPs/AQMPs/Attainment Plans in the SCAG region because the projected long-term emissions are in alignment with the local SIPs/AQMPs as demonstrated in the transportation conformity analysis, found in the appendices to the 2016 RTP/SCS. The emissions resulting from the Plan are within the applicable emissions budgets as stated in the SIPs/AQMPs for each nonattainment or maintenance area for all milestone, attainment, and planning horizon years.

As described in the Regulatory Framework, above, when a region is in nonattainment for any of the six criteria air pollutants relative to the NAAQs, the federal CAA requires states to develop SIPs to achieve the federal standard. The AQMPs are required as part of the SIP. Within the SCAG region, the 8-hour federal ozone standard is designated nonattainment for all the six counties. The only other of the six criteria pollutants designated nonattainment are $PM_{2.5}$ and PM_{10}. As a result, all the SIPs in the SCAG region focus on reducing ozone emissions and may also focus on particle pollution. The following air quality plans applicable to the 2016 RTP/SCS are: 2012 SCAQMD Air Quality Management Plans (AQMP), MDAQMD Federal 8-hour Ozone Attainment Plan (2008), Imperial County 2013 SIP, ICAPCD 1997 8-Hour Ozone Modified Air Quality Management Plan (2009), AVAQMD Federal 8-hour Ozone Attainment Plan (2008), and the VCAPCD Air Quality Management Plan (2008).

The goals of the air quality management plans and attainment plans are to establish a strategy for achieving the standards by a set date by listing all feasible control measures, including transportation control measures. These control measures help advance the attainment date and are financially, economically, and socially feasible. As standards become more stringent with time, achieving the standards becomes a moving target that the air quality districts and air-related plans must continue to chase. At this current snapshot in time (2015), the Plan would be not in conflict with the existing air-related plans if it was aligned with the feasible control measures. For example, the 2012 SCAQMD AQMP was written in alignment with the 2012 RTP/SCS, incorporating the latest scientific, technological, and regulatory information and planning assumptions as of December 7, 2012.

The 2016 RTP/SCS would result in more aggressive regional transportation and land use strategies than the 2012 RTP/SCS with respect to achieving emission reductions as it has a greater emphasis on more compact development in existing urbanized areas and opportunity areas, higher investments and more integrated strategies for active transportation, higher investments for transit and passenger rail, and a greater emphasis on building a balanced regional blueprint for improving public health and ensuring quality of life (as discussed in **Section 2.0, *Project Description***, of this PEIR). This is evident by the 2016 RTP/SCS transportation project types that allocate funding and planning efforts on trail access, regional greenway network, regional and local bikeway network, and pedestrian improvements by using a “complete street” approach; transit (rail, bus) improvements and new facilities; rideshare/vanpool programs; high-occupancy vehicle (HOV) lanes; traffic calming and signal improvements; and streetscape/landscape projects. The mission and resultant project list from the 2016 RTP/SCS strive to reduce emissions in both mobile and stationary sources by increasing density and reducing VMT. Additionally, land use strategies proposed in the Plan seek to balance the region’s strategic transportation investments and land use choices and are coordinated with the committed and projected transportation investments in the region that emphasize system preservation and enhancement, active transportation, and land use integration. These efforts are in alignment with the attainment plans and air quality management plans’ goals to reduce emissions of pollutants in nonattainment areas. Therefore, the Plan is expected to have a less than significant impact to conflict with or obstruct implementation of the applicable air quality plan, and the consideration of mitigation measures is not warranted.

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Significant Impact

The construction and operation of individual transportation projects and anticipated development as result of the proposed transportation and land use strategies in the 2016 RTP/SCS are expected to have the potential to violate air quality standards or contribute substantially to an air quality violation, thus requiring the consideration of mitigation measures.

Long Term. Under the 2016 RTP/SCS, air emissions were estimated in 2040 (with the Plan) and compared to existing conditions (2012 base year). The calculated emissions were compiled for ROG, NO_x, CO, PM_{10}, $PM_{2.5}$, and SO_x for each county in the SCAG region. For every criteria pollutant in every county in the SCAG region, there are air pollutant emission reductions or no change between the Plan in 2040 and existing conditions (**Table 3.3.4-1** ***Criteria Pollutant Emission by County— Plan [2040] vs. Existing Conditions [2015]***). There is a less than significant impact to Impact Air-2 in the long term.

TABLE 3.3.4-1
CRITERIA POLLUTANT EMISSION BY COUNTY— PLAN (2040) VS. EXISTING CONDITIONS (2015)

County		(Tons/Day)								
		ROG		NO_x			CO	PM_{10}	$PM_{2.5}$	SO_x
		Summer	Annual	Summer	Annual	Winter	Winter	Annual	Annual	Annual
Imperial	Existing	4	4	10	11	11	28	1	0	0
	Plan	2	2	3	3	3	13	1	0	0
	Difference	**–2**	**–2**	**–7**	**–7**	**–7**	**–14**	**0**	**0**	**0**
Los Angeles	Existing	103	101	179	194	190	851	17	9	1
	Plan	21	21	35	37	36	141	14	6	1
	Difference	**–81**	**–80**	**–144**	**–157**	**–154**	**–711**	**–3**	**–3**	**0**
Orange	Existing	28	28	42	46	45	225	5	2	0
	Plan	7	7	8	8	8	44	5	2	0
	Difference	**–21**	**–21**	**–35**	**–38**	**–37**	**–181**	**0**	**–1**	**0**
Riverside	Existing	26	23	66	70	69	183	5	3	0
	Plan	8	7	14	15	15	42	5	2	0
	Difference	**–19**	**–17**	**–52**	**–55**	**–55**	**–141**	**0**	**–1**	**0**
San Bernardino	Existing	32	28	81	86	84	225	6	3	0
	Plan	8	7	22	22	22	46	6	2	0
	Difference	**–24**	**–21**	**–59**	**–64**	**–63**	**–179**	**0**	**–1**	**0**
Ventura	Existing	9	8	12	14	14	70	1	1	0
	Plan	2	2	2	2	2	11	1	0	0
	Difference	**–7**	**–7**	**–10**	**–11**	**–11**	**–59**	**0**	**0**	**0**

SOURCE:
SCAG Transportation Modeling, 2015.
NOTE: Please note that 2012 base year network includes projects in the 2015 Federal Transportation Improvement Program (FTIP) adopted in September 2014 and projects in the 2012 RTP/SCS as last amended in September 2014.

The analysis of air quality also includes a comparison between the expected future conditions with the Plan and the expected future conditions if no Plan (No Project Alternative) were adopted. This evaluation is not included in the determination of the significance of impacts (which is based on a comparison of future conditions with the Plan to existing conditions); however, it provides a meaningful perspective on the effects of the Plan. **Figure 3.3.4-1, *$PM_{2.5}$ Emissions Change***, and **Figure 3.3.4-2, *CO Emissions Change***, compare the Baseline (2040) emissions with the Plan (2040) emissions for $PM_{2.5}$ and CO. The classification in the figures range from ≤2.5 standard deviations (SD), –2.5 to –1.5 SD, –1.5 to –0.5,SD, –0.5 to 0.5 SD, 0.5 to 1.5 SD, 1.5 to 2.5 SD, and >2.5 SD. CO and $PM_{2.5}$ emissions mainly originate from vehicle exhaust, so their emissions are closely tied to transportation patterns and total VMT. In 2040, the Plan has less PM_{10}, $PM_{2.5}$, and CO emissions relative to Baseline, which could be attributed to policies that increase density in urban areas and active transportation (e.g., walking and biking) in the urban areas. Additionally, heavy duty vehicles which would incorporate emission reducing technology would also result in reduced emissions in nearby sensitive receptors. Since urban areas are responsible for most of the CO and $PM_{2.5}$ emissions, the Plan has less $PM_{2.5}$ and CO emissions relative to the No Project Alternative.

Short Term. The 2016 RTP/SCS would result in construction of transportation projects, buildings, and general development as the region grows. These construction activities would result in short-term emissions of air pollutants including ROG, NO_x, PM_{10}, $PM_{2.5}$ and fugitive dust. The sources associated with these emissions include construction equipment, employee and vendor vehicles, demolition, grading and other ground-disturbing activities, application of paint and other coatings, paving, and others. Typically larger projects are associated with larger emissions during construction.

Since the 2016 RTP/SCS documents transportation projects in the six-county area, it is more than likely that multiple simultaneous construction projects would occur, resulting in greater cumulative emissions. While construction is transient in nature, short-term emissions from construction have the potential to contribute substantially to localized and daily thresholds. The SCAQMD sets mass daily thresholds for both construction and operation for the six main criteria pollutants and lead. All the air districts in the SCAG region also have a relevant fugitive dust rule that applies to construction activities. Therefore, the 2016 RTP/SCS would have the potential to result in a significant impact in the short term.

IMPACT Air 3: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under applicable NAAQS or CAAQS

Less than Significant Impact

The 2016 RTP/SCS would not result in a cumulatively considerable net increase of any criteria pollutant for which the region is designated nonattainment because the projected long-term emissions are in alignment with the local AQMPs/SIPs as demonstrated in the conformity analysis. The criteria pollutants that have a violation under the NAAQS are summarized in **Table 3.3.2-4, *2015 Nonattainment Areas in the SCAG Region for All Criteria Pollutants by County by NAAQs***. The SCAG region is currently in nonattainment for $PM_{2.5}$, PM_{10}, and ozone. These pollutants are the same ones that violate the CAAQs as well (**Table 3.3.2-5, *CAAQS Area Designations***). The Plan when compared to existing conditions, would result in either no change or a decrease for $PM_{2.5}$ and PM_{10} (**Table 3.3.4-1**). Ozone is assessed using the emissions for the ozone precursors which include ROG and NO_x. Since ROG and NO_x emissions

FIGURE 3.3.4-1:
PM 2.5 Emissions Change

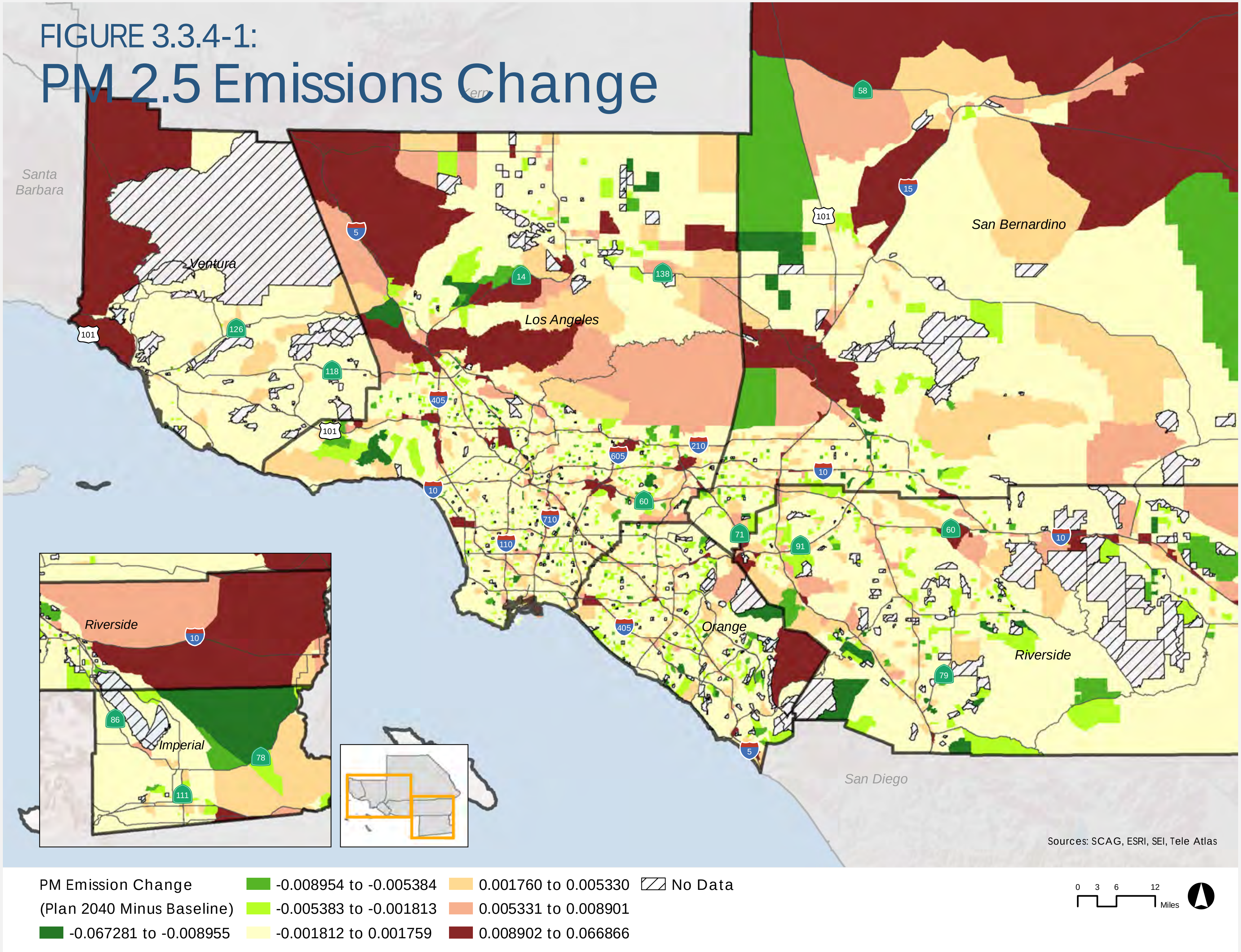


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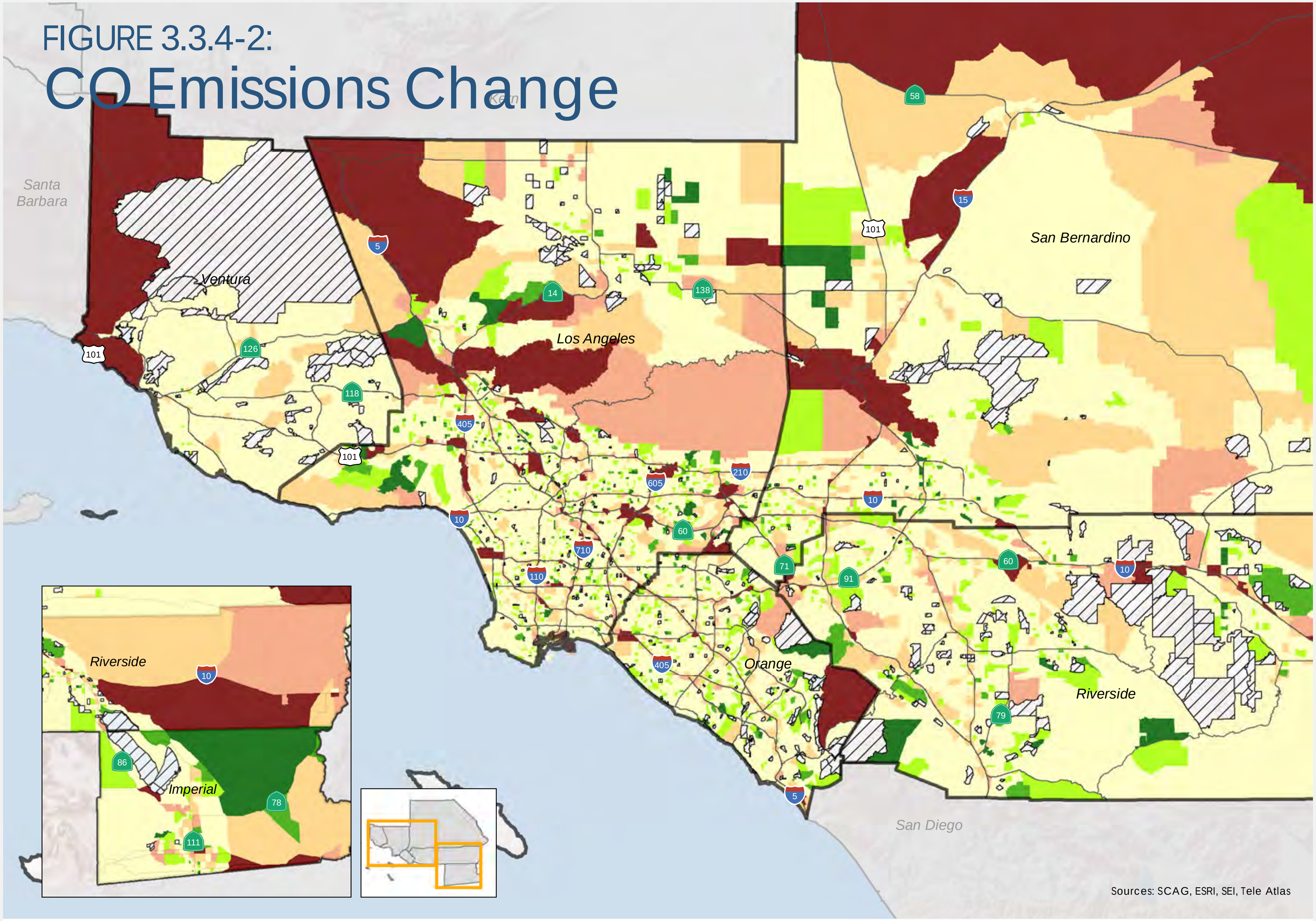
FIGURE 3.3.4-2:

CO Emissions Change



CO Emission Change (Plan 2040 Minus Baseline)

- -1.556883 to -0.198799
- -0.198798 to -0.119998
- -0.119997 to -0.041198
- -0.041197 to 0.037603
- 0.037604 to 0.116404
- 0.116405 to 0.195204
- 0.195205 to 1.418439
- No Data

show a decrease from the existing conditions to the Plan, they will not contribute to a net increase in ozone.

Pursuant to the U.S. EPA's Transportation Conformity Regulations, the regional emissions tests are met if plan emissions are within the applicable emissions budgets for each nonattainment or maintenance area for all milestone, attainment, and planning horizon years and, if no emissions budgets have been established, the Plan/build emissions are less than the no-build emissions or the base-year emissions. The emissions budgets that were established in the AQMPs/SIPs in the SCAG region and have been approved by the U.S. EPA function as the applicable emission budgets for the conformity analysis for the respective nonattainment and maintenance areas. Federal conformity regulations also require the regional emissions analysis to be based on the Latest Planning Assumptions that include the latest vehicle data (fleet, age, activity) and latest socioeconomic growth forecast. A conformity determination must be made for each nonattainment and maintenance area in the region. In addition to the regional emissions analysis, the Plan is also required to pass (1) the timely implementation of the Transportation Control Measures (TCM) test, (2) the Financial Constraint test, and (3) the Interagency Consultation and Public Involvement test.

The regional emissions analysis serves as a reasonable analysis of cumulative air quality impacts of the Plan. The 2016 RTP/SCS meets the regional emissions tests for each nonattainment and maintenance area and for all milestone, attainment, and planning horizon years. The Transportation Conformity analysis can be found in the appendices of the 2016 RTP/SCS. The analysis concludes that the Plan meets all federal and state requirements for meeting attainment goals throughout the SCAG region as demonstrated by no net increase in any of the criteria pollutants that are currently in non-attainment according to the Plan (**Table 3.3.4-1**). Therefore, there would be less than significant impact, and the consideration of mitigation measures is not warranted.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

Significant Impact

Despite diesel emission reductions, the cancer risk as measured along the freeways is above the threshold with the 2016 RTP/SCS, a significant impact to sensitive receptors and public health exists, thus requiring the consideration of mitigation measures.

Sensitive Receptors. Substantial concentrations of air pollutants are linked to adverse health effects especially when located in proximity to sensitive receptors. Because certain populations such as children and elderly are more sensitive to air pollution, it is critical to identify the effect of the 2016 RTP/SCS has on these populations. Sensitive receptors are identified as locations where people reside as they spend a significant amount of time in that location as well as schools, medical facilities, senior centers, nursing homes, etc. CARB recommends that local governments avoid locating new sensitive land uses within 500 feet of freeways. Consistent with CARB and public input, the 2016 RTP/SCS aims to limit placing new growth within 500 feet.

As shown in **Table 3.3.4-2, *Sensitive Receptors by County***, only a small portion of the total number of existing sensitive receptors in the six counties are affected by the transportation projects listed in the 2016 RTP/SCS.

TABLE 3.3.4-2
SENSITIVE RECEPTORS BY COUNTY

County	Sensitive Receptors Count within 500-Foot Buffer of Major Transportation Projects	Total Sensitive Receptors Count	% Sensitive Receptors within 500-Foot Buffer of Major Transportation Projects
Imperial	829	37,329	2%
Los Angeles	92,491	1,749,992	5%
Orange	31,516	589,844	5%
Riverside	14,311	621,196	2%
San Bernardino	11,910	556,706	2%
Ventura	2,839	219,644	1%

SOURCE:
SCAG GIS modeling and data, 2015.

To assess public health risks caused by emissions, a Health Risk Assessment (HRA) was prepared (**Appendix D**) for this PEIR. The HRA evaluates potential carcinogenic health risks from emissions of diesel particulate matter (DPM) and other air toxics from motor vehicles on major freeways and transportation corridors. Ambient PM_{10} and $PM_{2.5}$, of which DPM is one component. These emissions of diesel particulate emissions have been associated with acute (short-term) and chronic (long-term) health effects, such as the worsening of heart and lung diseases. Elevated levels of ambient particulate matter have also been identified as one of many aggravating factors for childhood asthma. PM_{10} and $PM_{2.5}$ are a health concern, particularly at levels above the federal and State ambient air quality standards. $PM_{2.5}$ is thought to have greater effects on health because smaller particles are able to penetrate to the deepest parts of the lungs.

Scientific studies have suggested links between fine particulate matter and numerous health problems, including asthma, bronchitis, and acute and chronic respiratory symptoms such as shortness of breath and painful breathing.[55] Children are more susceptible to the health risks of $PM_{2.5}$ because their immune and respiratory systems are still developing. Very small particles of certain substances (e.g., sulfates and nitrates) can also directly cause lung damage or can contain absorbed gases (e.g., chlorides or ammonium) that may be injurious to health.[56]

The HRA quantitatively analyzed the potential to expose people to increased cancer and other health risks, based on using the potential for increased cancer risk from diesel particulate matter form heavy-duty diesel trucks traveling on major freeways. Cancer risk is used as a corollary for general respiratory health. Only motor vehicle emissions on freeways were quantitatively evaluated because emissions from other transportation corridors are much less than emissions on major freeways. The declines in cancer risk across all freeway segments are the result of continued decreases in per-vehicle mile fleet emissions projected to occur due to continued emission control technology improvements in new vehicles.

The HRA evaluated 16 freeway segments (as shown on **Figure 3.3.4-3*, Overview Freeway Segments to Be Evaluated***). Emissions of DPM from each segment were calculated using the SCAG Transportation

[55] Active Living Research. Accessed 7 September 2015. *Research Results on Land Use, Transportation, and Community Design.* Available at: http://activelivingresearch.org/land-use-transportation-and-community-design-research-summary-slides

[56] Id.

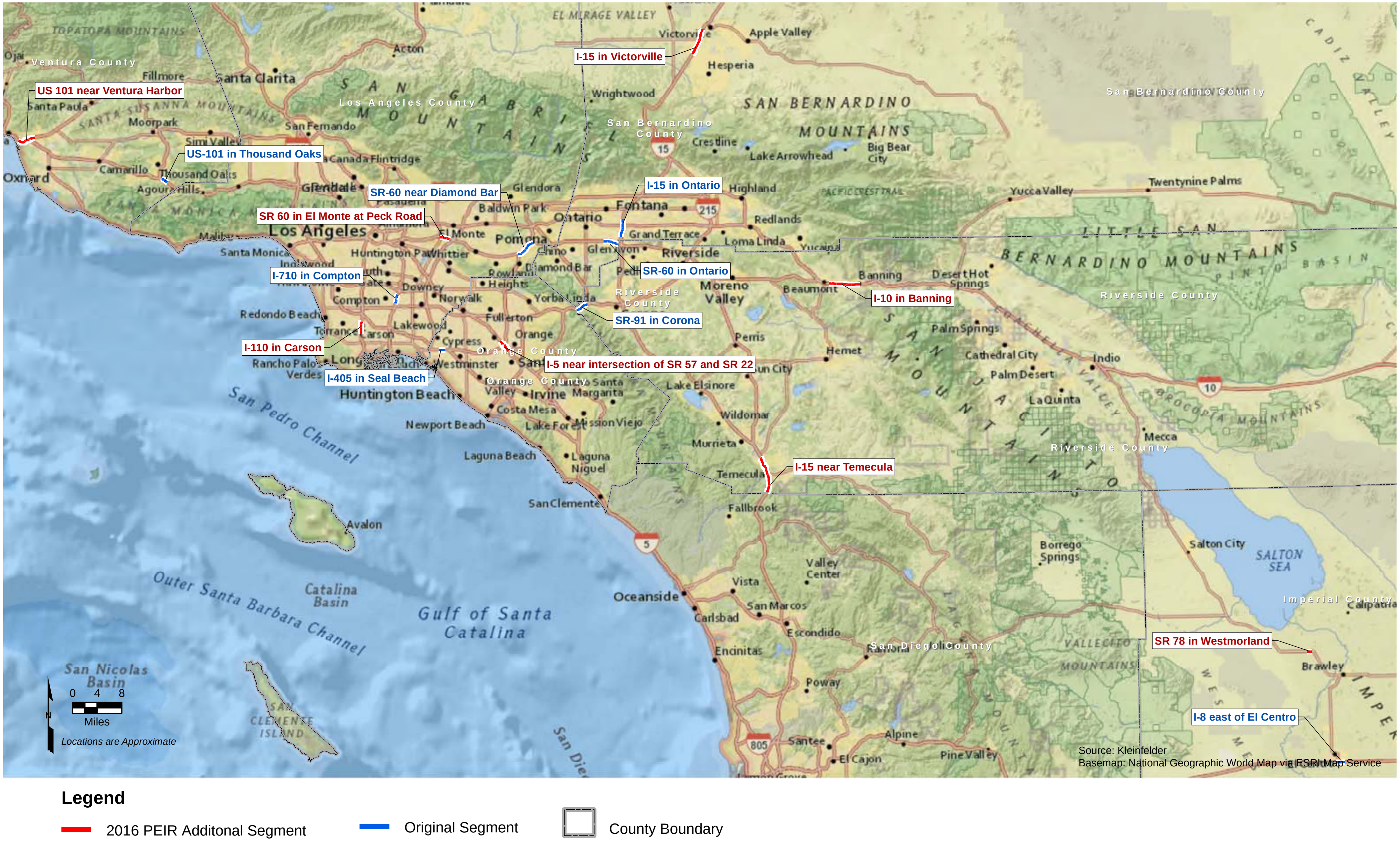


FIGURE 3.3.4-3:

Overview Freeway Segments to Be Evaluated

Demand Model VMT data for 2012 base year and projections for 2040 Plan. The potential cancer risk for residences was evaluated for a 30-year exposure, 9-year exposure and 70-year exposure. SCAG VMT data was provided for heavy duty vehicles and light/medium duty vehicles. The most current version of the California Air Resources Board (CARB) mobile source emissions model (EMFAC 2014) was used to obtain emission factors of particulate matter less than 10 microns diameter in diesel-fueled vehicles, which were assumed equal to DPM emission factors.

The potential impacts of emissions from a representative 1-mile long portion of the freeway segment were evaluated with CARB-approved AERMOD dispersion model (Version 15181) and meteorological data obtained from South Coast, Imperial, and Ventura Air District monitoring sites. The calculated DPM concentration was then used to calculate the potential carcinogenic risk using the most current HRA guidelines published by the California Office of Environmental Health Hazard Assessment (OEHHA). The potential cancer risk calculated for DPM was increased by 5 percent to account for the additional organic gases of acetaldehyde, benzene, 1-3-butadiene, and formaldehyde based on observations of past data.

To analyze potential cancer risk with respect to DPM, a baseline threshold of 10 per one million was utilized.[57] To clarify, the cancer risk in a given area is a measure of any one person's likelihood (chance) of contracting cancer due to exposure from a particular carcinogen; it is not a measure of how many people would actually contract cancer. This threshold is supported by air quality management districts in California, CARB and OEHHA. A 30-year exposure cancer risk was used in this analysis for a highly conservative scenario. This timeframe was selected as the typical resident lives in a home for approximately 30 years. Additionally, the analysis also assumed that the person would stay in the same place for 30 years, 7 days a week, 24 hours a day. As shown on **Table 3.3.4-3, *Summary Maximum Exposed Individual Residential 30-Year Exposure Cancer Risk*** (see also **Appendix D**), the maximum 30-year exposure to residential cancer risk for each transportation segment is significantly reduced when compared to existing conditions. While the VMT would rise under the Plan, the maximum potential cancer risk is on the order of 50 to 90 percent less than existing conditions. This is due to the dramatic reduction in emissions that are expected due to the federal and state regulations that require reduced emissions from on-road heavy-duty diesel trucks (HDDT). It is important to note that despite the reduction in cancer risk compared to existing conditions, the Plan would still result in minor exposure sensitive receptors to substantial pollutant concentrations and would slightly exceed the cancer risk threshold (10 in a million). As shown on **Table 3.3.4-3,** 15 of the 16 freeway segments exceeds the 10 in a million threshold, with the exception of Segment 2 (IMP SR-78, Imperial/Westmoreland), which is at 9 in a million. Despite the significant reduction in DPM emissions, impacts are still above the cancer risk threshold and are significant.

57 South Coast Air Quality Management District. March 2015. *SCAQMD Air Quality Significance Thresholds*. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2

TABLE 3.3.4-3
SUMMARY MAXIMUM EXPOSED INDIVIDUAL RESIDENTIAL 30-YEAR EXPOSURE CANCER RISK

Segment No.	Transportation Segment	County/Region	Existing Conditions	2016 RTP/SCS	Exceed Thresholds?
1	IMP I-8	Imperial / El Centro	125	19	Yes
2	IMP SR-78	Imperial / Westmoreland	82	9	No
3	LA I-110	Los Angeles / Carson	664	46	Yes
4	LA I-710	Los Angeles / Compton	847	55	Yes
5	LA SR-60 DB	Los Angeles / Diamond Bar	1,101	60	Yes
6	LA SR-60 SEM	Los Angeles / South El Monte	763	44	Yes
7	ORA I-5	Orange / Orange	455	33	Yes
8	ORA I-405	Orange / Seal Beach	1,142	78	Yes
9	RIV I-10	Riverside / Banning	152	15	Yes
10	RIV I-15	Riverside / Temecula	366	38	Yes
11	RIV SR-91	Riverside / Corona	937	55	Yes
12	SB I-15 ONT	San Bernardino / Ontario	236	25	Yes
13	SB I-15 VIC	San Bernardino / Victorville	524	64	Yes
14	SB SR-60	San Bernardino / Ontario	810	39	Yes
15	VEN US-101 SB	Ventura / San Buenaventura	165	11	Yes
16	VEN US-101 TO	Ventura / Thousand Oaks	832	48	Yes

SOURCE:
Health Risk Assessment (**Appendix D**).
NOTE:
Cancer Risk Threshold is 10 per 1 million.

Public Health. In addition to emissions, multiple social, economic, and lifestyle factors could contribute to the detriment to the public health of a region. Built upon the public health emphasis of the 2012 RTP/SCS, the 2016 RTP/SCS places an even greater emphasis on public health. SCAG has evaluated social determinants including the community context, availability of health care, neighborhood and surrounding built environment, education, and economic health to see how these factors shape public health. With nearly half of U.S. adults living with a chronic disease, SCAG recognizes improving public health is vital to the community. The Surgeon General promotes increasing physical activity as one strategy to improve public health. While VMT from heavy duty trucks would increase, SCAG's Plan would decrease personal vehicle usage and increase active transportation. There is a growing support for increasing active transportation throughout the communities in the region. These changes can only be met if there is also a change in the built environment that enables people to walk safely in their communities. Proposed land use strategies and transportation investments such as provision of additional investments in active transportation networks including first/last mile improvements, Safe Routes to School projects, and regional bikeways infrastructures are expected to increase the number of short trips and improve physical activity outcomes. The statewide Affordable Housing and Sustainable Communities (AHSC) program, as noted in the Plan, would help to lower VMT traveled and AQ/GHG emissions by funding housing and transportation improvements. The program focuses on creating HQTAs.

The 2016 SCAG RTP/SCS includes regional strategies that may contribute to improving public health. As discussed in **Section 2.0,** ***Project Description***, of this PEIR, these strategies include, for example, increased transportation investments in active transportation opportunities and facilities, transit and passenger rail use, and land use strategies that create more opportunities for walking and biking or other physical activities. The RTP/SCS projects that daily VMT will increase in all counties above baseline conditions in the 2040 Plan Year (**Table 3.3.4-4, *Daily VMT by County***). While per capita VMT is expected to decline, the net increase in population results in net increases in VMT in all counties. These strategies are linked to relevant performance measures in the outcome categories of economic wellbeing, investment effectiveness, environmental quality, location efficiency, mobility and accessibility, safety and health, system sustainability, and environmental justice. Incorporation of active transportation modes such as expanded regional greenway network and local and regional bikeway networks for biking and walking allow for more physical activities and greater health.

TABLE 3.3.4-4
DAILY VMT BY COUNTY

County	2012 Base Year	2040 Baseline	2040 Plan
Imperial	5,000	9,000	9,000
Los Angeles	226,000	249,000	228,000
Orange	77,000	84,000	79,000
Riverside	58,000	86,000	80,000
San Bernardino	62,000	89,000	86,000
Ventura	20,000	23,000	21,000
SCAG total	448,000	540,000	504,000

SOURCE:
SCAG GIS modeling and data, 2015.

In addition, SCAG is working on its community outreach and leadership through its Public Health Work Program. This program, expressed in the 2016 SCAG RTP/SCS, relies on leadership and collaboration, policy and analysis, and regional support. SCAG would build partnerships among government agencies, nonprofits, educational institutions, foundations, and other stakeholders to increase regional engagement. Synergies developed among the stakeholders improve data sharing and resource pooling for more comprehensive and integrated regional policy planning. This regional-level cooperation will lead to more standardized metrics and in turn help assist local agencies take advantage of Sustainability Planning Grants and other grant funding to promote public health.

The 2016 RTP/SCS would provide strategies to improve public health and develop walkable and transit friendly communities. The cancer risk would exceed thresholds, though it would be significantly reduced when compared to existing conditions. Impacts would remain significant and unavoidable.

IMPACT Air-5: Expose a substantial number of people to objectionable odors.

Less than Significant Impact

The 2016 RTP/SCS would result in a less than significant impact to air quality in relation to exposing a substantial number of people to objectionable odors. Odor sources within the SCAG region, such as wastewater treatment facilities, landfills, and agricultural operations, are controlled by county and city odor ordinances and air district rules that prohibit nuisance odors and identify enforcement measures to reduce odor impacts to nearby receptors. These ordinances and rules are enforced by the air pollution control districts and local law enforcement. For example, SCAQMD/MDAQMD/AVAQMD Rule 1113, VCAPCD Rule 74.2 and ICAPCD Rule 101, Rule 424, *Architectural Coatings*, limit the amount of volatile organic compounds from architectural coatings and solvents to further reduce the potential for odiferous emissions. However, transportation improvement projects in 2040 would not be expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions. Therefore, the impact would be less than significant, and the consideration of mitigation measures is not warranted.

Construction. In accordance with federal and state regulations, diesel emissions from heavy duty trucks are projected to decrease with the Plan (see the HRA, **Appendix D**), and construction activities associated with the Plan would occur away from sensitive receptors in adherence to CARB's guidelines and response to public input gathered during the public outreach period. Construction of transportation projects listed in the Plan, as well as anticipated growth and development in the SCAG region have the potential to cause an increase in construction activities. From 2015 to 2040, construction would occur from transportation network improvements and land use development projects. Activities associated with the operation of construction equipment, diesel, the application of asphalt, the application of architectural coatings and other interior and exterior finished, and roofing may produce discernible odors typical of most construction sites. SCAQMD/MDAQMD/AVAQMD Rule 1113, VCAPCD Rule 74.2 and ICAPCD Rule 101, Rule 424, *Architectural Coatings*, limit the amount of volatile organic compounds from architectural coatings and solvents to further reduce the potential for odiferous emissions. Similar odor reducing rules apply to the other air quality districts in the SCAG region. Although these odors could be a source of nuisance to adjacent uses, odors from construction are temporary and intermittent in nature. Construction-related emissions also decrease with distance from the project site and quickly dissipate.

Land Use. The regional growth and anticipated land use changes reflected in the RTP/SCS would have the potential to result in nuisance odors. The level of exposure and number of receptors affected can only be determined through project-level analysis once facility designs of individual projects are available. Therefore, odor analyses related to regional growth and land use change in 2020 would be analyzed at the project level. However, projects would be required to comply with applicable odor regulations. Regional growth and land use change projects in 2020 would not be expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions. Therefore, the impact would be less than significant, and the consideration of mitigation measures is not warranted.

Transportation Improvements. Transportation projects that involve roadway expansions or realignments could result in the transfer of vehicle emissions and/or could result in odor emissions sources being located closer to receptors. In addition, some projects (e.g., rail stations) could result in localized traffic congestion that generates odor concentrations. The level of exposure and number of receptors affected can only be determined through project-level analysis once facility designs of individual projects are available. Therefore, the odor analyses related to transportation improvements in 2020 for the 2050 RTP/SCS would be completed at the project level. However, projects would be required to comply with applicable odor regulations. Transportation projects in 2040 would not be expected to result in substantial odor emissions or affect a substantial number of people when compared to existing conditions. Therefore, the impact would be less than significant, and the consideration of mitigation measures is not warranted.

3.3.5 CUMULATIVE IMPACTS

The 2016 RTP/SCS contains transportation projects and strategies to integrate transportation investments with land use. These transportation projects, provided by county transportation commissions during the bottom-up planning process, are included in SCAG's transportation model. Transportation projects and anticipated development as part of the forecasted regional growth and land use strategies of the Plan have the potential to generate emissions for all six criteria air pollutants during both construction and operation.

IMPACT Air-1: Potential to conflict with or obstruct implementation of the applicable air quality plan.

Less than Significant Cumulative Impact

The 2016 RTP/SCS includes transportation projects and strategies that are consistent with air-related plans in the region and would not result in a cumulative impact with respect to conflicting with or obstructing implementation of an applicable air quality plan. Air quality plans are written for the applicable air basin(s) it covers. Because air basins are distinct geographical areas, the pollutants emitted beyond those air basins analyzed in this PEIR would not conflict with or obstruct implementation of those air quality management plans or attainment plans in the SCAG region. The cumulative impact would then be less than significant with regard to conflicting with the applicable air quality plans.

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Significant Cumulative Impact

Implementation of the transportation projects included in the 2016 RTP/SCS, when taken into consideration with other development and infrastructure projects within the SCAG region and surrounding areas, would have the potential to result in a significant cumulative impact to violating an air quality standard or contributing substantially to an existing or projected air quality violation in the short-term from construction emissions. Projected long-term emissions are considered to have a less than significant cumulative impact according to the SCAG Transportation Model because the Plan is consistent with the local air quality management plans and state implementation plans. The model is inclusive of all potential air emissions in the SCAG region that could occur as a result of the Plan. Violations to the air quality standard outside of the SCAG region would not affect significance determinations within the SCAG region because the air quality thresholds are bounded within the air districts. Because the construction of development projects, occurring within the same neighborhood, may result in significant air quality emissions in excess of the thresholds, there would be a significant impact and therefore also a significant cumulative impact to the potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

IMPACT Air 3: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under applicable NAAQS or CAAQS

Less than Significant Cumulative Impact

The 2016 RTP/SCS would result in a less than significant cumulative impact to increasing any criteria pollutant that is in nonattainment under applicable NAAQS or CAAQS. The region is in nonattainment for PM2.5, PM10, and ozone. The Plan would not contribute to a net increase in these pollutants and is within the emission budgets set by the AQMPs/SIPs in the SCAG region. As a result, the Plan has demonstrated compliance with the transportation conformity regulations set by the U.S. EPA that apply in non-attainment and maintenance areas. Increases in criteria pollutants outside the areas already analyzed in the SCAG region would have no bearing on the Plan’s ability to achieve conformity. There would be a less than significant cumulative impact to a net increase of any criteria pollutant designated as non-attainment.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

Significant Cumulative Impact

The 2016 RTP/SCS includes transportation projects and strategies to improve public health, but would result in a significant cumulative impact by exposing sensitive receptors to substantial pollutant concentrations that would harm public health outcomes. While the Plan aims to limit growth within the 500-foot buffers of freeways and high volume roadways, it places a small percentage of sensitive receptors within a 500 foot buffer of major transportation projects in HQTAs beyond those provided by local jurisdictions. The Plan also sets forth strategies to increase active transportation and physical activity to improve public health. However, the HRA analysis revealed that despite a 50 to 90 percent reduction in mobile source emissions, the cancer risk threshold as measured at the receptor locations would be exceeded in all but one of sixteen segments. Because the Plan and HRA considered the potential for sensitive receptors in the SCAG region to be affected by substantial pollutant concentrations, the analysis in the Plan and HRA is representative of all the impacts to sensitive receptors in the SCAG region. Impacts to sensitive receptors outside the SCAG region would be less than those already evaluated because the distance to the receptor would be much greater. Because the Plan already results in direct and indirect significant impacts to sensitive receptors, the Plan would result in a significant cumulative impact in exposing sensitive receptors to substantial pollutant concentrations and harming public health.

IMPACT Air-5: Expose a substantial number of people to objectionable odors.

Less than Significant Cumulative Impact

The 2016 RTP/SCS would not expose a substantial number of people to objectionable odors. Odors from construction are temporary and intermittent in nature. While odors would need to be evaluated on a project by project basis, there is a potential for multiple projects to occur simultaneously within the same neighborhood and in close proximity of each other. However because all projects must comply with odor regulations as prescribed by the applicable air district, the Plan would result in a less than significant cumulative impact to exposing a substantial number of people to objectionable odors.

3.3.6 MITIGATION MEASURES

Mitigation measures as they pertain to each CEQA question related to air quality are described below. Mitigation measures are categorized into two categories: SCAG mitigation measures and project-level mitigation measures. SCAG mitigation measures shall be implemented by SCAG over the lifetime of the 2016 RTP/SCS. Project-level mitigation measures can and should be implemented by the Lead Agencies for transportation and development projects, as applicable and feasible.

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

SCAG Mitigation Measures

MM-Air-2(a)(1): SCAG shall determine as part of its conformity finding pursuant to the federal CAA that the Plan and updates provide for timely implementation of transportation control measures (TCMs), as required in the CAA Section 108(f)(1)(A). TCMs are identified in the Transportation Conformity Appendix to the 2016 RTP/SCS. SCAG has identified 17 measures as illustrative of TCMs based on review information contained in CAA Section 108(f)(1)(A) and information provided by utilities that serve the SCAG region:

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 HOV;
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;

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.

XVII. Programs to encourage the installation of personal electric vehicle charging stations, and other alternative fuel sources.

MM-Air-2(a)(2): During the 2016 to 2040 Planning Horizon, SCAG shall pursue activities to reduce the impacts associated with health risk for sensitive receptors within 500 feet of freeways and high-traffic volume roadways as follows:

- Participate in ongoing statewide deliberations on health risks near freeways and high-traffic-volume roadways. This involvement includes supporting the statewide process by providing available data and information such as the current and projected locations of sensitive receptors relative to transportation infrastructure.
- Continue to work with air agencies including ARB, SCAQMD, and all air districts in the SCAG region to support their work in monitoring the progress on reducing exposure to emissions of PM_{10} and $PM_{2.5}$ for sensitive receptors, including schools and residents within 500 feet of freeways and high-traffic-volume roadways.
- Work with stakeholders to identify planning and development practices that are effective in reducing health impacts to sensitive receptors.
- Share information on all of the above efforts with stakeholders, member cities, counties, and the public.

Project-Level Mitigation Measures

MM-Air-2(b): Consistent with the provisions of Section 15091 of the State CEQA Guidelines, SCAG has identified mitigation measures that are within the jurisdiction and authority of the CARB, air quality management districts and other regulatory agencies. Where the Lead Agency has identified that a project has the potential to violate an air quality standard or contribute substantially to an existing air quality violation, the Lead Agency can and should consider the measures that have been identified by CARB and air district(s) and other agencies as set forth below, or other comparable measures, to facilitate consistency with plans for attainment of the NAAQS and CAAQS, as applicable and feasible.

CARB, South Coast AQMD, Antelope Valley AQMD, Imperial County APCD, Mojave Desert AQMD, Ventura County APCD, and Caltrans have identified project-level feasible measures to reduce construction emissions:

- Minimize land disturbance.
- Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas.
- Suspend grading and earth moving when wind gusts exceed 25 miles per hour unless the soil is wet enough to prevent dust plumes.
- Cover trucks when hauling dirt.

- Stabilize the surface of dirt piles if not removed immediately.
- Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.
- Minimize unnecessary vehicular and machinery activities.
- Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
- Revegetate disturbed land, including vehicular paths created during construction to avoid future off-road vehicular activities.
- On Caltrans projects, Caltrans Standard Specifications 10-Dust Control, 17-Watering, and 18-Dust Palliative shall be incorporated into project specifications.
- Require contractors to assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that could be used an aggregate of 40 or more hours for the construction project. Prepare a plan for approval by the applicable air district demonstrating achievement of the applicable percent reduction for a CARB-approved fleet.
- Ensure that all construction equipment is properly tuned and maintained.
- Minimize idling time to 5 minutes—saves fuel and reduces emissions.
- Provide an operational water truck on-site at all times. Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas. Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
- Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.
- Develop a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.
- As appropriate require that portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain CARB Portable Equipment Registration with the state or a local district permit. Arrange appropriate consultations with the CARB or the District to determine registration and permitting requirements prior to equipment operation at the site.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

SCAG Mitigation Measures

See **MM-Air-2(a)(1) and MM-Air-2(a)(2).**

Project-Level Mitigation Measures

MM-Air-4(b): Consistent with the provisions of Section 15091 of the State CEQA Guidelines, SCAG has identified mitigation measures that are within the jurisdiction and authority of the air quality management district(s) where proposed 2016 RTP/SCS projects or development projects resulting from the land use patterns in the 2016 RTP/SCS would be located. Where the Lead Agency has identified that a project has the potential, to expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially, the Lead Agency can and should consider the measures that have been identified by CARB and air district(s), or other comparable measures, to reduce cancer risk pursuant to the Air Toxics "Hot Spots" Act of 1987 (AB2588), as applicable and feasible. Such measures include those adopted by CARB designed to reduce substantial pollutant concentrations, specifically diesel, from mobile sources and equipment. CARB's strategy 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.
- Pursue long-term advanced technology measures.

Proposed new transportation–related SIP measures include:

<u>On-Road Sources</u>

- 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
- Limited idling of diesel-powered trucks
- Consolidated truck trips and improve traffic flow
- Late model engines, Low emission diesel products, engine retrofit technology
- Alternative fuels for on-road vehicles

<u>Off-Road Sources</u>

- 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

3.3.7 LEVEL OF SIGNIFICANCE AFTER MITIGATION

IMPACT Air-2: Potential to violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Given SCAG's limited authority over the local jurisdictions and unforeseeable circumstances at the project level, whereas implementation of **MM-Air-2(a)(1), MM-Air-2(a)(2)**, and **MM-Air-2(b)** would reduce the impact of short-term emissions, direct, indirect, and cumulative impacts would remain significant and unavoidable.

IMPACT Air-4: Expose sensitive receptors to substantial pollutant concentrations and harm public health outcomes substantially.

Implementation of **MM-Air-2(a)(1), MM-Air-2(a)(2)**, and **MM-Air-4(b)** would reduce the impacts to sensitive receptors and public health, but direct, indirect, and cumulative impacts would remain significant and unavoidable.