South Coast AQMD

DRAFT FINAL

2022 AIR QUALITY MANAGEMENT PLAN

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

GOVERNING BOARD

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Table of Contents

Executive Summary

1. Introduction

2. Air Quality and Health Effects

3. Base Year and Future Emissions

4. Control Strategy and Implementation

5. Future Air Quality

6. Federal & State Clean Air Act Requirements

7. Current & Future Air Quality - Desert Nonattainment Areas SIP

8. Environmental Justice Communities

Executive Summary

- Despite great strides in cleaning the air over the past several decades, the Los Angeles area still has the highest levels of ozone (smog) in the nation.
- Meeting the 2015 federal ozone standard requires reducing emissions of nitrogen oxides (NOx) – the key pollutant that creates ozone – by ~~71~~67 percent more than is required by adopted rules and regulations in 2037.
- The only way to achieve the required NOx reductions is through extensive use of zero emission technologies across all stationary and mobile sources.
- South Coast Air Quality Management District's (South Coast AQMD) primary authority is over stationary sources which account for ~~less than~~approximately 20 percent of NOx emissions.
- The overwhelming majority of NOx emissions are from heavy-duty trucks, ships and other State and federally regulated mobile sources that are mostly beyond the South Coast AQMD's control.
- The region will not meet the standard absent significant federal action.
- In addition to federal action, the 2022 Air Quality Management Plan (AQMP) requires substantial reliance on future deployment of advanced technologies to meet the standard.
- The required transition to zero and low emission technologies to meet the standard will be more expensive than traditional control strategies developed for previous federal standards. Ensuring the transition is equitable and affordable will be key to the success of the AQMP.

In This Chapter

Overview

The 17 million residents of the greater Los Angeles area have historically suffered from some of the worst air quality in the nation. While air pollution has reduced greatly, more needs to be done. The region has the worst levels of ground-level ozone (smog) and among the highest levels of fine particulate matter (PM2.5). The air pollution levels in the region exceed both National and California Ambient Air Quality Standards for both these air pollutants. The health impacts associated with the high levels of air pollution cause respiratory and cardiovascular disease, exacerbate asthma, and can lead to premature death. We also know that our Environmental Justice (EJ) communities experience the brunt of the health effects from air pollution. In this document, EJ communities are defined as census tracts in the top 25 percent in the California Office of Environmental Health Hazard Assessment's California Communities Environmental Health Screening Tool (CalEnviroScreen).[1] Approximately 42~~37~~ percent of the South Coast Air Basin (Basin) residents and 11~~8~~ percent of Coachella Valley residents live in EJ communities.

The U.S. Environmental Protection Agency (U.S. EPA) requires areas that do not meet a National Ambient Air Quality Standard (NAAQS or standard) to develop and submit a State Implementation Plan (SIP) for approval. SIPs are used to show how the region will meet the standard. Regions must attain NAAQS by specific dates or face the possibility of sanctions by the federal government and other consequences under the Clean Air Act (CAA). This can result in increased permitting fees, stricter restrictions for permitting new projects, and the loss of federal highway funds.

The South Coast AQMD SIPs are developed within the ~~agencies~~agency's Air Quality Management Plans (AQMPs). The most recent AQMP was developed in 2016 and addressed the 1997 8-hour and 2008 8-hour ozone standards, as well as PM2.5 standards. This document is the Draft Final 2022 AQMP and is focused on attaining the 2015 8-hour ozone standard of 70 parts per billion (ppb).

In August 2018, the U.S. EPA designated the Basin as "extreme" nonattainment and the Coachella Valley as "severe-15" nonattainment for the 2015 8-hour ozone standard. The South Coast Air Basin includes large areas of Los Angeles, Orange, Riverside, and San Bernardino counties. The Coachella Valley is the desert portion of Riverside County in the Salton Sea Air Basin. "Extreme" nonattainment areas must attain this standard by August 2038 and "severe" nonattainment areas must attain by August 2033 (Table ES-1).

[1] Full details of the CalEnviroScreen methodology and data sources can be found in the CalEnviroScreen 4.0 report released in October 2021. Available online at: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.

TABLE ES-1

NONATTAINMENT STATUS OF 2015 8-HOUR OZONE NAAQS

Standard	Nonattainment Area	Classification	Attainment Year
2015 8-Hour Ozone	South Coast Air Basin	Extreme	2037[2]
	Coachella Valley	Severe-15	2032[3]

The Draft Final 2022 AQMP builds upon measures already in place from previous AQMPs. It also includes a variety of additional strategies such as regulation, accelerated deployment of available cleaner technologies (e.g., zero ~~emission~~emissions technologies, when cost-effective and feasible, and low NOx technologies in other applications), best management practices, co-benefits from existing programs (e.g., climate and energy efficiency), incentives, and other CAA measures to achieve the 2015 8-hour ozone standard.

The 2015 8-hour ozone standard is the most stringent standard to date. Because current ozone levels in the Basin are so high, meeting the standard will require substantial ~~emission~~emissions reductions above and beyond current programs. We project that emissions of NOx – the key pollutant controlling formation of ozone – must be reduced by ~~71~~67 percent beyond what we would achieve through current programs by 2037 to meet the standard. The magnitude of such an emission reduction means that all sources of emissions must be controlled as stringently as possible. This also means that we will have to rely on flexibilities provided by ~~the~~ Section 182(e)(5) of the CAA, known as "black box" measures, to show that we are able to meet the standard. These "black box" measures can include the development and deployment of future technologies to reduce emissions as well as the reduction of NOx from sources regulated by the federal government. As depicted in Figure ES-1, ~~42~~46 percent of NOx emissions in 2037 will come from federal sources, while ~~39~~34 percent will come from State regulated sources, and only ~~19~~20 percent will come from ~~the~~ South Coast AQMD regulated sources.

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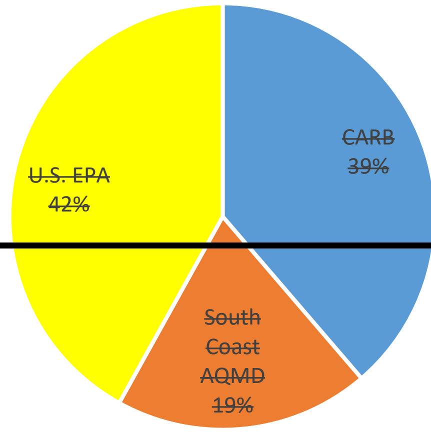
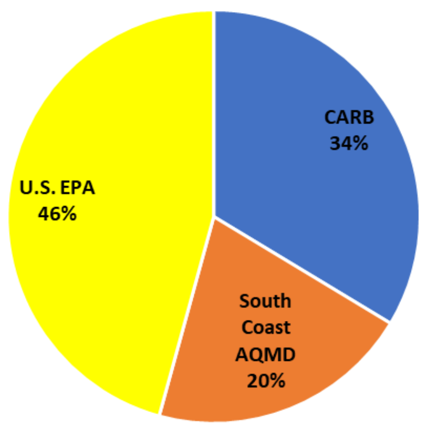
[2] Attainment date is August 3, 2038, which is 20 years from the designation as "extreme" nonattainment areas. The U.S. EPA requires that all control measures in the attainment demonstration must be implemented no later than the beginning of the attainment year ozone season. The U.S. EPA also defines the attainment year ozone season ~~is~~as the ozone season immediately preceding a nonattainment area's maximum attainment date, which is August 3, 2038, therefore, 2037 is the attainment year for the ~~basin~~Basin.

[3] Attainment date is August 3, 2033, which is 15 years from the designation as "severe" nonattainment area. The attainment year is the ozone season preceding August 3, 2033, which leads to 2032 as attainment year.



~~**NOx Emissions: 220 Tons per Day**~~

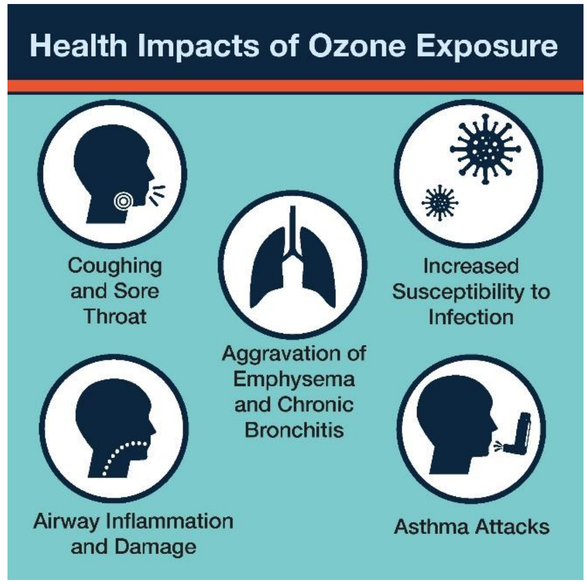


NOx Emissions: 184 tons/day

FIGURE ES-1
2037 EMISSIONS INVENTORY BY AGENCY RESPONSIBILITY

Health Effects and Air Quality Trends

Breathing high levels of ozone can cause a variety of negative health impacts such as asthma, chronic bronchitis, and emphysema; and increased susceptibility to lung infection. Individuals working outdoors, children, older adults, people with preexisting lung disease, and individuals with certain nutritional deficiencies are the most susceptible to these effects. Exposure to high levels of ozone levels can increase school absences, hospital visits, disease, and death.



Improvements in cleaner technology and strict regulations have reduced ozone levels since its peak in the mid-twentieth century. However, ozone levels have remained unacceptably high over the past decade despite significant reductions. This trend is due to the changes in climate and other weather conditions such as the increase in hot, stagnant days that can lead to the formation of ozone that we have experienced in recent years. While this AQMP predominantly addresses ozone, the trends and attainment status of all criteria air pollutants are presented in Chapter 2 and Appendix ~~2~~II. The Basin meets federal standards for particulate matter less than 10 microns in diameter (PM10), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2) and lead, but does not meet federal ozone and PM2.5 standards. The Coachella Valley does not meet federal ozone and PM10 standards, but attains federal PM2.5, NO_2, and CO standards.[4]

Emissions in the Basin and Reductions Needed for Attainment

Unlike most other air pollutants, ozone is not directly emitted, but instead is formed in the atmosphere. Ozone is formed when NOx and volatile organic compounds (VOCs) react in the presence of sunlight.[5] While both NOx and VOCs contribute to ozone, the key to attaining the ozone standard is to reduce NOx.

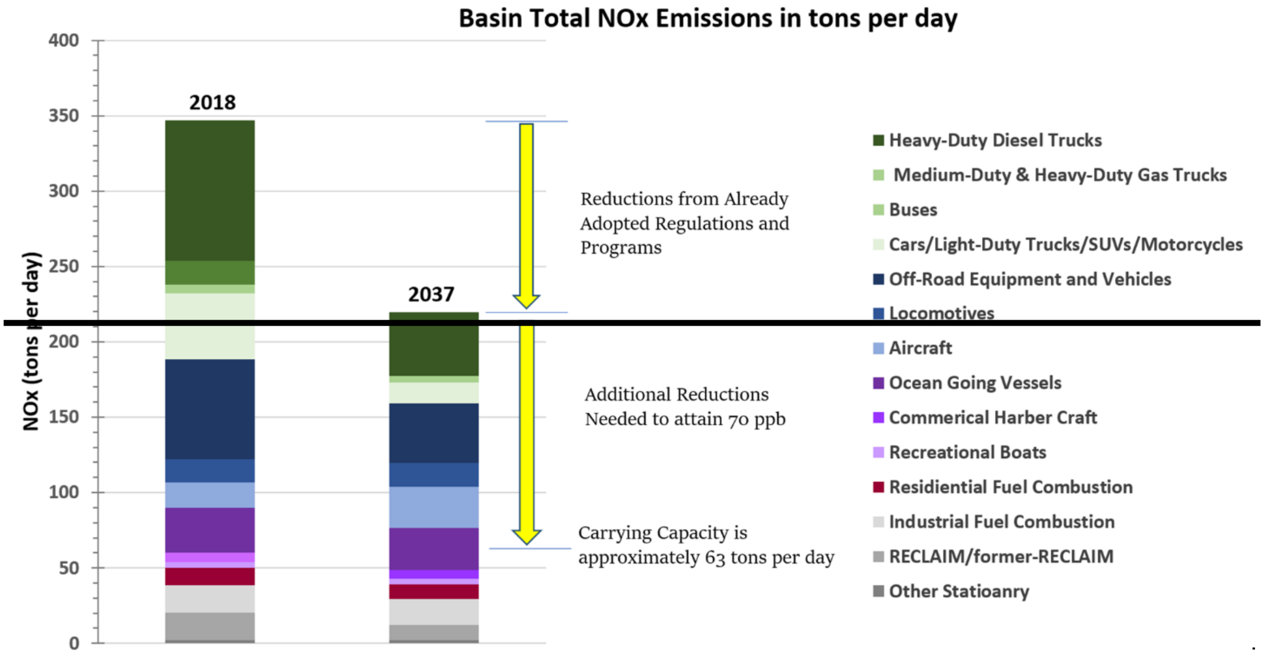
In the Basin, mobile sources – heavy-duty trucks, ships, airplanes, locomotives, and construction equipment – account for ~~more than~~80 percent of NOx emissions. Meanwhile, stationary sources – such as power plants, refineries, and factories – will be responsible for the remaining ~~19~~20 percent in 2037. This is an important point as the majority of~~ the~~ South Coast AQMD's regulatory authority is for stationary sources with only limited authority to control mobile sources.

In 2037, we project that ~~220~~184 tons per day of NOx will be emitted. This is known as the "baseline" and includes the implementation of existing regulations and programs, but does not include the actions proposed in this AQMP. This level is ~~36~~48 percent lower than NOx emissions in 2018. In order to meet the

[4] Lead and SO_2 concentrations were not measured in the Coachella Valley. In 2020, however, historic analyses have shown concentrations to be less than the federal standards and no major sources of these pollutants are located in the Coachella Valley.

[5] Ozone formation is complex and is described in greater detail in Chapter 2.

ozone standard, the amount of NOx that can be emitted into the atmosphere is ~~63~~60 tons per day and is known as the “carrying capacity.” This means that NOx needs to be reduced about ~~71~~67 percent beyond the current 2037 baseline and about ~~82~~83 percent below current levels (Figure ES-2).



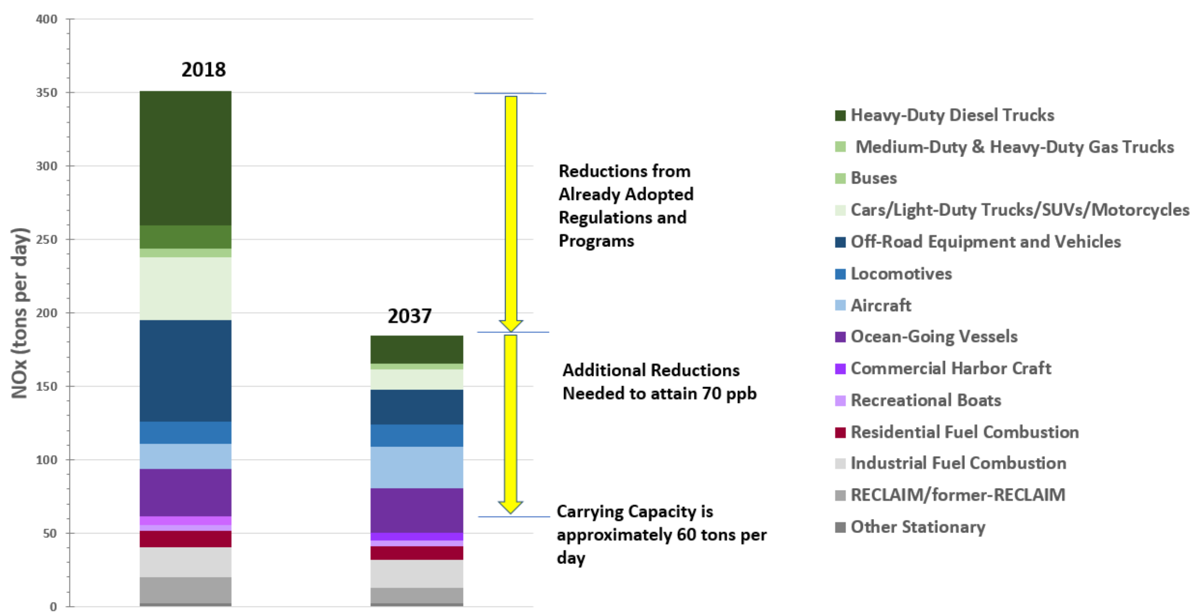
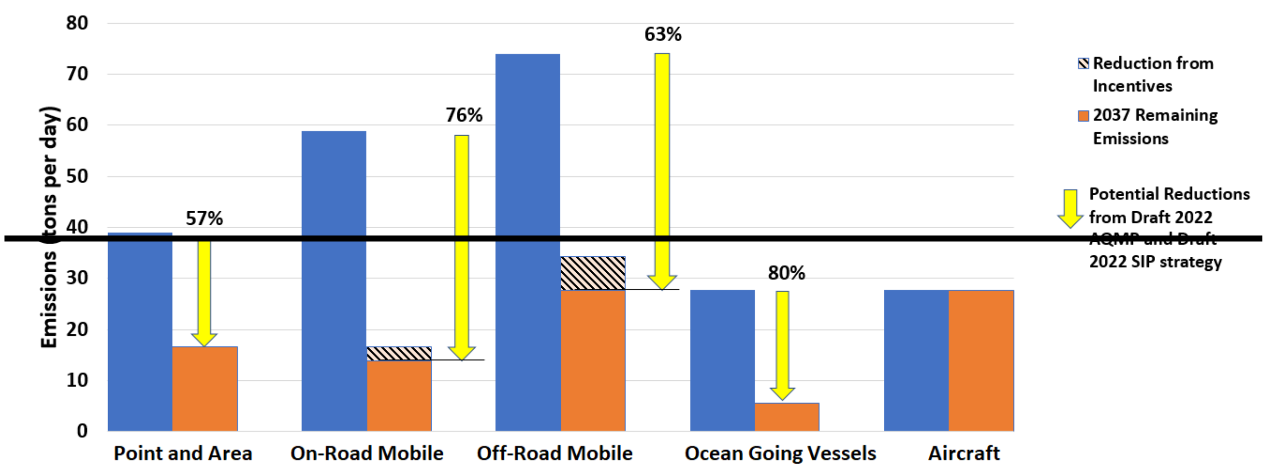


FIGURE ES-2
BASELINE NOX EMISSIONS INVENTORIES AND ADDITIONAL REDUCTIONS REQUIRED TO ATTAIN THE 2015 OZONE STANDARD

Control Strategy

Reducing significant amounts of NOx emissions poses a serious challenge. Previous AQMPs have relied on increasingly stringent regulations targeting tailpipe and exhaust stack emissions, new engine technologies, or fuel mix improvements. However, these approaches rely on additional reductions from already strictly regulated sources~~,~~ and cannot achieve an additional ~~71~~67 percent reduction beyond the 2037 baseline. Therefore, there is no viable pathway to achieve the needed reductions without widespread adoption of zero ~~emission~~emissions (ZE) technologies across all mobile sectors and stationary sources, large and small.

An overview of the control strategy by category is shown in Figure ES-3. Low NOx technologies will also need to play a significant role for some areas where ZE technology is not ready or commercially available. These lower ~~emission~~emissions technologies will also assist with attainment of other air quality standards with earlier deadlines.



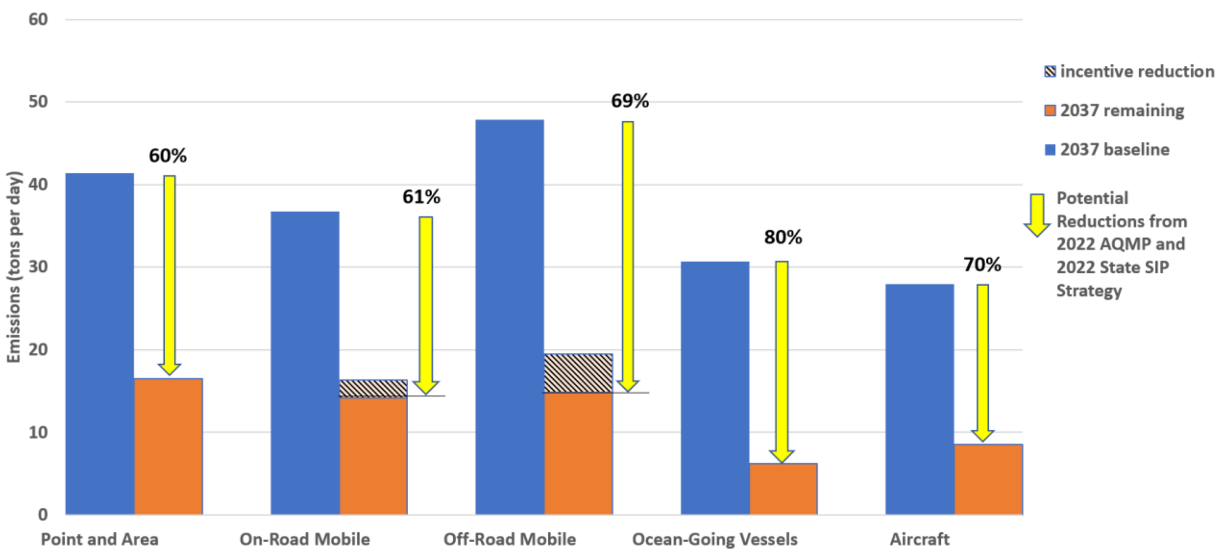
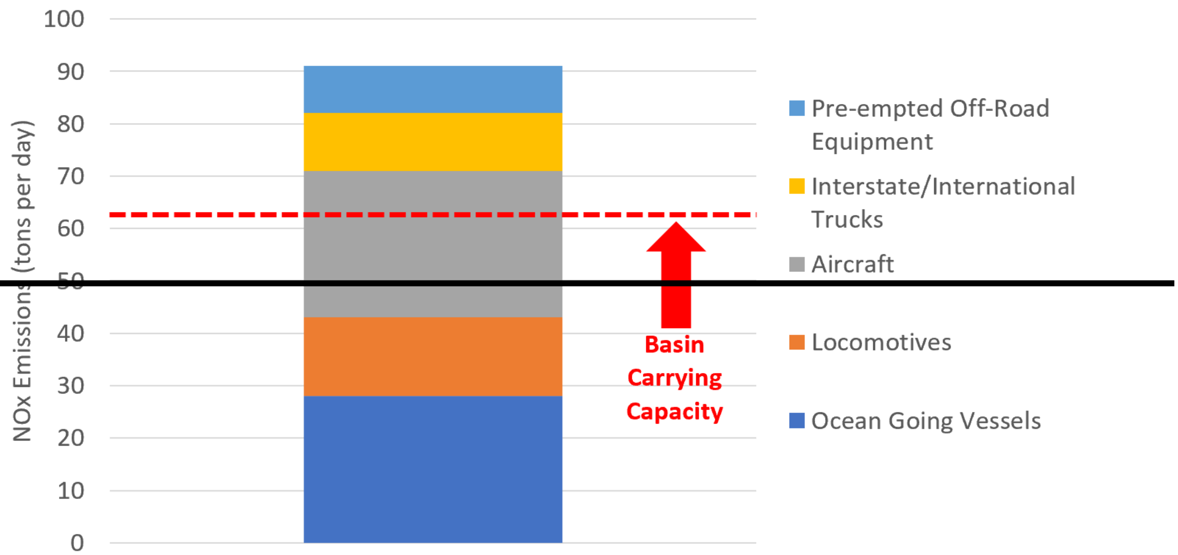


FIGURE ES-3
SUMMARY OF APPROACH TO REDUCING NOx EMISSIONS BY MAJOR SOURCE CATEGORY

The control strategy for the 2022 AQMP includes aggressive new regulations and the development of incentive programs to support early deployment of advanced technologies. The two key areas for incentive programs are (1) promoting widespread deployment of available ZE and low NOx technologies and (2) developing new ZE and ultra-low NOx technologies for use in cases where the technology is not currently available. ~~The~~ South Coast AQMD will prioritize distribution of incentive funding in EJ areas and seek opportunities to focus benefits on the most disadvantaged communities. Cost-effectiveness and affordability will be further considered during the rulemaking or incentive program development process.

Given the bulk of the Basin's NOx emissions in 2037 will be coming from federally regulated sources, the South Coast AQMD and the California Air Resources Board (CARB) cannot sufficiently reduce emissions to meet the standard without federal action. It is therefore imperative that the federal government act decisively to reduce emissions from federally regulated sources of air pollution, including interstate heavy-duty trucks, ships, locomotives, aircraft, and certain categories of off-road equipment.

Emissions from federal and international sources are estimated to be ~~92~~85 tons per day in 2037 (see Figure ES-4). Even if all sources regulated by CARB and ~~the~~ South Coast AQMD were zero emissions, federal sources alone would emit substantially more than the ~~63~~60 tons per day NOx limit, thwarting any other actions to meet the standard.



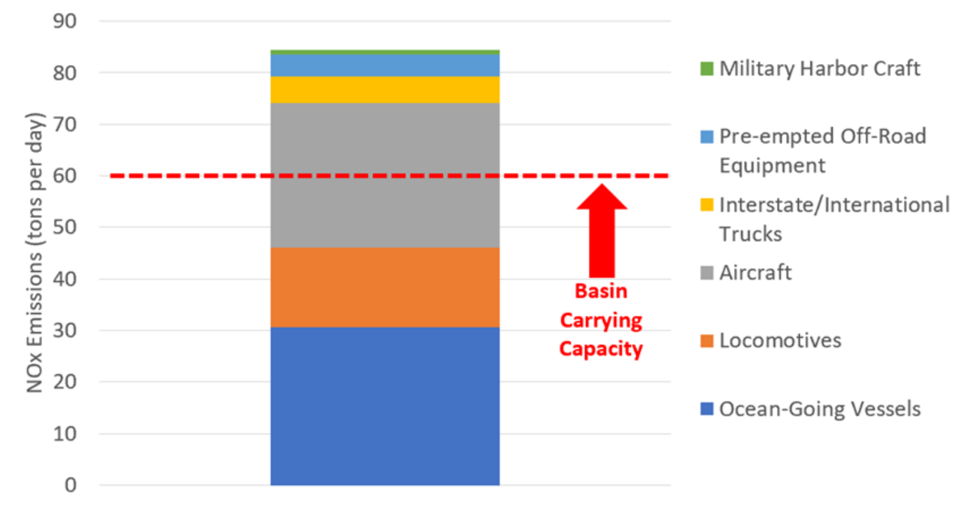


FIGURE ES-4

NOx EMISSIONS IN 2037 FROM SOURCES UNDER FEDERAL JURISDICTION IN RELATION TO THE CARRYING CAPACITY FOR THE 2015 8-HOUR OZONE NAAQS

Control Measures

~~The~~ South Coast AQMD proposes a total of 4~~8~~9 control measures for the 2022 AQMP. Thirty-one control measures targeting stationary sources are categorized into four groups (Figure ES-5). The NOx measures are further grouped by residential ~~combustion~~, commercial ~~equipment~~, and large ~~equipment~~industrial combustion. The first two groups mostly target non-permitted sources and have a 70 percent reduction goal by 2037. Large industrial combustion sources have a goal of 37 percent reductions by 2037 and predominantly address permitted equipment. Many control measures focus on widespread deployment of ZE and low NOx technologies through a combination of regulatory approaches and incentives and will require technology assessments to better understand where and when ZE and low NOx technologies can be implemented. New funding and programs are needed for research, development, demonstration, and deployment of advanced technologies.

The residential and commercial measures are frequently referred to as "building measures," which are in line with California's aggressive climate goals to reduce greenhouse gases (GHG) emissions across various sectors. State climate actions, such as Title 24 energy code requirements and building electrification (e.g., Assembly Bill 3232~~)~~), can also help reduce NOx emissions. In addition, as part of the 2022 State ~~SIP~~ Strategy for the State Implementation Plan~~-~~, CARB has proposed a statewide zero GHG ~~emission~~emissions standard for residential and commercial ~~buildings~~building appliances, which would have criteria pollutant co-benefits.~~ The~~ South Coast AQMD has also developed multiple building-related control measures to address emissions from residential and commercial combustion equipment for space heating, water heating, cooking, and others.

In addition to the NOx measures, this AQMP relies on co-benefits from climate and energy efficiency programs for further reductions, limited strategic measures for VOC~~s~~ reductions, and other actions.

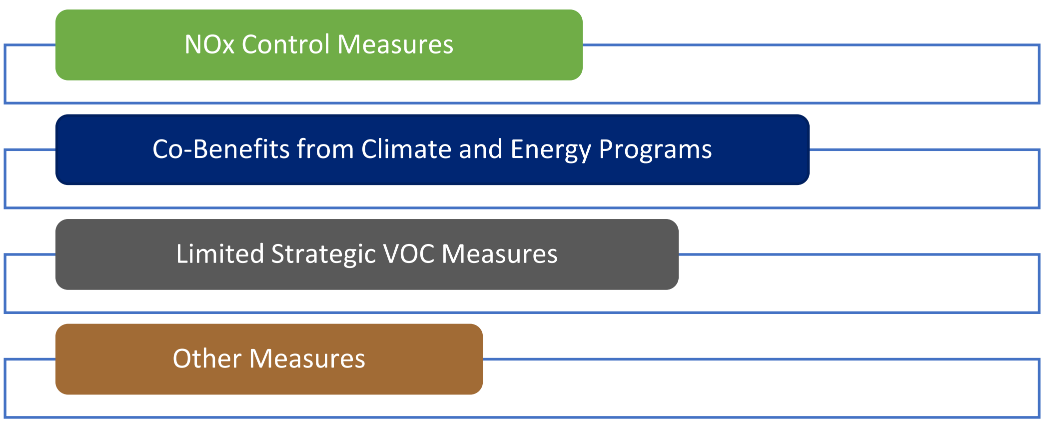


FIGURE ES-5
SOUTH COAST AQMD STATIONARY AND AREA SOURCE CONTROL STRATEGY

The remaining 18 control measures target mobile sources. They are facility-based mobile source measures, emission reductions from incentive programs, and partnerships with local, State, federal, and international entities (Figure ES-6).

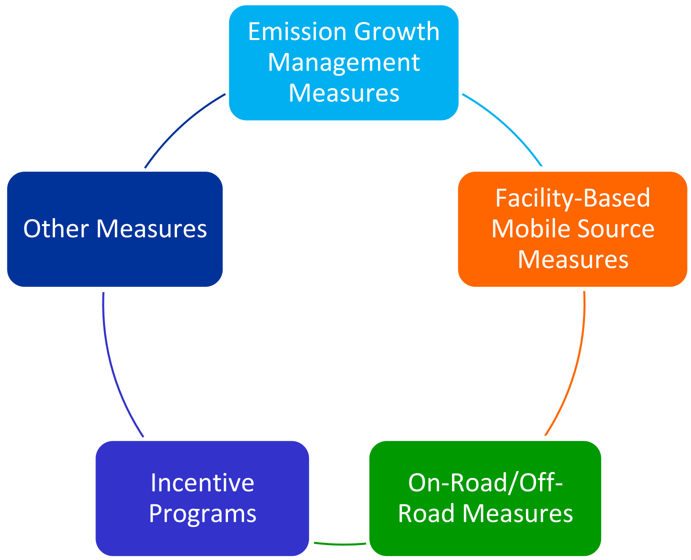


FIGURE ES-6
SOUTH COAST AQMD MOBILE SOURCE CONTROL STRATEGY

Further deployment of cleaner technologies will be necessary to attain the ozone standard. These are the CAA section 182(e)(5) "black box" measures that point to deployment of developing advanced technologies. Given that the zero and low NOx ~~emission~~emissions technologies needed for attainment of the ozone standard are still being developed, reliance on section 182(e)(5) measures provides flexibility and time for the development of new technology and improvement of existing technologies. South Coast AQMD measures include modest black box NOx reductions of 3 tons per day for stationary sources and ~~10~~7 tons per day for mobile source incentives. However, a much larger black box is needed to accommodate ~~emission~~emissions reductions from sources regulated by the U.S. EPA, namely aircraft, ships, and interstate trucks. The black box is needed because the U.S. EPA has not adopted aggressive controls targeting these sources. The black box includes ~~a 70 precent emission reduction for aircraft, which is approximately 19~~ 58 tons per day~~, and~~ of NOx reductions ~~of 35 tons per day~~ from ~~other~~ sources subject to U.S. EPA authority. Collectively, black box measures comprise ~~67~~61 tons per day~~,~~ or ~~43~~49 percent of the ~~emission~~NOx emissions reductions needed to reach attainment. A summary of the ~~emission~~emissions reductions ~~is~~are shown in Figure ES-7.

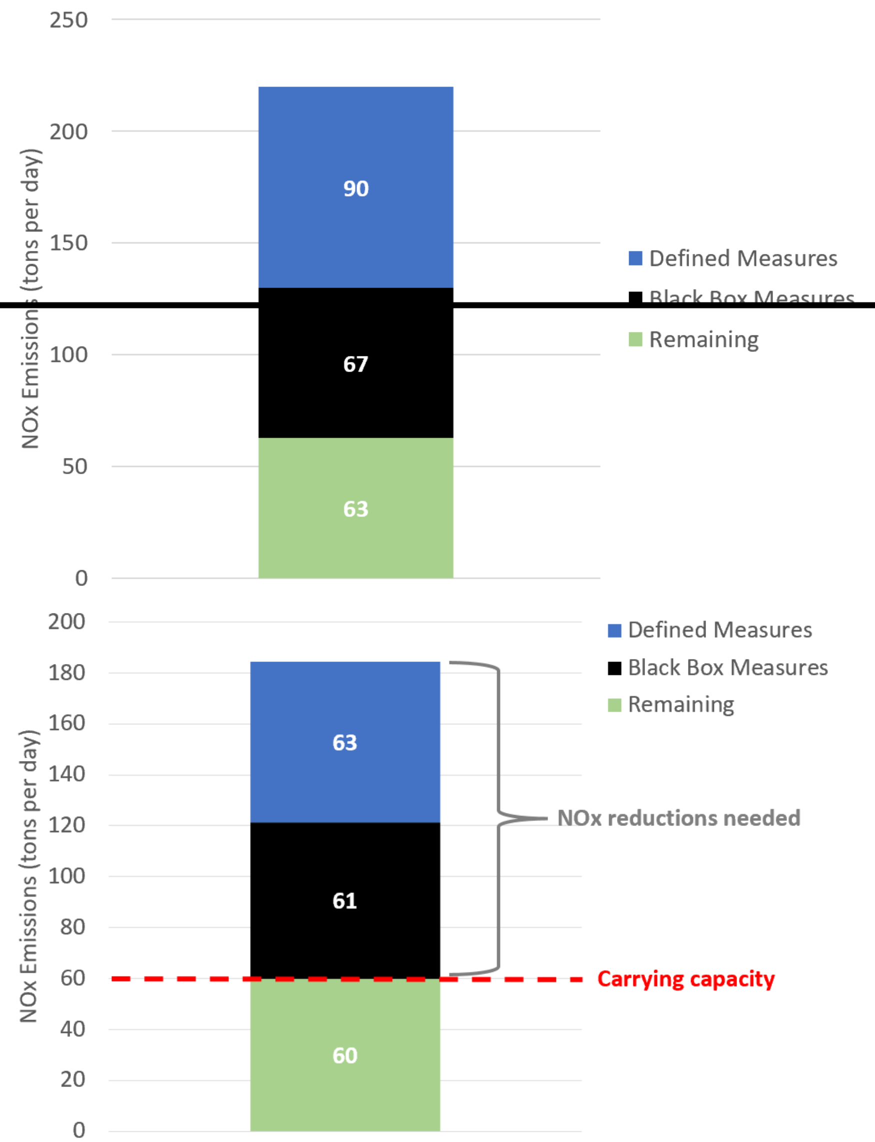


FIGURE ES-7
CONTRIBUTION OF CONTROL MEASURES TO NOx EMISSION REDUCTIONS[6]

Attainment Demonstration

Air quality modeling is used to demonstrate future attainment of the ozone standard and is an integral part of the planning process. Modeling allows us to demonstrate the connection between ~~emission~~emissions reductions and a path to attainment. It reflects updated emissions estimates, new

[6] Mobile source measures reflect CARB's commitment from the 2016 and 2022 State SIP Strategies. Available online at: https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf and https://ww3.arb.ca.gov/planning/sip/2016sip/rev2016statesip.pdf.

technical information, enhanced air quality modeling techniques, updated attainment demonstration methodology, and the control strategy.

Under baseline conditions, NOx emissions are expected to decline by nearly ~~36~~48 percent from 2018 to 2037, yet air quality modeling shows ~~that~~ the standard would not be met. However, modeling shows ~~that~~ we would ~~be expected to~~ meet the ozone standard in 2037 with a ~~71~~67 percent additional reduction from baseline emissions ~~based on~~achieved through the ~~controls~~control strategies proposed in this AQMP.

Air quality modeling indicates that the Coachella Valley will not meet the 70 ppb standard by its 2032 deadline. Therefore, ~~the~~ South Coast AQMD is requesting the redesignation of the Coachella Valley as an "extreme" nonattainment area, giving it a new attainment deadline of August 2038. Modeling demonstrates attainment in Coachella Valley in 2037.

Collaboration, Public Process, and Outreach

The development of the 2022 AQMP has been a regional, multi-agency effort that includes ~~the~~ South Coast AQMD, CARB, the Southern California ~~Associate~~ Association of Governments, and the U.S. EPA. The 2022 AQMP also incorporates collaborative efforts by a wide range of stakeholders such as businesses, environmental and health organizations, community groups, and academia. As shown in Figure ES-8, numerous meetings were conducted to promote the collaborative process and public participation. Meeting materials for the public workshops and regional public hearings were translated to Spanish and each had one meeting that featured live Spanish translation. Agendas and presentations for each meeting are available at the South Coast AQMD's website.[7]

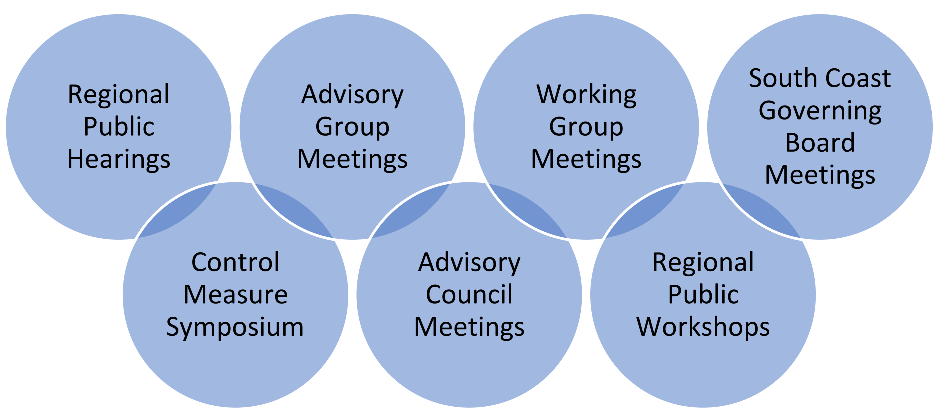


FIGURE ES-8

VENUES ACCOMMODATING STAKEHOLDER PARTICIPATION

[7] www.aqmd.gov/2022aqmp.

Chapter 1

Introduction

- **The Los Angeles area started experiencing high levels of smog in the early 1900s, with its first smog event in 1943.**
- **Air quality has improved dramatically in Southern California over the past several decades, but the region still suffers the worst ozone air pollution and among the worst particulate matter pollution in the nation.**
- **Air pollution levels in the region exceed multiple State and federal air quality standards, including the 2015 8-hour ozone National Ambient Air Quality Standard.**
- **This document is the plan to meet the 2015 8-hour ozone standard no later than the required date of 2037.**

In This Chapter

Purpose

The greater Los Angeles area experiences some of the worst air pollution in the nation. The region has the highest levels of ozone, and among the highest levels of fine particulate matter (PM2.5). These air pollutants cause substantial health impacts, including respiratory and cardiovascular disease, worsening asthma symptoms, and premature death.

The federal Clean Air Act (CAA or Act) requires areas that do not meet the health-based National Ambient Air Quality Standards (NAAQS or federal standards) to develop and implement an emission reduction strategy to attain healthy levels of air quality in a timely manner. The State of California also requires areas that do not meet the California ambient air quality standards (CAAQS or State standards) to take all feasible measures towards achieving the CAAQS at the earliest practicable date. Air Quality Management Plans (AQMPs or Plans) provide the strategy and the underlying technical analysis for how the region will meet federal standards by the required dates and continue progress to achieve the state standards. The South Coast Air Quality Management District (South Coast AQMD), with contributions from and collaborations with the California Air Resources Board (CARB) and Southern California Association of Governments (SCAG), has developed six comprehensive AQMPs since the late 1990s to address updates to air quality standards and attainment deadlines. The primary purpose of the 2022 AQMP is to identify, develop, and implement strategies and control measures to meet the 2015 8-hour ozone NAAQS - 70 parts per billion (ppb) as expeditiously as practicable, but no later than the statutory attainment deadline of August 3, 2038 for South Coast Air Basin (Basin)~~ and Coachella Valley.~~[1] and August 3, 2033 for the Riverside County portion of the Salton Sea Air Basin (referred as Coachella Valley Planning Area or Coachella Valley).[2]

Historical Perspective

Photochemical smog is air pollution containing ozone and other chemicals that is formed with sunlight in the atmosphere. Nitrogen oxides (NOx) and Volatile Organic Compounds (VOCs) are the building blocks that form smog and are referred to as "ozone precursors.".~~.~~ The abundant sunlight and presence of mountain ranges surrounding the greater Los Angeles area provide favorable conditions for smog formation within the Basin. As population in the region grew, the air pollution worsened from the

[1] The Basin's ozone attainment date is August 3, 2038, which is 20 years from the designation as an "extreme" nonattainment area. The U.S. EPA requires all control measures in the attainment demonstration must be implemented no later than the beginning of the attainment year ozone season. The U.S. EPA also defines the attainment year ozone season is the ozone season immediately preceding a nonattainment area's maximum attainment date, which is August 3, 2038, therefore, 2037 is the attainment year for the Basin.

[2] The Coachella Valley's ozone attainment date is August 3, 2033, which is 15 years from the designation as a ~~"extreme"~~ "severe-15" nonattainment area. The U.S. EPA requires all control measures in the attainment demonstration must be implemented no later than the beginning of the attainment year ozone season. The U.S. EPA also defines the attainment year ozone season is the ozone season immediately preceding a nonattainment area's maximum attainment date, which is August 3, 2033, therefore, 2032 is the attainment year for Coachella Valley.

increased number of motor vehicles and industrial facilities. With this worsening of air pollution, the Los Angeles area started experiencing high levels of smog in the early 20^{th} century. Los Angeles recorded its first smog event on July 26, 1943. The *Los Angeles Times* described this event as a cloud of smoke and fumes that descended on downtown, severely cut visibility, and invoked negative health effects in residents such as respiratory problems and headaches.

In response to rising levels of smog, the City of Los Angeles established a Bureau of Smoke Control in 1945. In 1947, State law authorized the creation of county-wide air districts with jurisdiction across cities. The Los Angeles Board of Supervisors created the Los Angeles Air Pollution Control District (APCD), the first in the nation, as a county-wide air quality agency with broad powers to adopt and enforce air pollution regulations. That same year, the newly formed agency required all major industries to have air pollution permits and adopted a rule to require metal melting plants to control dust and fumes with baghouse[3] controls.

In 1948, Arie J. Haagen-Smit, a biochemistry professor at the California Institute of Technology in Pasadena, started examining the biology of plants and crops that had been damaged by smog. By the early 1950's, Dr. Haagen-Smit had determined that smog caused eye irritation and damage to plants and materials, including rubber tubing that cracked in seven minutes when exposed to high smog levels. In 1953, the Los Angeles County APCD started requiring controls to reduce VOC emissions from industrial gasoline storage tanks, and vapor leaks from the filling of gasoline tank trucks and underground storage tanks at service stations. These actions were critical in helping to reduce the estimated 2,000 tons per day of VOCs and 250 tons per day of NOx[4] at a time when the population in the region was only five million residents.

Downtown Los Angeles, 1950s

Smog got so bad in the shadow of City Hall that pedestrians would carry

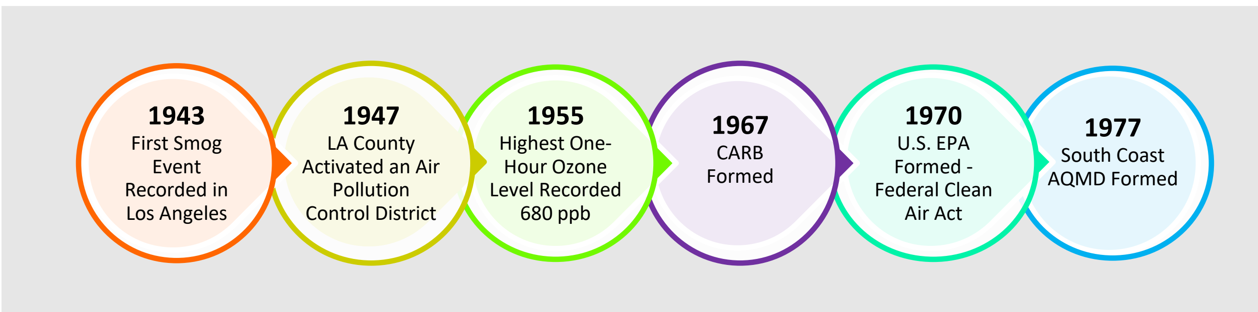
A Smog Emergency Warning System was launched in 1955 when the highest one-hour ozone level of 680 ppb was recorded in downtown L.A. The first network of air monitors was initiated in 1956 and backyard trash incinerators were banned in 1958 when trash collection programs were established in the region.

3 A baghouse or bag filter is an air pollution control device that removes particulates out of air or gas released from commercial or industrial processes.

4 "Second Technical and Administrative Report on Air Pollution in Los Angeles County," Annual Report 1950–51, Air Pollution Control District, Los Angeles County, California, 1952.

Other regulated sources included petroleum-based solvents, landfills, refineries, power plants, and industrial facilities.

Recognizing that counties could not adequately regulate motor vehicle pollution, the California Legislature established the California Motor Vehicle Pollution Control Board to test vehicle emissions and certify emission control devices. Six years later, California became the first state in the nation to establish automobile tailpipe emission standards, ~~one~~ 1 year before the creation of ~~the~~ CARB. By 1969, the first state ambient air quality standards were enacted in California. In the following year, the U.S. Environmental Protection Agency (U.S. EPA) was formed, and the federal CAA became law. The U.S. EPA adopted the first national ambient air quality standards in 1971. Trailing the State and federal air quality standards, California adopted regulations requiring the installation of a vehicle pollution control device, the catalytic converter, starting with the 1975 model year. Over time, motor vehicle fuels were reformulated to reduce photochemically reactive olefins, remove lead in gasoline, and utilize fewer smog-forming and toxic chemicals.



In 1977, the Los Angeles County APCD merged with the APCDs of Orange, Riverside, and San Bernardino counties to form the South Coast Air Quality Management District.[5] The following year, the newly formed agency required gas stations to install vapor recovery "boots" on gasoline nozzles, further reducing VOCs that would escape when filling the vehicle tank. The South Coast AQMD has continued to adopt and implement rules to reduce air pollution emissions and public exposure to unhealthful air pollution. In addition, efforts on the State and federal level have continued to contribute ~~toward~~towards reducing air pollution from mobile and area sources to achieve the ground-level ozone and particulate matter (PM) NAAQS.

Currently, ~~the~~ South Coast AQMD oversees three air basins, which are the South Coast Air Basin (the Basin), the Riverside County portion of the Salton Sea Air Basin (referred to as Coachella Valley Planning Area or Coachella Valley) and the Riverside County portion of the Mojave Desert Air Basin (MDAB). ~~Details~~Further details are provided in the Regional Setting section of this chapter.

[5] Pursuant to the Lewis Air Quality Management Act adopted by the California Legislature in 1976 https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=HSC&division=26.&title=&part=3.&chapter=5.5.&article=2.

Agency Responsibilities

The federal and state ~~Clean Air Acts~~CAAs provide the principal framework for national, state, and local efforts to protect public health from harmful air pollution. Authority to reduce emissions from various sectors is spread across different agencies.

South Coast Air Quality Management District (South Coast AQMD): Local air districts are responsible for preparing the portion of the State Implementation Plan (SIP) applicable within their boundaries. SIPs are comprehensive plans that describe how an area will attain NAAQS. The 2022 AQMP will be the portion of the SIP for the Basin and Coachella Valley.[6] The South Coast AQMD has primary authority to reduce local emissions by adopting control regulations for stationary sources. Stationary sources include point sources, such as power plants and refineries, and selected area sources, such as gas stations, dry cleaners, and paints and coatings. The South Coast AQMD also has limited authority to address mobile sources through incentive programs and implementation of indirect source and transportation control measures (e.g., employee ridesharing rules). Mobile source emissions such as cars, trucks, trains, and off-road vehicles and equipment are instead regulated primarily by State and federal authorities. Ships and airplanes are regulated primarily by international authorities.

Southern California Association of Governments (SCAG): Under federal law (23 U.S. Code § 134 and 49 U.S. Code § 5303), SCAG is designated as the Metropolitan Planning Organization (MPO) and is designated as a Regional Transportation Planning Agency and a Council of Governments under state law (California Government Code, § 29532, et. seq.). SCAG is responsible for preparing the portion of the SIP that addresses transportation control measures, land use, and growth projections.[7] In particular, SCAG develops long-range regional transportation plans including sustainable communities strategy and growth forecast components, regional transportation improvement programs, regional housing needs allocations and a portion of the South Coast AQMD's AQMPs. SCAG provides plans for ~~6~~ six counties and 26 planning areas according to the attainment status of ozone, particulate matter less than 10 microns in diameter (PM10) and PM2.5 NAAQS. South Coast Air Basin and Coachella Valley are both included in their planning areas.

California Air Resources Board (CARB): CARB is a state level agency primarily responsible for adopting motor vehicle emission standards, compiling the SIP for submission to the U.S. EPA; approving district air quality plans as sufficient to meet State legal requirements, and providing general oversight of districts. CARB establishes State air quality regulations addressing certain categories of consumer products and mobile sources such as heavy-duty trucks, light-duty cars, construction equipment and small off-road engines. CARB has also established State ambient air quality standards for criteria pollutants which are generally more stringent than the ~~national ambient air quality standards~~NAAQS.

[6] The Riverside portion of the MDAB is not classified as nonattainment for 2015 8-hour ozone standard and so does not need a SIP. https://www3.epa.gov/airquality/greenbook/jbtcw.html.

[7] SCAG is responsible for the portion of SIP that addresses transportation control measures, land use, and growth projections within certain districts that have not met air quality standards.

United States Environmental Protection Agency (U.S. EPA): The federal ~~Clean Air Act~~CAA requires the U.S. EPA to set standards, also known as NAAQS, for pollutants which are considered harmful to human health and the environment. The U.S. EPA is also responsible for ensuring that these air quality standards are met, or attained (in cooperation with state, Tribal, and local governments) through national standards and strategies to control pollutant emissions from selected on-road mobile source, facilities, and other mobile sources. In addition, the federal CAA requires States or the U.S. EPA (depending on the program) to set emissions standards or limits for air pollution sources such as power plants, industrial facilities, and motor vehicles. For example, the U.S. EPA is responsible for setting federal emission standards for mobile sources such as light-duty vehicles, heavy-duty engines and vehicles, and nonroad engines and vehicles.

In the South Coast Air Basin, mobile sources account for over 80 percent of smog-forming pollution. This means that the South Coast AQMD lacks direct authority to regulate the sources of emissions responsible for high levels of air pollution. Given each agency's primary responsibilities, ~~the~~ South Coast AQMD, CARB, the U.S. EPA, international agencies, and other public agencies must all work together to achieve the needed reductions to ensure that air quality standards are met in the region.

Emission reductions can be achieved by employing cleaner technologies and cleaner fuel and/or limiting activities producing emissions such as vehicle miles travelled, economic activities, and population growth. While South Coast AQMD strongly supports economic growth in the region, we also recognize that growth in sectors such as goods movement affect certain communities disproportionally.

Goods movement is a substantial source of smog-forming emissions in our region and the goods movement sector has recently experienced substantial growth in the region. Projections indicate that this expansion will continue. This growth has resulted in surging demand for warehousing, which has fueled the construction of new warehouses in the Inland Empire. Due to the substantial emissions associated with warehouses, it is critical that land use decisions regarding the siting of warehouses consider air quality impacts when approving new projects. While these decisions are typically made at the local level and South Coast AQMD lacks direct regulatory authority over land use, South Coast AQMD recognizes that collaboration across multiple public agencies and cities is required to promote better land use planning in consideration of air quality impacts. Figure 1-1 provides a summary of the agencies responsible for controlling growth rates and emissions standards. While South Coast AQMD is responsible for both, we are not the primary agency for demand management. More details regarding the specific measures that the 2022 AQMP will employ to reduce emissions from the goods movement sector can be found in Chapter 4 and Appendix IV-A and transportation control measures are in Appendix IV-C.

FIGURE 1-1
ILLUSTRATION OF LOCAL, STATE, AND FEDERAL AGENCIES AND THEIR AUTHORITY OVER EMISSIONS CONTROL TECHNOLOGY OR EMISSIONS DEMAND MANAGEMENT.[8]

Regional Setting

Because air pollution is not contained within city and county jurisdictional boundaries, local programs were not enough to solve regional problems. For air resource management, California was divided into 15 air basins which are characterized as regions having similar geography and terrain, similar weather and climate conditions, and are affected by similar regional air quality problems.[9] The jurisdiction of the South Coast AQMD covers (Figure 1-~~1~~2) an area of approximately 10,743 square miles, consisting of the ~~South Coast Air~~ Basin ~~(Basin),~~, and the Riverside County portions of the ~~Salton Sea Air Basin (~~SSAB~~)~~ and ~~Mojave Desert Air Basin (~~MDAB~~).~~. The Basin, which is a sub-region of the South Coast AQMD's jurisdiction, is bounded by the

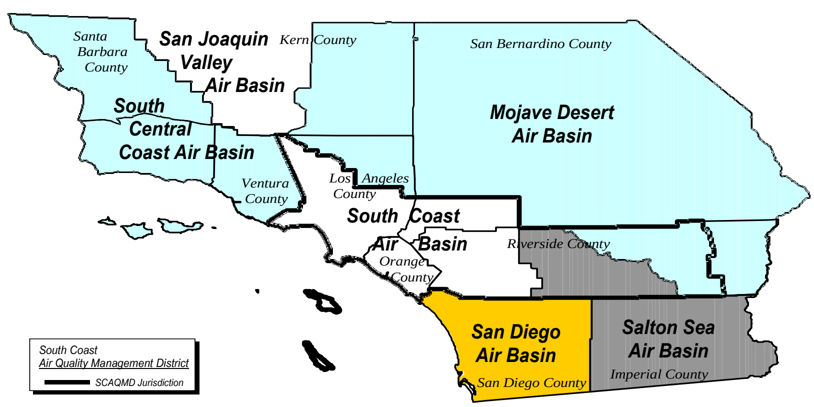


FIGURE 1-~~1~~2
BOUNDARIES OF THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT AND NEIGHBORING FEDERAL PLANNING AREAS

8 The cities displayed in the figure are for illustrative purposes only and South Coast AQMD recognizes that all cities contribute to emission demand management through land use decisions.

9 https://www.arb.ca.gov/app/emsinv/maps/2021statemap/abmap.php.

Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. It includes all of Orange County and major portions of Los Angeles, Riverside, and San Bernardino counties. The Coachella Valley Planning Area (Riverside County portion of the SSAB) is a federal nonattainment area that is part of a sub-region of Riverside County in the SSAB that is bounded by the San Jacinto Mountains to the west and the eastern boundary of the Coachella Valley. The Riverside County portion of the MDAB within the South Coast AQMD jurisdiction is bounded by the eastern boundary of the Coachella Valley in the west and spans eastward to the Palo Verde Valley. The SSAB and MDAB were previously included in a single large basin called the Southeast Desert Air Basin (SEDAB).

The Coachella Valley Planning Area also experiences high levels of ozone but lacks the large sources of smog-forming emissions. Instead, it is primarily impacted by pollutants that are transported from the Basin. In addition, pollutant transport also impacts the Antelope Valley, Mojave Desert, Ventura County, and San Diego County. As part of this AQMP, the air quality planning requirements for the Coachella Valley ozone nonattainment area are discussed and addressed in Chapter 7.

The topography and climate of Southern California combine to make the Basin an area highly favorable for forming air pollution. A warm air mass frequently descends over the cool, moist marine layer produced by the interaction between the ocean's surface and the lowest layer of the atmosphere. ~~The~~Within the atmosphere, the warm upper layer forms a cap over the cooler surface layer, which traps the pollutants near the ground. Light winds can further limit ventilation. Additionally, the region experiences more days of sunlight than any other major urban area in the nation except Phoenix, Arizona. This abundant sunlight triggers the photochemical reactions which produce ozone and PM2.5.

Emissions Sources

The Basin's economic base is diverse. Historically, the four counties of the Basin have collectively comprised one of the largest and fastest-growing local economies in the nation. Significant changes have occurred in the composition of the industrial base of the region in the past few decades. As in many areas of the nation, a large segment of heavy manufacturing, including steel and tire manufacturing as well as automobile assembly, has either eliminated or greatly lessened their operations. Although there are still significant manufacturing operations in the region,[10] growth in shipping and trade, service and logistics businesses have replaced some of the heavy industry. The region is home to the largest seaport complex in the nation, and over a third of all cargo imported to the nation comes through the Ports of Los Angeles and Long Beach.[11] The goods movement sector has further grown rapidly in recent years and the emissions from the associated seaports, railyards, warehouse, drayage trucks, and cargo handling equipment accounts for a significant portion of the Basin's emissions. In particular, the COVID-19 pandemic shifted American consumers behavior from service-based economy to goods-based economy, which brought record high congestion in the Ports of Los Angeles and Long Beach and substantially increased emissions in the region. These goods movement activities posed additional challenges in cleaning air for the 17 million residents in the Basin.

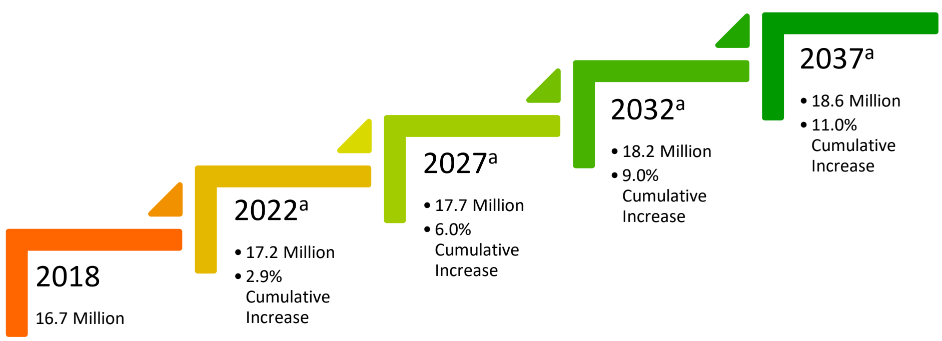
[10] http://blogs.wsj.com/economics/2015/07/15/where-are-the-most-u-s-manufacturing-workers-los-angeles/.

[11] https://www.statista.com/statistics/1265024/leading-us-ports-by-teu/.

Air pollution forms either directly or indirectly from pollutants emitted from a variety of sources. These sources of air pollution can be natural, such as oil seeps, vegetation, or windblown dust. However, the majority of emissions in the Basin are related to human activity. The air pollution control strategy in the 2022 AQMP is directed at controlling man-made sources~~.~~ of air pollution. Examples of man-made emission sources include industrial and manufacturing facilities, cars and trucks, off-road mobile sources such as locomotives, aircraft and ocean-going vessels, evaporation of organic liquids, such as those used in coating and cleaning processes, and abrasion processes, such as tires on roadways. South Coast Air Basin has a complex mix of emission sources. The Basin has around 28,400 stationary ~~sources~~source businesses operating under ~~the~~ South Coast AQMD permits, including 31 electricity generating facilities[12] and ~~5~~five major petroleum refineries.[13] The Basin is also a ~~logistic~~logistics hub with the largest port complex in the nation, ~~5~~five major commercial airports, around 9,500 locomotive fleet operating per year, and around 3,000 warehouses larger than or equal to 100,000 square feet. More details on the emission sources in the Basin are described in Chapter 3. Natural emissions are included in the air quality modeling analysis in Chapter 5.

Population

Since the end of World War II, the Basin has experienced faster population growth than the rest of the nation. The annual average percent growth has slowed but the overall population of the region is expected to continue to increase through 2037 and beyond. Figure 1-~~2~~ 3 shows the estimated population and projections based on the regional growth forecast from the 2020 Regional Transportation Plan/Sustainable Communities Strategy (2020 RTP/SCS).[14]



a Based on SCAG's 2020 Regional Transportation Plan

FIGURE 1-~~2~~3
REGIONAL POPULATION GROWTH

Despite this population growth, air quality has improved significantly over the years, primarily due to the impacts of air quality control programs at the local, State and federal levels. Figure 1-~~3~~ 4 shows the trends

12 http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1135/par-1135---dsr---final.pdf?sfvrsn=12.

13 http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-Nov5-034.pdf?sfvrsn=6.

14 https://scag.ca.gov/read-plan-adopted-final-plan.

since 1995 of the 8-hour ozone levels, the 1-hour ozone levels, and annual PM2.5 levels (since 2001), compared to the regional gross domestic product, total employment, and population. Human activity in the region has an impact on achieving reductions in emissions. However, over the past several decades ozone and PM levels have been reduced significantly as the size of the economy and population increased, demonstrating that it is possible to maintain a healthy economy while improving public health through air quality. While California has seen tremendous regional air quality improvement, many communities known as environmental justice communities are disproportionately impacted due to multiple air pollution sources near residential areas. Details regarding environmental justice communities can be found in Chapter 8.

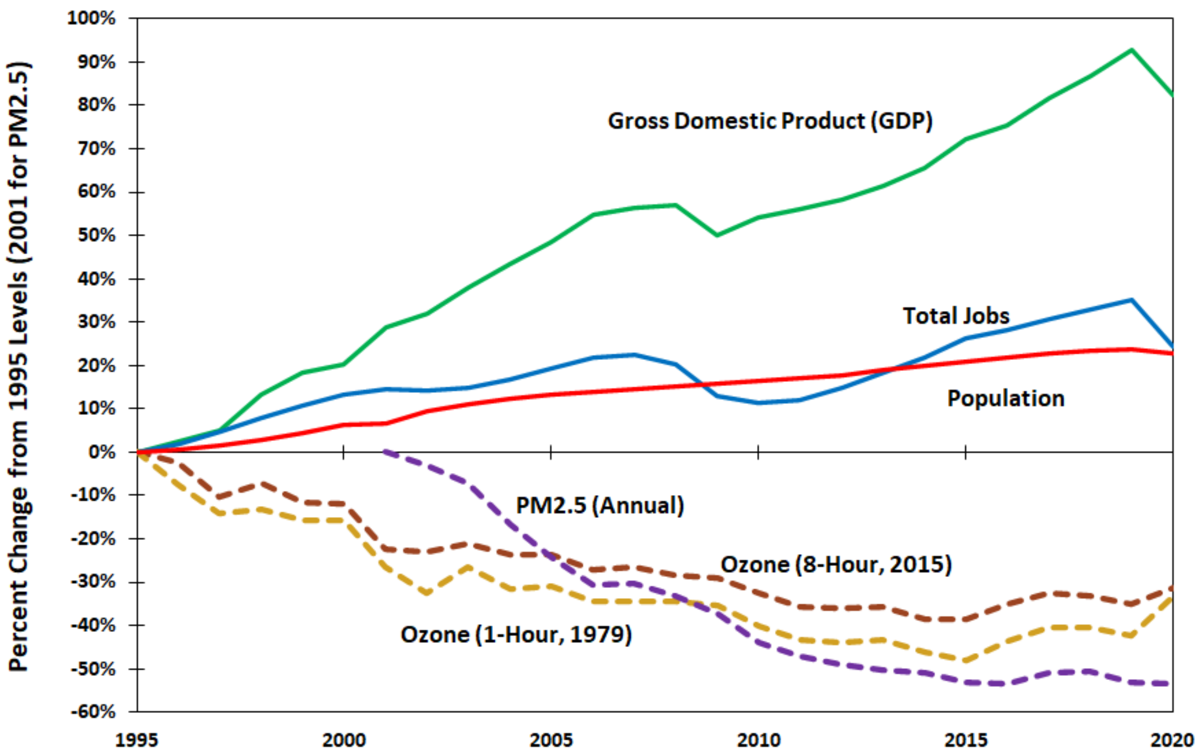


FIGURE 1-~~3~~4

PERCENT CHANGE IN AIR QUALITY ALONG WITH DEMOGRAPHIC DATA FOR THE 4-COUNTY REGION (1995–2020)

(ECONOMIC SET BACK IN 2019 AND 2020 DUE TO COVID-19 PANDEMIC)

Federal Ozone National Ambient Air Quality Standards

The U.S. EPA is required by law to review the NAAQS every ~~five~~ 5 years. The purpose of the review is for the U.S. EPA to evaluate the latest scientific data to ensure that the NAAQS are set at levels that are protective of public health. In the review, the U.S. EPA considers the most recent scientific and health effects information, air quality information, and quantitative risk (e.g., size of at-risk groups affected). The U.S. EPA must consider the uncertainties and limitations of the scientific evidence as well as conclusions from the U.S. EPA experts and advice from the Clean Air Scientific Advisory Committee (CASAC).[15] At the conclusion of the review, the U.S. EPA determines if the current standards are "requisite to protect public health with an adequate margin of safety."[16]

In 1979, the U.S. EPA approved a 1-hour ozone standard (120 ppb) that was replaced in 1997 with a more stringent 8-hour ozone standard (80 ppb). The U.S. EPA subsequently revoked the 1-hour standard entirely, effective in 2005, based on research demonstrating that the 1-hour standard was inadequate for protecting public health~~,~~ and that ozone can affect human health at lower levels and over longer exposure times than one hour. Still, in order to avoid losing clean air progress achieved under the 1-hour standard, the U.S. EPA requires that certain emissions control requirements for areas designated as nonattainment or maintenance for the revoked 1-hour standard must remain in place.[17] The 8-hour ozone standard was subsequently lowered to 75 ppb in 2008 and to 70 ppb in 2015. The U.S. EPA concluded that the 70 ppb ozone standard was sufficient to protect health in 2020~~; however~~. However, the U.S. EPA is currently in the process of revisiting that determination.

Within 2 years of setting a new or revised NAAQS, Title I of the CAA requires the U.S. EPA to designate areas as meeting (attainment) or not meeting (nonattainment) the standard.[18] Areas are classified based on their design values[19] for each standard. Figure 1-~~4~~ 5 shows the nonattainment classifications for the 2015 8-hour ozone standard based on design values.[20]

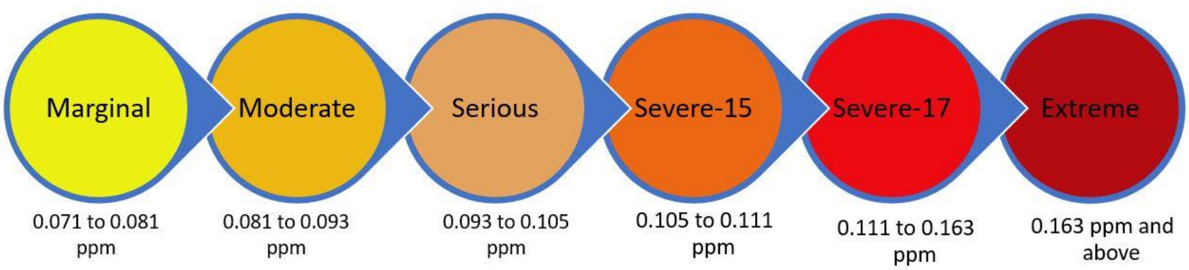


FIGURE 1-45

OZONE NONATTAINMENT CLASSIFICATIONS FOR 2015 8-HOUR STANDARD BASED ON DESIGN VALUES

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[15] The Clean Air Scientific Advisory Committee (CASAC) is an independent scientific advisory committee established by the CAA charged with providing advice to the U.S. EPA.

[16] https://www.epa.gov/sites/default/files/2015-10/documents/overview_of_2015_rule.pdf.

[17] https://archive.epa.gov/ozonedesignations/web/html/fsjul05.html.

[18] https://www.epa.gov/ozone-designations/learn-about-ozone-designations#process.

[19] The design value of an air basin for the 2015 8-hour ozone standard is determined by the highest ozone value of all stations, based on a 3-year average.

[20] https://www.epa.gov/green-book/ozone-designation-and-classification-information.

TABLE 1-1

OZONE NONATTAINMENT CLASSIFICATIONS FOR SOUTH COAST AIR BASIN AND COACHELLA VALLEY

Standard	Level	South Coast Classification	Coachella Valley Classification	Attainment Date
2015 8-hour Ozone	70 ppb	Extreme	Severe	August 3, 2038 (South Coast) August 3, 2033 (Coachella Valley)
2008 8-hour Ozone	75 ppb	Extreme	Severe**	July 20, 2032 (South Coast) July 20, 2027 (Coachella Valley)
1997 8-hour Ozone	80 ppb	Extreme	Extreme*	June 15, 2024 (both South Coast and Coachella Valley)
1979 1-hour Ozone	120 ppb	Extreme	Attainment	December 31, 2022 (South Coast)

*Voluntary reclassification from "severe" to "extreme" in July 2019.
** Requested voluntary reclassification to "extreme" in November 2022.

As shown in Table 1-1, South Coast Air Basin and Coachella Valley have been classified as "extreme" and "severe" nonattainment for the 2015 ozone standard, respectively. As an "extreme" ozone nonattainment area, the South Coast AQMD has until August 3, 2038 to attain the 2015 ozone standard for the Basin, which is 20 years from the designation as an "extreme" nonattainment area. The U.S. EPA requires that all control measures in the attainment demonstration must be implemented no later than the beginning of the attainment year ozone season. The U.S. EPA also defines the attainment year ozone season as the ozone season immediately preceding a nonattainment area's maximum attainment date, which is August 3, 2038. Therefore, 2037 is considered the attainment year for the Basin and 2032 is the attainment year for Coachella Valley. Chapter 3 provides the emission inventory for the attainment year and Chapter 5 provides the modeled projected air quality in that year to demonstrate attainment of the standard. This AQMP focuses on developing plans to address the 2015 ozone standard. Other ozone and PM standards have been addressed in prior AQMPs.

As an "extreme" nonattainment area, the Basin ozone SIP for the 2015 8-hour ozone NAAQS is required to be submitted within ~~four~~ 4 years[21] after the designation effective date. Key SIP elements for extreme nonattainment areas include, but are not limited to: (1) an attainment demonstration~~;~~, (2) a reasonable further progress (RFP) demonstration showing ozone precursor reductions of at least 3 percent per year until the attainment date~~;~~, (3) additional reasonably available control technology (RACT) rules to address sources subject to the "extreme" area major source threshold~~;~~, (4) use of clean fuels or advanced control

[21] CAA, Title I, Part D, Subpart 2, Section 182(e) requires that "extreme" areas submit according to Section 182(c)(2).

technology for boilers as described at CAA section 182(e)(3~~);~~), and (5) contingency measures.[22] ~~The~~Under the CAA, the U.S. EPA has some discretion ~~under CAA~~ with penalties for submittal deadlines~~, and penalties~~. Penalties for failure to submit SIP elements on time are not incurred until 18 months after a finding of late non-submittal.

Air Quality Planning Requirements

After approving a standard, the U.S. EPA designates areas across the nation as attainment or as nonattainment of the standard. The U.S. EPA classifies areas of ozone nonattainment (e.g., "extreme," "severe," "serious," "moderate~~"~~," or "marginal") based on how much an area exceeds the standard, which in turn affects requirements for a SIP and determines the attainment date. The more severe the ozone problem, the more time is allowed to demonstrate attainment in recognition of the greater challenges involved to reach attainment. However, the higher classifications are also subject to more stringent requirements.

If an area is designated as nonattainment of the NAAQS, the State is required to submit a SIP demonstrating compliance with a series of CAA requirements. Chapter 6 provides a detailed explanation of the federal CAA requirements along with how the requirements are addressed in this plan. In addition, the U.S. EPA requires that transportation conformity budgets are established based on both the most recent planning assumptions (i.e., within the last ~~five~~ 5 years) and approved motor vehicle emission models.[23] Transportation conformity ensures that transportation plans and programs do not cause or contribute to a new violation of a standard, increase the frequency or severity of any existing violation, or delay the timely attainment of the air quality standards.

The California Lewis Air Quality Act (now known as the Lewis-Presley Air Quality Management Act) requires that ~~the~~ South Coast AQMD prepares an AQMP consistent with federal planning requirements. In 1977, amendments to the federal CAA included requirements for submitting SIPs for non-attainment areas that fail to meet all federal ambient air quality standards. State law also imposed planning requirements for the Basin (Health & Safety Code §40462). The federal CAA was amended in 1990 to specify attainment dates and SIP requirements for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2) and PM10. The California Clean Air Act (CCAA), adopted in 1988, requires the South Coast AQMD to endeavor to achieve and maintain state ambient air quality standards for ozone, CO, sulfur dioxide (SO_2), and NO_2 by the earliest practicable date (Health & Safety Code §40910), and establishing requirements to update the plan periodically. The first AQMP was prepared and adopted by the South Coast AQMD in 1979 and has been updated and revised a number of times. The CCAA requires a ~~three~~3-year plan review and update to the AQMP. The following bullet items summarize the main components of those updates and revisions~~.~~:

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[22] 84 FR 44801.

[23] Transportation conformity is required under CAA Section 176(c); transportation projects that receive federal funding, approvals, or permits must demonstrate that their actions are air quality neutral or beneficial and meet specified emissions budgets in the SIP.

- In 1982, the AQMP was revised to reflect better data and modeling tools;
- In 1987, a federal court ordered the U.S. EPA to disapprove the 1982 AQMP because it did not demonstrate attainment of all NAAQS by 1987, as required by the CAA;
- The 1989 AQMP was adopted in March 1989 and was specifically designed to attain all NAAQS. This plan called for three "tiers" of measures as needed to attain all standards and relied on significant future technology advancement to attain these standards;
- In 1991, the South Coast AQMD prepared and adopted the 1991 AQMP to comply with the CCAA;
- In 1992, the 1991 AQMP was amended to add a control measure containing market incentive programs;
- In 1994, the South Coast AQMD prepared and adopted the 1994 AQMP to comply with the CCAA ~~three~~3-year update requirement and to meet the federal CAA requirement for an ozone SIP;
- The 1997 AQMP was designed to comply with the ~~three~~3-year update requirements specified in the CCAA as well as to include an attainment demonstration for PM10 as required by the federal CAA;

- In 1999, the ozone plan portion of the 1997 AQMP was amended to address the U.S. EPA concerns with the 1997 AQMP ~~plan~~;
- In April 2000, the U.S. EPA approved the 1999 ozone SIP Amendment to the 1997 plan. The 1999 Amendment in part addressed the State's requirements for a triennial plan update;
- The 1997 PM10 SIP, as updated in 2002, was deemed complete by the U.S. EPA in November 2002 and approved in April 2003;
- The 2003 AQMP was adopted by the South Coast AQMD in August 2003;
- The 2007 AQMP was developed to comply with CAA requirements for nonattainment areas to prepare SIP revisions for the federal ~~eight~~8-hour ozone and PM2.5 standards and was adopted in June 2007;
- The 2012 AQMP was adopted in December 2012 to address the 2006 24-hour PM2.5 air quality standard and to satisfy the planning requirements of the CAA;
- A Supplement to the 2012 AQMP was prepared to demonstrate attainment of the 24-hour PM2.5 standard by 2015. The South Coast AQMD approved the Supplement in February 2015 and submitted to CARB/the U.S.EPA for approval as part of the SIP;

- The 2016 AQMP was developed to address five NAAQS - three ozone standards and two PM2.5 standards - and was adopted in March 2017; and
- The 2022 AQMP is being developed to identify and implement strategies and control measures to meet the 2015 8-hour ozone NAAQS (70 ppb) as expeditiously as practicable, but no later than the statutory attainment deadline of August 3, 2038 for South Coast Air Basin and August 3, 2033 for the Coachella Valley. The 2022 AQMP is based on the most recent assumptions provided by both CARB and SCAG for motor vehicle emissions and demographic updates and includes updated transportation conformity budgets. Chapter 2 provides more detail on the federal and State ambient air quality standards, attainment status, trends, and specific pollutant information such as the health effects due to exposure.

Air Quality Progress

As of 2022, the region's population exceeds 17 million people, yet emissions have continued to decrease. In the South Coast Air Basin, approximately ~~417~~406 tons per day of VOCs and ~~347~~351 tons per day of NOx were emitted in 2018 (the base-year of the emissions inventory and modeling analysis in this plan). Based on current regulations and actions already taken, emissions are estimated to be approximately ~~389~~339 tons per day of ~~VOCs~~VOC emissions and ~~220~~184 tons per day of NOx emissions in 2037. See Appendix III for 2018, and 2037 summer planning inventory emissions. However, these levels are not low enough to meet the 2015 8-hour ozone NAAQS for the Basin and significant additional ~~emission~~emissions reductions are necessary.

Substantial progress has been made in reducing the pollutants that form ozone (i.e., VOCs, NOx) and PM2.5 emissions through regulatory measures, voluntary actions, and partnerships with other agencies and stakeholders. Figure 1-~~5~~ 6 illustrates the ozone and PM2.5 levels in the Basin as a percentage of the federal standard~~, demonstrating~~ which demonstrates that while air quality progress has been dramatic since the 1990s, much work remains to bring the Basin into attainment of the ozone standards. Detailed ozone concentrations and trends can be found in Chapter 2.

Even with the substantial progress, more action must occur to meet the federal and California health-based standards. The 2022 AQMP explores new and innovative ways to accomplish these goals through incentive programs, efficiency improvements, recognition of co-benefits from other programs, regulatory measures, and other voluntary actions.

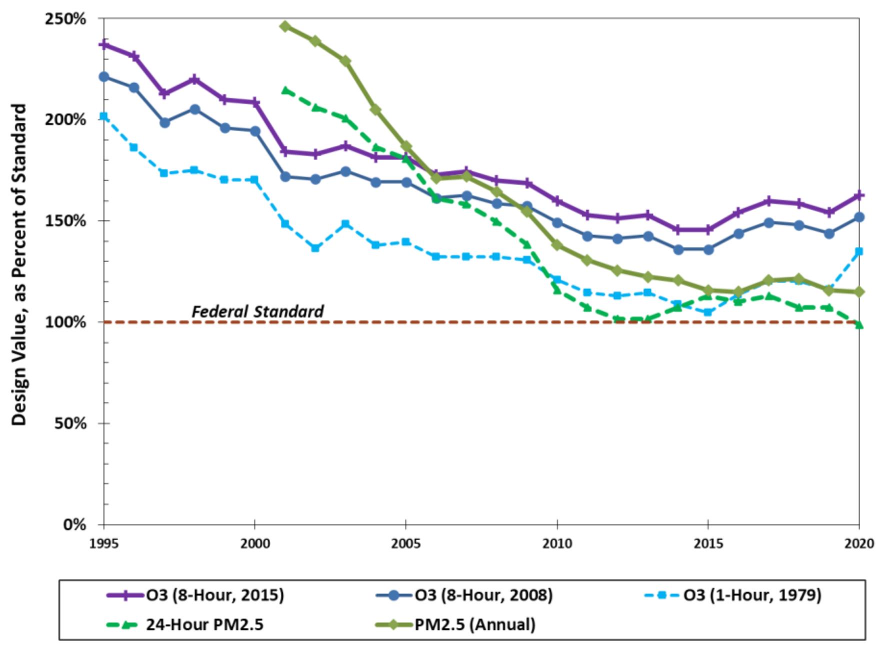


FIGURE 1-~~5~~6

TRENDS OF SOUTH COAST AIR BASIN MAXIMUM 3-YEAR DESIGN VALUES FOR OZONE AND PM2.5

(*AS PERCENTAGES OF CURRENT FEDERAL STANDARDS. 24-HOUR PM2.5 DESIGN VALUES EXCLUDE EXCEPTIONAL EVENTS CAUSED BY THE BOBCAT AND EL DORADO FIRES IN 2020*)

Progress in Implementing the 2016 AQMP

South Coast AQMD's Actions – Rules and Regulations

The 2016 AQMP was adopted in March 2017, approved by CARB the same month, and submitted to the U.S. EPA in April 2017. The 2016 AQMP included a comprehensive control strategy with specific control measures to attain ozone and PM2.5 NAAQS. The ozone portion and the 24-hour PM2.5 standard elements of the 2016 AQMP have been approved by the U.S. EPA into the SIP.[24] The "moderate" annual PM2.5 elements of the 2016 AQMP have also been approved by the U.S. EPA~~,~~ and in 2020 the U.S. EPA approved the Basin's re-designation as a "serious" nonattainment area for the annual PM2.5 standard.[25] These approvals include SIP revisions submitted in response to the U.S. EPA's initial findings.

Since its adoption,~~ the~~ South Coast AQMD has continued to implement the controls described in the 2016 AQMP control strategy. Progress toward fulfilling the 2016 AQMP commitments is tracked by emissions reductions that have occurred and are expected to occur from the implementation of adopted

[24] 84 FR 52005.

[25] 85 FR 71264.

regulations. ~~A~~In the past several years, a particular area of focus ~~the past several years~~ has been ~~on~~ implementing Control Measure CMB-05 for transitioning facilities from the Regional Clean Air Incentives Market (RECLAIM) Program to Best Available Retrofit Control Technology (BARCT) level controls. That transition is expected to achieve ~~five~~ 5 tons per day of NOx reductions in addition to the reduction on the RECLAIM allocation cap as specified in the 2015 Regulation XX amendment. The recent amendments of rules applicable to the RECLAIM facilities also address in part the requirements set by the AB 617 Community Emissions Reductions Programs. From 2018 to 2021, a total of twelve rules (Rules 1109.1, 1110.2, 1117, 1118.1, 1134, 1135, 1146, 1146.1, ~~and~~ 1146.2, 1147.1, 1150.3, and 1179.1) were adopted/amended to establish BARCT NOx emission limits.

With the exception of Rule 1109.1, the total emission reductions resulting from these rules are about 5.9 tons per day, which are anticipated to be achieved by 2024 (reductions from Rule 1118.1 are allocated to CMB-03). Implementation of Rule 1109.1, adopted on November 5, 2021, is estimated to reduce NOx emissions by approximately 7.7 to 7.9 tons per day upon final implementation, with 3.7 to 3.8 tons per day expected by 2023. ~~2.6 tons per day o~~Out of the total 7.7 to 7.9 tons per day reductions, 2.6 tons per day will be used to fulfill the RECLAIM shave commitment set by the 2015 amendment of Regulation XX. Furthermore, four additional rules (Rules 1147, 1147.2, 1153.1, and 1159.1) are currently under development and are scheduled for amendment ~~/~~ /adoption in calendar year 2022. More details on the RECLAIM Program and associated emissions can be found in Chapter 3.

~~The~~ South Coast AQMD has ~~also~~ taken several innovative actions to implement the facility-based mobile source measures included in the 2016 AQMP to achieve further reductions from mobile sources. These are measures aimed at reducing emissions from indirect sources, which are facilities which do not directly emit significant air pollution ~~themselves~~, but attract substantial mobile sources. Rules focused on ~~emission~~emissions reductions from indirect sources are referred to as indirect source rules (ISR). ~~The~~ South Coast AQMD has been pursuing implementation of facility-based mobile source measures in five key areas as described below~~:~~.

- Marine Ports: On May 4, 2018, the South Coast AQMD Governing Board (Board) directed staff to pursue both regulatory and voluntary approaches for some of the Basin's largest indirect sources, which include marine ports and airports. In August 2021, the Board directed staff to pursue a Memorandum of Understanding (MOU) with the ports of Los Angeles and Long Beach for another four months and ~~begin evaluation of marine ports ISR in December 2021~~, if a draft MOU (or draft MOUs) is not ready for full execution by all parties~~.~~, to begin evaluation of a marine ports ISR in December 2021. Per the Board direction, ~~emission~~emissions reductions from marine ports pivoted fully to an ISR approach in February 2022 due to the lack of progress in developing MOUs with the ports~~;~~.

- Commercial Airports: Following Board direction ~~from~~ given on May 4, 2018, emissions reductions from the operations of commercial airports were pursued using a collaborative and voluntary approach with five major commercial airports in the Basin. As a result, MOUs with five commercial airports were developed and adopted at the December 6, 2019 Governing Board meeting, with a projected NOx emission reduction of 0.52 and 0.37 tons per day in 2023 and 2031, respectively~~;~~.

- Warehouses/Distribution Centers: Rule 2305 ~~(~~ – ~~Warehouse Indirect Source Rule)~~ – Warehouse Actions and Investments to Reduce Emissions (WAIRE) Program was adopted in May 2021 to reduce NOx and diesel emissions associated with warehousing activities~~,~~ with estimated NOx reductions of 1.5 to 3 tons per day by 2031~~;~~.

- Railyards: Rulemaking is currently underway for new rail yards~~; and~~.

- New and Re-development: ~~this~~The measure is currently under development.

Table 1-2 lists ~~the~~ South Coast AQMD's 2016 AQMP commitments and the control measures or rules that were adopted through 2021. ~~Emission reduction~~ Emissions reductions commitments and reductions achieved through adopted measures are based on the ~~emission~~emissions inventories and milestone years from the 2016 AQMP. The new control strategy and attainment demonstrations in the 2022 AQMP are expected to supersede any previous commitments not achieved and not to be re-introduced in the proposed control strategy. "N/A" in the tables ~~indicate~~indicates a measure designed to ensure that reductions assumed to occur will in fact occur. "TBD" reductions are to be determined once the technical assessment is complete~~,~~ and inventory and specific control approach are identified.

TABLE 1-2

2016 AQMP ~~EMISSION~~EMISSIONS REDUCTIONS (TONS PER DAY) BY MEASURE/ADOPTION DATE

Control Measure #	Control Measure Title	Adoption Date	Commitment		Adopted to be Achieved	
			2023	2031	2023	2031
NOx EMISSIONS[a]						
CMB-01	Transition to Zero and Near-Zero Emission Technologies for Stationary Sources	--	2.5	6.0	--	--
CMB-02	Emission Reductions from Replacement with Zero or Near-Zero NOx Appliances in Commercial and Residential Applications [R1111]	2018	1.1	2.8	0.01[b]	--
CMB-03	Emission Reductions from Non-Refinery Flares [R1118.1]	2018	1.4	1.5	0.2[c]	--
CMB-04	Emission Reductions from Restaurant Burners and Residential Cooking	--	0.8	1.6	--	--
CMB-05	Further NOx Reductions from RECLAIM Assessment	2018-2021	0.0	5.0	9.4[d]	11.7[d]
ECC-02	Co-Benefits from Existing Residential and Commercial Building Energy Efficiency Measures	2018	0.3	1.1	0.3[e]	--
ECC-03	Additional Enhancements in Reducing Existing Residential Building Energy Use	--	1.2	2.1	--	--
MOB-03	Emission Reductions at Warehouse Distribution Centers	2021	TBD	TBD	0.7 to 1.5[f]	1.5 to 3.0[f]
MOB-04	Emission Reductions at Commercial Airports	2019	TBD	TBD	0.5	0.37
MOB-10	Extension of the SOON Provision for Construction/ Industrial Equipment	Ongoing	1.9	1.9	--[g]	TBD
MOB-11	Extended Exchange Program	Ongoing	2.9	1.0	<0.1	TBD
MOB-14	Emission Reductions from Incentive Programs	Ongoing	11	7.8	11.2	TBD
TOTAL NOx REDUCTIONS			**23.1**	**31.0**	**22.3 to 23.1**	**13.6 to 15.1**

TABLE 1-2 (CONTINUED)

2016 AQMP ~~EMISSION~~EMISSIONS REDUCTIONS (TONS PER DAY) BY MEASURE/ADOPTION DATE

Control Measure #	Control Measure Title	Adoption Date	Commitment		Adopted to be Achieved	
			2023	2031	2023	2031
VOC EMISSIONS[a]						
CTS-01	Further Emission Reductions from Coatings, Solvents, Adhesives, and Sealants [R1168]	2017	1.0	2.0	1.4[h]	--
FUG-01	Improved Leak Detection and Repair	--	2.0	2.0	--	--
CMB-01	Transition to Zero and Near-Zero Emission Technologies for Stationary Sources	--	1.2	2.8	--	--
CMB-03	Emission Reductions from Non-Refinery Flares [R1118.1]	2018	0.4	0.4	0.014[c]	--
ECC-02	Co-Benefits from Existing Residential and Commercial Building Energy Efficiency Measures	2018	0.07	0.3	0.07	--
ECC-03	Additional Enhancements in Reducing Existing Residential Building Energy Use	--	0.2	0.3	--	--
BCM-10	Emission Reductions from Greenwaste Composting	--	1.5	1.8	--	--
MSC-02	Application of All Feasible Measures	TBD	TBD	TBD	0.88[i]	**--**
TOTAL VOC REDUCTIONS			**6.4**	**9.6**	**2.4**	**--**

TABLE 1-2 (CONCLUDED)

2016 AQMP ~~EMISSION~~EMISSIONS REDUCTIONS (TONS PER DAY) BY MEASURE/ADOPTION DATE

Control Measure #	Control Measure Title	Adoption Date	Commitment		Adopted to be Achieved	
			2021	2025	2021	2025
PM2.5 EMISSIONS						
BCM-01	Further Emission Reductions from Commercial Cooking	--	0.0	3.3	--	--
BCM-04	Emission Reductions from Manure Management Strategies [NH3]	--	0.26	0.2	--	--
BCM-10	Emission Reductions from Greenwaste Composting [NH3]	--	0.1	0.1	--	--
TOTAL PM2.5 REDUCTIONS			**TBD**	**3.3**	--	--

[a] SIP commitments in the 2016 AQMP for VOC and NOx use a summer planning inventory, whereas expected ~~emission~~emissions reductions shown in this table are based on annual average inventories estimated during development of specific rules/measures. Annual average inventories for VOC and NOx are generally lower than summer planning inventories~~, hence~~. Hence, this table shows conservatively low ~~emission~~emissions reductions relative to SIP commitments.

[b] ~~Emission~~Emissions reductions reflect implementation of existing requirements in Rule 1111.

[c] During rule development, ~~emission~~emissions levels were found to be lower than those estimated in the 2016 AQMP.

[d] Reflects emission reductions from Rules 1109.1, 1110.2, 1117, 1134, 1135,1146 series, 1147.1, 1150.3, and 1179.1 (adopted from 2018 to 2021, with partial reductions of 3.7 tons per day and 5.8 tons per day by 2023 and 2031, respectively for Rule 1109.1). The specific ~~emission~~emissions reductions by 2023/2031 vary depending on the implementation schedule of each rule. There may be partial overlap between the ~~emission~~emissions reductions shown and those achieved from the RECLAIM shave, as described in the 2015 amendment of Rule 2002. In addition, part of these ~~emission~~emissions reductions resulting from non-RECLAIM facilities satisfy commitments for CMB-01 and CMB- 02.

[e] A linear extrapolation was used to estimate ~~emission~~emissions reductions from ECC-02 which are co- benefits from the adoption of State policies, such as SB350 and Title 24.

[f] SIP credit subject to the U.S. EPA's approval.

[g] Estimated reductions for MOB-10 are included in MOB-14.

[h] Amendment to Rule 1168 underway; emissions reductions to be updated.

[i] Includes ~~emission~~emissions reductions from Rule 1113 amendment adopted in February 2016, which was not reflected in the 2016 AQMP ~~emission~~emissions inventory.

South Coast AQMD's Actions – Technology Demonstration and Incentives

One of the key elements of the 2016 AQMP is to make private and public funding available to help further development and deployment of ~~the~~ advanced cleaner technologies, such as zero emission and near-zero emission technologies, and also achieve co-benefits from existing programs (e.g., climate and energy efficiency). Significant public and private investments are essential to achieve the needed transformation to zero emission technologies. The costs of zero emission technologies could be high when they are not commercially available on a large scale and thus, those investments would help expedite continued innovation and the advancement and deployment of clean technologies.

On January 4, 2019, the South Coast AQMD Governing Board awarded funding to 26 ~~emission reduction~~emissions reductions incentive projects, totaling over $47 million to support the 2016 AQMP's ~~emission reduction target~~emissions reductions targets via an incentive approach. Of the 26 projects, 16 would implement commercially available zero or near-zero control technologies or support infrastructure for implementation of cleaner fuels. These projects are anticipated to result in approximately 0.24 tons per day of NOx and 0.005 tons per day of PM2.5 emissions reductions in the Basin, with the majority of the projects implemented in environmental justice communities. Additionally, 11 stationary and mobile source technology demonstration projects were also included in this funding program. Upon successful demonstration and deployment, these projects have the potential to provide additional long-term NOx and VOC ~~emission~~emissions reductions. The awarded projects are consistent with the commitments in various 2016 AQMP control measures including MOB-14, CMB-02, CMB-04, and ECC-03. To estimate the benefits of zero and near-zero ~~emission~~emissions technology in the residential and commercial sectors, staff has also developed an interactive tool to estimate changes in criteria and GHG emissions and costs associated with upgrades in residential appliances. The Net Emissions Analysis Tool (NEAT) has been developed to assist in implementing control measures CMB-02 and ECC-03 of the 2016 AQMP. These measures seek ~~emission~~emissions reductions with zero and near-zero NOx appliances in commercial and residential applications, and integrate energy efficiency enhancements with criteria pollutants (e.g., NOx) and greenhouse gas ~~emission reduction~~emissions reductions co-benefits.

In addition, ~~the~~ South Coast AQMD continues the implementation of existing ongoing mobile source programs such as Surplus Off-Road Opt-In for NOx (SOON), the extended exchange program, and incentive programs (e.g., Carl Moyer) specified in the 2016 AQMP control measures MOB-10 (Extension of the SOON Provision for Construction/Industrial Equipment), MOB-11 (Extended Exchange Program), and MOB-14 (Emission Reductions from Incentive Programs). The ~~Mobile Source Incentive Programs~~mobile source incentive programs listed in Table 1-3 includes the number of affected mobile source equipment and ~~emission~~emissions reductions in tons per year for projects approved in year 2021.

TABLE 1-3

ESTIMATED ~~EMISSION~~EMISSIONS REDUCTIONS BENEFITS FROM 2021 INCENTIVE PROGRAMS

Program	# of Engines / Equipment / INF Stations	Estimated Emission Reductions NOx (Tons/Year)	Estimated Emission Reductions PM (Tons/Year)	Award Amount
Carl Moyer	163	231.9	4.1	$39,664,068
AB 617 CAPP Incentives	239	123.5	6.0	$37,762,509
Lower-Emission School Bus	178	34.1	4.8	$46,983,000
FARMER Program	2	5.8	0.3	$711,736
Volkswagen Mitigation	107 (First Come First Serve)	--[a]		$8,974,476
	38 (Competitive)	12.2	--[b]	$2,361,126
VIP	30	19.6	0.1	$1,300,000
Prop 1B	307	101.8	0	$32,825,000
Replace your Ride	865	2.5	0.1	$7,014,500
			TOTAL	**$177,596,415**

[a] ~~Emission~~Emissions reduction values pending evaluation from this first-come-first-served (FCFS) solicitation.

[b] Only NOx is required for ~~VW~~Volkswagen Environmental Mitigation Trust Program.

2022 AQMP

Scope

The 2022 AQMP is designed ~~to~~ primarily to address the federal 2015 8-hour ozone NAAQS, to satisfy the planning requirements of the federal CAA for the Basin and the Coachella Valley. Specific federal CAA requirements included in the 2022 AQMP are discussed later in this section. Once approved by the South Coast AQMD Governing Board and CARB, the 2022 AQMP will be submitted to the U.S. EPA as part of California's SIP.

In addition, the 2022 AQMP includes a chapter reporting on the air quality status of the ~~Riverside County portion of the Salton Sea Air Basin (~~Coachella Valley~~)~~ (Chapter 7). Chapter 8 describes the air quality impacts experienced in environmental justice communities and outline some of the steps South Coast AQMD is taking to address localized impacts. An additional chapter provides the public process and participation of the 2022 AQMP development (Chapter 9).

Approach

As described in Chapter 5, the Basin is expected to attain the 2015 8-hour ozone NAAQS in 2037 with the existing control programs and the newly proposed control strategy in the 2022 AQMP. Under the federal CAA, the Basin must achieve the federal NAAQS "as expeditiously as practicable." Therefore, if feasible measures are available, they must be adopted and implemented ~~in~~into the SIP. Chapter 4 of the 2022 AQMP outlines a comprehensive control strategy that meets the requirement for expeditious progress towards the attainment date for the 2015 8-hour ozone NAAQS~~ being analyzed~~.

The ~~Clean Air Act~~CAA provides additional flexibilities to nonattainment areas that are classified as "extreme" for ozone. Section 182(e)(5) allows extreme ozone nonattainment areas to take credit for emission reductions from future improvements and breakthroughs in control techniques and technologies. These emissions reductions are also known as "black box" measures because the specific technologies or controls to achieve the ~~emission~~emissions reductions are not yet known. The rationale for allowing "black box" measures is that extreme ozone nonattainment areas have 20 years to attain the standard~~,~~ and, in that time, advanced technologies to achieve further ~~emission~~emissions reductions are presumed to become available.

As shown in the ozone strategy in Chapter 4, reliance on "black box" ~~emission~~emissions reductions strategies is necessary. This is due to the substantial ~~emission~~emissions reductions that are needed to attain the standard. The photochemical ozone modeling analysis and attainment demonstration included in Chapter 5 indicate that ~~71~~67 percent of ~~emission~~emissions reductions beyond the 2037 baseline are required. This is equivalent to an ~~82~~83 percent reduction from 2018 emissions. Given the magnitude of ~~emission~~emissions reductions required for attainment of the 2015 8-hour ozone standard, ~~we~~the attainment demonstration will have to rely on the deployment of future advanced technologies to achieve the needed ~~emission~~emissions reductions.

The magnitude of ~~emission~~emissions reductions needed also means that no single emissions category can be left uncontrolled, including sources subject to federal authority. While emissions from sources subject to the authority of the South Coast AQMD and CARB have been significantly reduced in the past few decades, emissions from sources primarily regulated by federal and international authorities have remained relatively stagnant or have increased over this time period. The reductions from the sources that are subject to federal and international authorities are subject to CAA Section 182(e)(5) provisions, since the State and local district cannot assign ~~emission~~emissions reductions to federal entities through the SIP. As such, reliance on 182(e)(5) "black box" provisions is necessary in demonstrating attainment of the 2015 ozone standard. ~~The ~~South Coast AQMD will pursue close collaboration with other agencies to continue progress and work actively towards defining and achieving as many ~~emission~~emissions reductions as possible, and not wait until subsequent AQMPs to begin to address any shortfalls.

The control measures contained in the 2022 AQMP can be categorized as follows:

Ozone Measures~~.~~: These measures provide for necessary actions to attain the 2015 8-hour ozone NAAQS in 2037, including actions to reduce NOx and VOC emissions from both stationary (point and area) and mobile sources, as included in ~~the~~ South Coast AQMD's proposed stationary and mobile source measures, as well as CARB's State Strategy for the State Implementation Plan (State SIP Strategy~~.~~). The mobile source measures include actions to be taken by ~~the~~ South Coast AQMD, CARB and the U.S. EPA.

Contingency Measures~~.~~: –These measures are to be automatically implemented if the Basin fails to achieve the ozone standard by the latest statutory attainment date or ~~Reasonable Further Progresss~~ reasonable further progress requirements.

Transportation Control Measures~~.~~: –These measures are generally designed to reduce vehicle miles traveled (VMT) as included in SCAG's 2020 Regional Transportation Plan~~.~~ (RTP).

Some of the control measures achieve ~~emission~~emissions reductions by taking advantage of existing programs, while some control measures focus on incentives, outreach, and education to bring about ~~emission~~emissions reductions through voluntary participation and behavioral changes needed to complement regulations.

Need for Integrated and Coordinated Planning

The Basin faces several ozone and PM2.5 attainment challenges, as strategies for significant emission reductions become harder to identify and the federal standards continue to become more stringent. California's ~~greenhouse gas~~GHG reduction targets under SB 32 and Governor Executive Order B-55-18 add new challenges and timelines that affect many of the same sources that emit criteria pollutants. In finding the most cost-effective and efficient path to meet multiple deadlines for multiple air quality and climate objectives, an integrated planning approach is optimal. Responsibilities for achieving these goals span all levels of government and coordinated and consistent planning efforts among multiple government agencies are a key component of this integrated approach.

Federal CAA Planning Requirements Addressed by 2022 AQMP

In November 1990, Congress enacted a series of amendments to the ~~Clean Air Act (~~CAA~~)~~, intended to strengthen air pollution control efforts across the nation. One of the primary goals of these amendments was an overhaul of the planning provisions for those areas not currently meeting NAAQS. The CAA identifies specific emission reduction goals, requires both a demonstration of reasonable further progress and an attainment demonstration, and incorporates more stringent sanctions for failure to attain or to meet interim milestones.

There are several sets of general planning requirements in the federal CAA, both for nonattainment areas (Section 172(c)) and for implementation plans in general (Section 110(a)(2)). These requirements are listed and briefly described in Tables 1-4 and 1-5, respectively. The general provisions apply to all applicable pollutants unless superseded by pollutant-specific requirements. Chapter 6 and Appendix ~~6~~ VI describe the specific CAA requirements and how these requirements are satisfied by the 2022 AQMP.

TABLE 1-4

NONATTAINMENT PLAN PROVISIONS [CAA SECTION 172(C)]

Requirement	Description
Reasonably available control measures	Implementation of all reasonably available control measures as expeditiously as practicable [Section 172(c)(1)]
Reasonable further progress	Provision for reasonable further progress, which is defined as "such annual incremental reductions in emissions of the relevant air pollutant as are required for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable date" [Section 172(c)(2)]
Inventory	Development and periodic revision of a comprehensive, accurate, current inventory of actual emissions from all sources [Section 172(c)(3)]
Allowable emission levels	Identification and quantification of allowable emission levels for major new or modified stationary sources [Section 172(c)(4)]
Permits for new and modified stationary sources	Permit requirements for the construction and operation of new or modified major stationary sources [Section 172(c)(5)]
Other measures	Inclusion of all enforceable emission limitations and control measures as may be necessary to attain the standard by the applicable attainment deadline [Section 172(c)(6)]
Contingency measures	Implementation of contingency measures to be undertaken in the event of failure to make reasonable further progress or to attain the NAAQS [Section 172(c)(9)]

TABLE 1-5

GENERAL CAA REQUIREMENTS FOR IMPLEMENTATION PLANS [CAA SECTION 110(A)]

Requirement	Description
Enforceable emission limitations	Enforceable emission limitations or other control measures as needed to meet the requirements of the CAA [Section 110(a)(2)(A)]
Ambient air quality monitoring	An ambient air quality monitoring program [Section 110(a)(2)(B)]
Enforcement and regulation	A program for the enforcement of adopted control measures and emission limitations and regulation of the modification and construction of any stationary source to assure that the NAAQS are achieved [Section 110(a)(2)(C)]
Interstate transport	Adequate provisions to inhibit emissions that will contribute to nonattainment or interfere with maintenance of NAAQS or interfere with measures required to prevent significant deterioration of air quality or to protect visibility in any other state [Section 110(a)(2)(D)]
Adequate resources	Assurances that adequate personnel, funding, and authority are available to carry out the plan [Section 110(a)(2)]
Source testing and monitoring	Requirements for emission monitoring and reporting by the source operators [Section 110(a)(2)(F)]
Emergency authority	Ability to bring suit and issue administrative orders to enforce against source presenting imminent and substantial endangerment to public health or environment [Section 110(a)(2)(G)]
Plan revisions	Provisions for revising the air quality plan to incorporate changes in the standards or in the availability of improved control methods [Section 110(a)(2)(H)]
Other CAA requirements	Adequate provisions to meet applicable requirements relating to new source review, consultation, notification, and prevention of significant deterioration and visibility protection contained in other sections of the CAA [Section 110(a)(2)(I),(J)]
Impact assessment	Appropriate air quality modeling to predict the effect of new source emissions on ambient air quality [Section 110(a)(2)(K)]
Permit fees	Provisions requiring major stationary sources to pay fees to cover reasonable costs for reviewing and acting on permit applications and for implementing and enforcing the permit conditions [Section 110(a)(2)(L)]
Local government participation	Provisions for consultation and participation by local political subdivisions affected by the plan [Sections 110(a)(2)(M) & 121]

The CAA requires that submitted plans include information on tracking plan implementation and milestone compliance. Requirements for these elements are described in CAA Section 182(g), and Chapters 4 and 6 address these issues.

The U.S. EPA also requires a public hearing on many of the required elements in SIP submittals before considering them officially submitted. ~~The~~ South Coast AQMD's AQMP public process includes multiple public workshops and public hearings on all the required elements prior to submittal. Chapter 9 describes the public process, participation, and comprehensive outreach program for the 2022 AQMP.

State Law Requirements Addressed by the 2022 AQMP

The ~~California Clean Air Act (~~CCAA~~)~~ (Health and Safety Code Sections 40910 *et seq*.) was signed into law on September 30, 1988, became effective on January 1, 1989, and was amended in 1992. Also known as the Sher Bill (AB 2595), the CCAA established a legal mandate to achieve health-based state air quality standards at the earliest practicable date. The California ambient air quality standards for ozone are 90 ppb for 1-hour ozone, established in 1987 and 70 ppb for 8-hour ozone, established in 2005. The Lewis Presley Act provides that the South Coast AQMD's plan must also contain deadlines for compliance with all state ambient air quality standards and the federally mandated primary ambient air quality standards (Health and Safety Code Section 40462(a)). Chapter 6 describes how the 2022 AQMP meets the State planning requirements under the CCAA, including schedules, plan effectiveness, ~~emission~~emissions reductions of 5 percent per year or adoption of all feasible measures, reducing population exposure to criteria pollutants, and ranking control measures by cost-effectiveness.

Format of This Document

This document is organized into eleven chapters, each addressing a specific topic. Each of the chapters is summarized below.

Chapter 1, "Introduction," introduces the 2022 AQMP including purpose, historical air quality progress, and the approach for the 2022 AQMP.

Chapter 2, "Air Quality and Health Effects," discusses the Basin's current air quality in comparison with federal and State health-based air pollution standards.

Chapter 3, "Base Year and Future Emissions," summarizes emissions inventories, estimates current emissions by source and pollutant, and projects future emissions with and without growth.

Chapter 4, "Control Strategy and Implementation," presents the control strategy, specific measures, and implementation schedules to attain the air quality standards by the specified attainment dates.

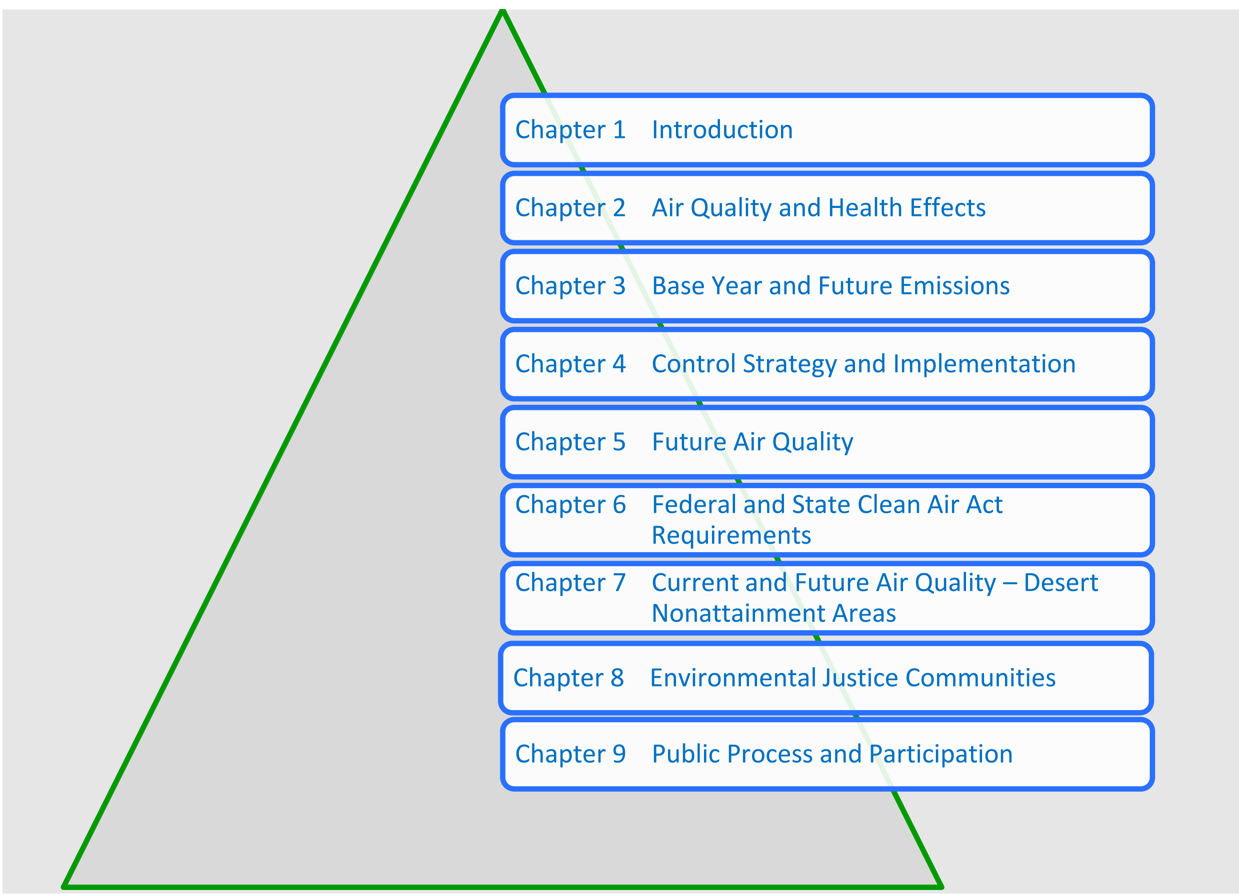
Chapter 5, "Future Air Quality," describes the modeling approach used in the AQMP and summarizes the Basin's future air quality projections with and without the control strategy.

Chapter 6, "Federal and State Clean Air Act Requirements," discusses specific federal and State requirements as they pertain to the 2022 AQMP, including anti-backsliding requirements for revoked standards.

Chapter 7, "Current and Future Air Quality – Desert Nonattainment Areas," describes the air quality status of the Coachella Valley, including emissions inventories, designations, and current and future air quality.

Chapter 8, "Environmental Justice Communities," describes air quality impacts experienced in environmental justice communities and outline some of the steps ~~the~~ South Coast AQMD is taking to address localized impacts.

Chapter 9, "Public Process and Participation," describes ~~the~~ South Coast AQMD's public outreach effort associated with the development of the 2022 AQMP.



A "Glossary" is provided at the end of the document, presenting definitions of commonly used terms found in the 2022 AQMP.

2022 AQMP technical appendices are listed below:

Appendix I (Health Effects) presents a summary of scientific findings on the health effects of ambient air pollutants, portions of which satisfy the requirements of California Health and Safety Code Section 40471(b).

Appendix II (Current Air Quality) contains a detailed summary of the air quality in 2020, along with prior year trends, in both the Basin and Coachella Valley, as monitored by the South Coast AQMD.

Appendix III (Base and Future Year ~~Emission~~Emissions Inventory) presents the 2018 base year emissions inventory and projected ~~emission~~emissions inventories of air pollutants in future milestone and attainment years for both annual average and summer planning inventories.

Appendix IV-A (South Coast AQMD's Stationary and Mobile Source Control Measures) describes ~~the~~ South Coast AQMD staff's proposed stationary and mobile source control measures.

Appendix IV-B (CARB's SIP Mobile Source Strategy) describes CARB staff's ~~proposed~~ 2022 State SIP ~~strategy~~Strategy.

Appendix IV-C (SCAG's Regional Transportation Strategy and Control Measures) describes the SCAG's Final 2020 Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures.

Appendix V (Modeling and Attainment Demonstrations) provides the details of the regional modeling for the attainment demonstrations that illustrate that the proposed ~~emission~~emissions reductions will achieve the federal ozone air quality standards by the regulatory attainment deadlines in the Basin and Coachella Valley.

Appendix VI (Compliance with Other Clean Air Act Requirements) provides the details demonstrating that the 2022 AQMP complies with specific federal and California Clean Air Act Requirements.

Appendix VII (CARB'S Commitment for Coachella Valley) describes new SIP measures and potential emissions reduction SIP commitments for the Coachella Valley based on the measures identified and quantified to date as provided in CARB's 2022 State SIP Strategy.

Chapter 2
Air Quality and Health Effects

- **The South Coast Air Basin (Basin) experiences high levels of ozone due to the large amount of air emissions combined with ideal weather and topography for ozone formation.**
- **The Basin does not meet federal ozone standards or the annual PM2.5 standard. It met the 24-hour PM2.5 standard for the first time based on 2018-2020 data but continues to exceed the annual PM2.5 standard.**
- **The Coachella Valley also fails to meet federal ozone standards due to transport of pollution from the South Coast Air Basin.**
- **The highest levels of ozone are typically in the Inland Empire; the highest levels of PM2.5 are typically in South Central Los Angeles and metropolitan Riverside County.**
- **The region experienced unusually high levels of ozone in 2020 due to record-breaking heatwaves and wildfires.**

In This Chapter

Introduction

There are many factors that contribute to the high levels of air pollution experienced in the South Coast Air Basin (Basin). The substantial amount of emissions from the nation's second largest urban area combined with meteorological conditions and topography that create the ideal conditions for the formation of pollutants such as ozone and fine particulate matter (PM2.5, particles less than 2.5 microns in diameter). Weather conditions such as low wind speed[1] and low mixing heights[2] hampers the dispersion of those emissions, and frequent strong temperature inversions form a cap that traps the emissions close to the ground. The mountainous terrain surrounding the ~~b~~Basin further traps pollutants as they are pushed inland with the sea breeze. Southern California also has abundant sunshine, which drives the photochemical reactions that form ozone and a significant portion of fine particulate matter. Together all these factors create a "perfect storm" of conditions for forming air pollution.

In the Basin, high ozone is typically observed from April through October, when longer days and more intense sunlight drives the photochemical reactions that form ozone. Elevated PM10 (particles less than 10 microns in diameter) and PM2.5 concentrations can occur in the Basin throughout the year. High PM10 levels are typically caused by windblown dust and are associated with high wind events. PM2.5 is both directly emitted (primary PM2.5) and formed in the atmosphere from the reaction of gas-phase precursors (secondary PM2.5); most PM2.5 in the Basin is formed from secondary processes. High PM2.5 levels tend to occur most frequently in fall and winter when stagnant conditions trap pollutants and enhance formation of PM2.5 in the atmosphere. Weather conditions are therefore a primary driver of observed air pollutant levels in our region.

While the 2022 Air Quality Management Plan (AQMP) is focused on strategies to meet the 2015 8-hour ozone standard, it is important to capture the broader picture of air quality in our region. This chapter provides a summary of air quality trends in both the Basin and the Riverside County portion of the Salton Sea Air Basin (SSAB), which we refer to as the Coachella Valley. We first provide an overview of the federal National Ambient Air Quality Standards (NAAQS or federal standards) and the California Ambient Air Quality Standards (CAAQS or State standards). We also briefly discuss the health effects due to air pollution exposure. We then summarize air quality trends in both the Basin and the Coachella Valley. We provide a summary of nationwide air quality data, with air quality in the Basin compared to conditions in other major U.S. and California urban areas. Finally, we examine potential causes of high ozone levels observed in the Basin in 2020. Additional details on current air quality and trends and comparisons can be found in Appendix II: Current Air Quality.

Note that more detailed information of the topics discussed in this chapter can be found in the Appendices. Appendix I contains further information on the health effects of air pollution. Appendix II contains additional details on current air quality and trends with comparisons to the federal and State standards, including spatial and temporal variability and location-specific air monitoring data. Further,

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[1] The average windspeed for Los Angeles is the lowest of the nation's 10 largest urban areas.

[2] The maximum mixing height is an index of how well pollutants can be dispersed vertically in the atmosphere.

current air quality and trend information specific to the Coachella Valley planning area is included in Chapter 7, along with the State Implementation Plan (SIP)'s elements for the 2015 8-hour ozone national ambient air quality standards specific to the Coachella Valley.

Ambient Air Quality Standards

Federal and State Standards

Both the federal government and the State of California have established ambient air quality standards for six air pollutants: Ozone, Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), PM (includes both PM10 and PM2.5), and lead. California has also set a standard for sulfates (SO_4^{2-}), which are a component of particulate matter, and a nuisance odor standard for hydrogen sulfide (H_2S).

The NAAQS for each criteria air pollutant is determined after a lengthy review of available health and air pollution data, with the aim of safeguarding public health. The U.S. EPA is legally barred from considering economic costs when setting the NAAQS. Some pollutants that have both ~~short and long term~~short- and long-term health consequences are regulated by establishing standards with different averaging times. PM2.5 for instance has daily and annual limits. Each standard has a different date by which it must be attained based on the date that an area is designated as nonattainment of the standard and the severity of the air pollutant concentrations.

California has its own standards for the same criteria pollutants in addition to sulfate, and hydrogen sulfide. Some California standards (CAAQS) such as the PM2.5 annual, ozone and CO 8-hour standards are similar to the NAAQS, but others are more stringent. Moreover, some CAAQS use averaging periods and calculation methods that are different from the NAAQS. The added stringency results from the State's own assessment of the nexus between pollutants and public health in California. See Chapter 6 for details.

In addition to criteria pollutants, more than 200 toxic air pollutants have been identified by the Office of Environmental Health Hazard Assessment (OEHHA). Examples include benzene, hexavalent chromium perchloroethylene and diesel exhaust. The most recent list of toxic air pollutants with their associated health risk is available in the OEHHA database.[3]~~.~~ Air toxics are regulated by controlling their emissions at the source, and do not have maximum permissible ambient concentrations like criteria pollutants do. The NAAQS and CAAQS for each of these pollutants and their effects on health and welfare are summarized in Table 2-1.

[3] https://ww2.arb.ca.gov/sites/default/files/classic/toxics/healthval/contable.pdf.

TABLE 2-1

AMBIENT AIR QUALITY STANDARDS AND KEY HEALTH AND WELFARE EFFECTS

AIR POLLUTANT	FEDERAL STANDARD (NAAQS)	STATE STANDARD (CAAQS)	KEY HEALTH & WELFARE EFFECTS[#]
	Concentration, Averaging Time, Year of NAAQS Review	Concentration, Averaging Time	
Ozone (O3)	**0.070 ppm, 8-Hour (2015)** 0.075 ppm, 8-Hour (2008) 0.08 ppm, 8-Hour (1997) 0.12 ppm, 1-Hour (1979)	**0.070 ppm, 8-Hour** **0.09 ppm, 1-Hour**	(a) Pulmonary function decrements and localized lung injury in humans and animals; (b) asthma exacerbation; (c) chronic obstructive pulmonary disease (COPD) exacerbation; (d) respiratory infection; (e) increased school absences, and hospital admissions and emergency department (ED) visits for combined respiratory diseases; (e) increased mortality; (f) possible metabolic effects Vegetation damage; property damage
Carbon Monoxide (CO)	**35 ppm, 1-Hour (1971)** **9 ppm, 8-Hour (1971)**	**20 ppm, 1-Hour** **9.0 ppm, 8-Hour**	Visibility reduction (a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) possible impairment of central nervous system functions; (d) possible increased risk to fetuses; (f) possible increased risk of pulmonary disease; (g) possible emergency department visits for respiratory diseases overall and visits for asthma.

TABLE 2-1 (CONTINUED)

AMBIENT AIR QUALITY STANDARDS AND KEY HEALTH AND WELFARE EFFECTS

AIR POLLUTANT	FEDERAL STANDARD (NAAQS)	STATE STANDARD (CAAQS)	KEY HEALTH & WELFARE EFFECTS[#]
	Concentration, Averaging Time, Year of NAAQS Review	Concentration, Averaging Time	
Fine Particulate Matter (PM2.5)	**35 µg/m^3, 24-Hour (2006)** 65 µg/m^3, 24-Hour (1997) 12.0 µg/m^3**, Annual (2012)** 15.0 µg/m^3, Annual (1997)	**12.0 µg/m^3, Annual**	Short -term (a) increase in mortality rates; (b) increase in respiratory infections; (c) increase in number and severity of asthma attacks; (d) COPD exacerbation; (e) increase in combined respiratory-diseases and number of hospital admissions; (f) increased mortality due to cardiovascular or respiratory diseases; (g) increase in hospital admissions for acute respiratory conditions; (h) increase in school absences; (i) increase in lost work days; (j) decrease in respiratory function in children; (k) increase medication use in children and adults with asthma. Long-term (a) reduced lung function growth in children; (b) changes in lung development; (c) development of asthma in children; (d) increased risk of cardiovascular diseases; (e) increased total mortality from lung cancer; (f) increased risk of premature death. Possible link to metabolic, nervous system, and reproductive and developmental effects for short-term and long-term exposure to PM2.5.
Respirable Particulate Matter (PM10)	**150 µg/m^3, 24-Hour (1997)**	**50 µg/m^3, 24-Hour** **20 µg/m^3, Annual**	

TABLE 2-1 (CONTINUED)

AMBIENT AIR QUALITY STANDARDS AND KEY HEALTH AND WELFARE EFFECTS

AIR POLLUTANT	FEDERAL STANDARD (NAAQS)	STATE STANDARD (CAAQS)	KEY HEALTH & WELFARE EFFECTS[#]
	Concentration, Averaging Time, Year of NAAQS Review	Concentration, Averaging Time	
Nitrogen Dioxide (NO_2)	**100 ppb, 1-Hour (2010)** **0.053 ppm, Annual (1971)**	**0.18 ppm, 1-Hour** **0.030 ppm, Annual**	Short-term (a) asthma exacerbations ("asthma attacks") Long-term (a) asthma development; (b) higher risk of all-cause, cardiovascular, and respiratory mortality. Both short and long term NO_2 exposure is also associated with chronic obstructive pulmonary disease (COPD) risk. Potential impacts on cardiovascular health, mortality and cancer, aggravate chronic respiratory disease. Contribution to atmospheric discoloration
Sulfur Dioxide (SO_2)	**75 ppb, 1-Hour (2010)**	**0.25 ppm, 1-Hour** **0.04 ppm, 24-Hour**	Respiratory symptoms (bronchoconstriction, possible wheezing or shortness of breath) during exercise or physical activity in persons with asthma. Possible allergic sensitization, airway inflammation, asthma development
Lead (Pb)	**0.15 µg/m^3, rolling 3-month average (2008)**	**1.5 µg/m^3, 30-day average**	(a) Learning disabilities; (b) impairment of blood formation and nerve function; (c) cardiovascular effects, including coronary heart disease and hypertension Possible male reproductive system effects

TABLE 2-1 (CONCLUED)

AMBIENT AIR QUALITY STANDARDS AND KEY HEALTH AND WELFARE EFFECTS

AIR POLLUTANT	FEDERAL STANDARD (NAAQS)	STATE STANDARD (CAAQS)	KEY HEALTH & WELFARE EFFECTS#
	Concentration, Averaging Time, Year of NAAQS Review	Concentration, Averaging Time	
Sulfates-PM10 (SO_4^{2-})	**N/A**	**25 µg/m³, 24-Hour**	(a) Decrease in lung function; (b) aggravation of asthmatic symptoms; (c) vegetation damage; (d) Degradation of visibility; (e) property damage
Hydrogen Sulfide (H_2S)	**N/A**	**0.03 ppm, 1-hour**	Exposure to lower ambient concentrations above the standard may result in objectionable odor and may be accompanied by symptoms such as headaches, nausea, dizziness, nasal irritation, cough, and shortness of breath

ppm - parts per million by volume; ppb - parts per billion by volume (0.01 ppm = 10 ppb).
Standards in bold are the current, most stringent standards; there may be continuing obligations for former standards.
State standards are "not-to-exceed" values based on State designation value calculations.
Federal standards follow the 3-year design value form of the NAAQS.
List of health and welfare effects is not comprehensive; detailed health effects information can be found in Appendix I: Health Effects or in the U.S. EPA NAAQS documentation at https://www.epa.gov/naaqs.

On October 1, 2015, the U.S. EPA finalized the new 2015 ozone standard at 0.070 ppm or 70 ppb for an 8-hour average, retaining the same form as the previous 8-hour standards. The 2015 ozone NAAQS became effective as of December 28, 2015. The PM2.5 standards currently in effect are the 2006 24-hour standard of 35 µg/m³, and the 2013 annual standard of 12 µg/m³. The U.S. EPA last reviewed the PM2.5 and ozone standards in 2020 and decided to retain them at their current levels. However, the present administration is re-evaluating the 2020 review and expects to finalize that re-evaluation ~~revise these standards~~ within the next few years. See Chapter 9 for more details.

The Basin and the Coachella Valley, as well as much of California, have been designated nonattainment for the 2015 8-hour ozone standard. The Basin and San Joaquin Valley are the only areas with an "extreme" nonattainment designation for the 2015 8-hour ozone standard. The Basin is designated nonattainment for current and former federal and State ozone standards, as well as the current PM2.5 standards. However, 2018-2020 was the first ~~three~~3-year period where the Basin met the 24-hour PM2.5 standard of 35 µg/m³ after removing elevated measurements driven by the Bobcat and El Dorado wildfires in the fall of 2020. The Los Angeles County portion of the Basin is also designated as a nonattainment area for the federal lead standard based on source-specific monitoring at two locations as determined by the

U.S. EPA using 2007-2009 data. However, all stations in the Basin, including the near-source monitoring in Los Angeles County, have remained below the lead NAAQS for the 2012 through 2020 period.

In June 2013, the U.S. EPA approved re-designation of the Basin as an attainment area for the 24-hour PM10 federal standard. The Basin also continues to be in attainment of the CO, NO_2, and SO_2 NAAQS. The Coachella Valley remains a nonattainment area for both the ozone and the PM10 NAAQS. However, PM10 concentrations in the Coachella Valley are continually evaluated and the influence of high-wind exceptional events are routinely assessed; a re-designation to attainment of the PM10 NAAQS could be possible in the near future. Further details on the federal and State standards are presented in this chapter by pollutant, along with the South Coast AQMD's current attainment status.

In this chapter and in Appendix II: Current Air Quality, the number of days exceeding air quality standards and the statistics that are compared to the NAAQS (design values[4]) using data measured at stations in the Basin and the Coachella Valley are presented. These metrics are instructive regarding trends and control strategy effectiveness. However, it should be noted that an exceedance of the concentration level of a federal standard does not necessarily mean that the NAAQS was violated or that it would cause nonattainment. The form of the standard must also be considered. For example, for 24-hour PM2.5, the form of the standard is the annual 98th percentile measurement of all of the 24-hour PM2.5 daily samples at each station, averaged over three years at each station. For 8-hour ozone, the form of the standard is the annual fourth highest measured 8-hour average daily maximum concentration at each station, averaged over three years at each station.

For NAAQS attainment/nonattainment decisions, the most recent three years of data are considered (two years for CO and one year for 24-hour SO2), along with the form of the standard, to calculate a *design value* for each station.[5] The overall design value for an air basin is the highest design value of all the stations in that basin. Table 2-2 shows the NAAQS, along with the design value and form of each federal standard. The California State air quality standards are values not to be exceeded, typically evaluated over a 3-year period, and the data is evaluated in terms of a *State designation value*, which eliminates some statistical data outliers and exceptional events, which are above the Expected Peak Day Concentration.[6]~~.~~ Attainment deadlines for the State standards are 'as soon as practicable'.

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[4] Design values are statistical metrics that can be compared directly to the NAAQS.

[5] Note that for modeling attainment demonstrations, the U.S. EPA modeling guidance recommends a 5-year weighted average for the design value instead of the 3-year.

[6] See https://ww2.arb.ca.gov/sites/default/files/classic/research/apr/past/93-49.pdf.

TABLE 2-2

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) AND DESIGN VALUE REQUIREMENTS

Pollutant	Averaging Time**	NAAQS Level	Design Value Form of NAAQS*
Ozone (O3)	1-Hour (1979) [revoked 2005]	0.12 ppm	Not to be exceeded more than once per year averaged over 3 years
	8-Hour (2015)	**0.070 ppm**	**Annual fourth highest 8-hour average concentration, averaged over 3 years**
	8-Hour(2008) [revised 2015]	0.075 ppm	
	8-Hour(1997) [revoked 2015]	0.08 ppm	
Fine Particulate Matter (PM2.5)	**24-Hour (2006)**	**35 µg/m³**	**3-year average of the annual 98th percentile of daily 24-hour concentration**
	24-Hour (1997)	**65 µg/m³**	
	Annual (2012)	**12.0 µg/m³**	**Annual average concentration, averaged over 3 years** *(annual averages based on average of 4 quarters)*
	Annual (1997) [revised 2012]	15.0 µg/m³	
Respirable Particulate Matter (PM10)	**24-Hour (1987)**	**150 µg/m³**	**Not to be exceeded more than once per year averaged over 3 years**
	Annual (1987) [revoked 2006]	50 µg/m³	Annual average concentration, averaged over 3 years
Carbon Monoxide (CO)	**1-Hour (1971)**	**35 ppm**	**Not to be exceeded more than once a year. Design value is the higher of each year's annual second maximum in a two-year period.**
	8-Hour (1971)	**9 ppm**	
Nitrogen Dioxide (NO_2)	**1-Hour (2010)**	**100 ppb**	**3-year avg. of the annual 98th percentile of the daily maximum 1-hour average concentrations (rounded)**
	Annual (1971)	**0.053 ppm**	**Annual avg. concentration, averaged over 3 years**

TABLE 2-2 (CONTINUED)

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) AND DESIGN VALUE REQUIREMENTS

Pollutant	Averaging Time[**]	NAAQS Level	Design Value Form of NAAQS[*]
Sulfur Dioxide (SO_2)	**1-Hour (2010)**	**75 ppb**	**99^{th} percentile of 1-hour daily maximum concentrations, averaged over 3 years**
	24-Hour (1971) [revoked 2010]	0.14 ppm	Not to be exceeded more than once per year
	Annual (1971) [revoked 2010]	0.03 ppm	Annual arithmetic average
Lead (Pb)	**3-Month Rolling Average (2008)[##]**	**0.15 $\mu g/m^3$**	**Highest rolling 3-month average of the 3 years**

Bold text denotes the current and most stringent NAAQS.

* The NAAQS is attained when the design value (form of concentration listed) is equal to or less than the level of the NAAQS; for pollutants with the design values based on "exceedances" (1-hour ozone, 24-hour PM10, CO, and 24-hour SO_2), the NAAQS is attained when the concentration associated with the design value is less than or equal to the standard level:

- For 1-hour ozone and 24-hour PM10, the NAAQS is attained when the fourth highest daily concentrations of the 3-year period is less than or equal to the standard level and
- For CO, the standard is attained when the maximum of the second highest daily concentration each year in the most recent two years is equal to or less than the standard level.

** Year of the U.S. EPA NAAQS update review shown in parenthesis and revoked or revised status in brackets; for revoked or revised NAAQS, areas may have continuing obligations until that standard is attained: for 1-hour ozone, the Basin has continuing obligations under the former 1979 standard; for 8-hour ozone, the NAAQS was lowered from 0.08 ppm to 0.075 ppm to 0.070 ppm, but the previous 8-hour ozone NAAQS and most related implementation rules remain in place until that standard is attained.

3-month rolling averages of the first year (of the 3~~three-~~year period) include November and December monthly averages of the prior year; the 3-month average is based on the average of "monthly" averages.

Attainment Status

Figure 2-1 shows the South Coast and Coachella Valley 3-year design values (2018-2020) for ozone, PM2.5, and PM10, as a percentage of the corresponding current and former federal standards. The current status of NAAQS attainment for all the criteria pollutants is presented in Table 2-3 for the Basin and in Table 2-4 for the Coachella Valley.

The U.S. EPA allows certain air quality data to be excluded when evaluating whether a region meets the NAAQS. Under the Exceptional Events Rule,[7] air quality data can be excluded when determining attainment status for data that is influenced by exceptional events. Exceptional events are natural events or human-caused events that are unlikely to recur at a particular location that are also not reasonably controllable or preventable. These events must meet strict evidence requirements, such as high winds,

[7] The U.S. EPA Exceptional Events Rule, *Treatment of Data Influenced by Exceptional Events*, became effective May 21, 2007 and was revised on September 16, 2016 [40 CFR 50.14(c)(3)]. The previous U.S. EPA *Natural Events Policy* for Particulate Matter was issued May 30, 1996.

wildfires, volcanoes, or some cultural events (such as Independence Day or New Year's fireworks). For several PM measurements in the Basin and the Coachella Valley in 2018 through 2020, the South Coast AQMD applied the U.S. EPA Exceptional Events Rule to flag some PM10 and PM2.5 data due to high-wind natural events, wildfires, and fireworks on Independence Day and New Year's Eve. All of the exceptional event flags through 2020 have been submitted with the affected data to the U.S. EPA's Air Quality System (AQS) database. Staff are currently preparing the documentation required to support high PM2.5 levels recorded during the Bobcat and El Dorado fires in 2020 and the U.S. EPA must approve the submittals before those events can be officially classified as exceptional events. The process to achieve PM2.5 re-designation for the Basin to attainment status for the 24-hour standard will therefore depend upon the U.S. EPA's concurrence this exceptional event demonstration.

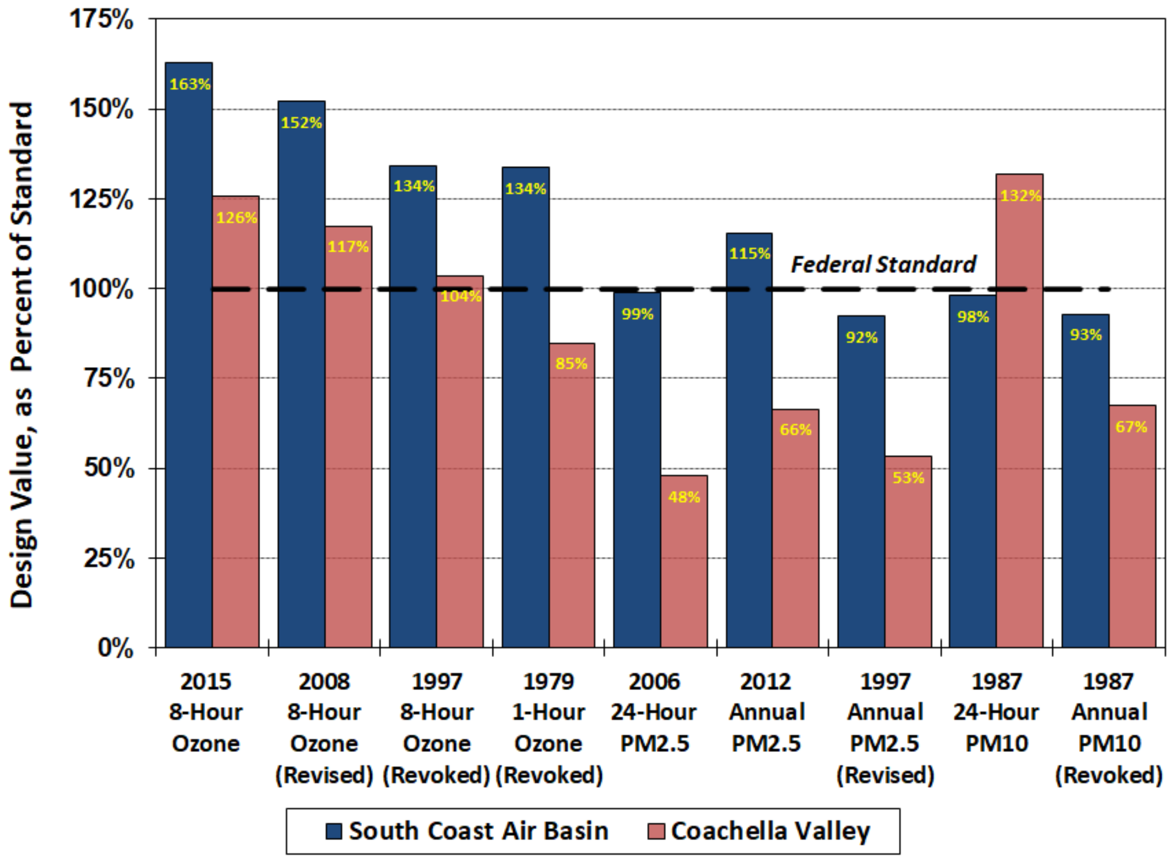

FIGURE 2-1

SOUTH COAST AIR BASIN AND COACHELLA VALLEY 2018-2020 3-YEAR DESIGN VALUES

(PERCENTAGE OF CURRENT AND FORMER FEDERAL STANDARDS, BY CRITERIA POLLUTANT; PM10[8] AND PM2.5 DATA FLAGGED AS EXCEPTIONAL EVENTS EXCLUDED BUT SUPPORTING DOCUMENTATION AND THE U.S. EPA CONCURRENCE STILL NEEDED; PM10 VALUES ARE CONCENTRATION-BASED DESIGN VALUES[9])

[8] A PM10 measurement conducted at the Long Beach Hudson monitor on July 19, 2018 resulted in an exceedance of the 24-hour PM10 standard. While South Coast AQMD staff believes that this exceedance does not meet the U.S. EPA criteria for removal as an exceptional event, it was recorded on a day with heavy construction immediately adjacent and underneath the monitoring station, and thus is not representative of local conditions. Following the South Coast AQMD data validation procedures, this measurement has been invalidated using the U.S. EPA Air Quality System (AQS) null data code for Construction/Repairs in Area (AC).

[9] The concentration-based design value is the fourth highest concentration at a monitor in a three-year period after repeating each measurement $round(dyear/d)$ times in each year, where $dyear$ is the number of days in the year, d is the number of measurements at the monitor, and $round()$ rounds to the nearest integer.

TABLE 2-3

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ATTAINMENT STATUS - SOUTH COAST AIR BASIN

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O3)	(1979) **1-Hour** (0.12 ppm)[c]	Nonattainment ("extreme")	2/26/2023 (revised deadline)
	(2015) **8-Hour** (0.070 ppm)[d]	Nonattainment ("extreme")	8/3/2038
	(2008) **8-Hour** (0.075 ppm)[d]	Nonattainment ("extreme")	7/20/2032
	(1997) **8-Hour** (0.08 ppm)[d]	Nonattainment ("extreme")	6/15/2024
PM2.5[e]	(2006) **24-Hour** (35	Nonattainment ("serious")	12/31/202~~1~~3~~9~~
	(2012) **Annual** (12.0 $\mu g/m^3$)	Nonattainment ("serious")	12/31/2025~~1~~
	(1997) **Annual** (15.0 $\mu g/m^3$)	Attainment (final determination pending)	4/5/2015 (attained 2013)
PM10[f]	(1987) **24-hour** (150 $\mu g/m^3$)	Attainment (Maintenance)	7/26/2013 (attained)
Lead (Pb)[g]	(2008) **3-Months Rolling** (0.15 $\mu g/m^3$)	Nonattainment (Partial) (Attainment determination to be requested)	12/31/2015
CO	(1971) **1-Hour** (35 ppm)	Attainment (Maintenance)	6/11/2007
	(1971) **8-Hour** (9 ppm)	Attainment (Maintenance)	6/11/2007
NO_2[h]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Attainment (Maintenance)	9/22/1998 (attained)
SO_2[i]	(2010) **1-Hour** (75 ppb)	Unclassifiable/Attainment	1/9/2018
	(1971) **24-Hour** (0.14 ppm)	Unclassifiable/Attainment	3/19/1979 (attained)

a) The U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable.

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration.

c) The 1979 1-hour ozone NAAQS (0.12 ppm) was revoked, effective 6/15/2005; however, the Basin has not attained this standard and therefore has some continuing obligations with respect to the revoked standard; original attainment date was 11/15/2010; the revised attainment date is 2/6/2023.

d) The 2008 8-hour ozone NAAQS (0.075 ppm) was revised to 0.070 ppm, effective 12/28/2015 with classifications and implementation goals to be finalized by 10/1/2017; the 1997 8-hour ozone NAAQS (0.08 ppm) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/2015; there are continuing obligations under the revoked 1997 and revised 2008 ozone NAAQS until they are attained.

e) The attainment deadline for the 2006 24-hour PM2.5 NAAQS was 12/31/2015 for the former "moderate" classification; the U.S. EPA approved reclassification to "serious," effective 2/12/2016 with an attainment deadline of 12/31/2019; the 2012 (proposal year) annual PM2.5 NAAQS was revised on 1/15/2013, effective 3/18/2013, from 15 to 12 $\mu g/m^3$; new annual designations were final 1/15/2015, effective 4/15/2015; on 7/25/2016 the U.S. EPA finalized a determination that the Basin attained the 1997 annual (15.0 $\mu g/m^3$) and 24-hour PM2.5 (65 $\mu g/m^3$) NAAQS, effective 8/24/2016.

f) The annual PM10 NAAQS was revoked, effective 12/18/2006; the 24-hour PM10 NAAQS deadline was 12/31/2006; the Basin's Attainment Re-designation Request and PM10 Maintenance Plan was approved by the U.S. EPA on 6/26/2013, effective 7/26/2013.

g) Partial Nonattainment designation - Los Angeles County portion of the Basin only for near-source monitors; expect to remain in attainment based on current monitoring data; attainment re-designation request pending.

h) New 1-hour NO_2 NAAQS became effective 8/2/2010, with attainment designations 1/20/2012; annual NO_2 NAAQS retained.

i) The 1971 annual and 24-hour SO2 NAAQS were revoked, effective 8/23/2010.

TABLE 2-4

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ATTAINMENT STATUS COACHELLA VALLEY PORTION OF THE SALTON SEA AIR BASIN

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O3)	(1979) **1-Hour** (0.12 ppm)[c]	Attainment	11/15/2007 (attained 12/31/2013)
	(2015) **8-Hour** (0.070 ppm)[d]	Nonattainment ("Severe-15")	8/3/2033
	(2008) **8-Hour** (0.075 ppm)[d]	Nonattainment ("Severe-15")[i)]	7/20/2027
	(1997) **8-Hour** (0.08 ppm)[d]	Nonattainment ("Extreme")	6/15/2024
PM2.5[e]	(2006) **24-Hour** (35 $\mu g/m^3$)	Unclassifiable/Attainment	N/A (attained)
	(2012) **Annual** (12.0 $\mu g/m^3$)	Unclassifiable/Attainment	N/A (attained)
	(1997) **Annual** (15.0 $\mu g/m^3$)	Unclassifiable/Attainment	N/A (attained)
PM10[f]	(1987) **24-hour** (150 $\mu g/m^3$)	Nonattainment ("Serious")	12/31/2006
Lead (Pb)	(2008) **3-Months Rolling** (0.15 $\mu g/m^3$)	Unclassifiable/Attainment	Unclassifiable/ Attainment

TABLE 2-4 (CONTINUED)

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ATTAINMENT STATUS COACHELLA VALLEY PORTION OF THE SALTON SEA AIR BASIN

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
CO	(1971) **1-Hour** (35 ppm)	Unclassifiable/Attainment	N/A (attained)
	(1971) **8-Hour** (9 ppm)	Unclassifiable/Attainment	N/A (attained)
NO_2[g]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Unclassifiable/Attainment	N/A (attained)
SO_2[h]	(2010) **1-Hour** (75 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **24-Hour** (0.14 ppm) (1971) **Annual** (0.03 ppm)	Unclassifiable/Attainment	Unclassifiable/ Attainment

a) The U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable.

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration.

c) The 1979 1-hour ozone NAAQS (0.12 ppm) was revoked, effective 6/15/2005; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, had not timely attained this standard by the 11/15/2007 "severe-17" deadline, based on 2005-2007 data; on 8/25/2014, the U.S. EPA proposed a clean data finding based on 2011-2013 data and a determination of attainment for the former 1-hour ozone NAAQS for the Southeast Desert nonattainment area; this rule was finalized by the U.S. EPA on 4/15/2015, effective 5/15/2015, that included preliminary 2014 data.

d) The 2008 8-hour ozone NAAQS (0.075 ppm) was revised to 0.070 ppm, effective 12/28/2015; the 1997 8-hour ozone NAAQS (0.08 ppm) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/2015; there are continuing obligations under the 1997 and 2008 ozone NAAQS until they are attained. The Coachella Valley was reclassified to "extreme" nonattainment effective 7/10/2019.

e) The annual PM2.5 standard was revised on 1/15/2013, effective 3/18/2013, from 15 to 12 µg/m³.

f) The annual PM10 standard was revoked, effective 12/18/2006; the 24-hour PM10 NAAQS attainment deadline was 12/31/2006; the Coachella Valley Attainment Re-designation Request and PM10 Maintenance Plan was postponed by the U.S. EPA pending additional monitoring and analysis in the southeastern Coachella Valley.

g) New 1-hour NO_2 NAAQS became effective 8/2/2010; attainment designations 1/20/2012; annual NO_2 NAAQS retained.

h) The 1971 Annual and 24-hour SO_2 NAAQS were revoked, effective 8/23/2010.

~~h)~~i) Requested voluntary reclassification to "extreme" in November 2022.

After approving a standard, the U.S. EPA designates areas across the nation as attainment or as nonattainment of the standard. The U.S. EPA classifies areas of ozone nonattainment (e.g., "extreme," "severe," "serious," "moderate" or "marginal") based on how much an area exceeds the standard, which in turn affects requirements for a SIP and determines the attainment date. The more severe the ozone problem, the more time is allowed to demonstrate attainment in recognition of the greater challenges involved to reach attainment. However, the higher classifications are also subject to more stringent requirements. See Chapter 6 for details. The current status of CAAQS attainment for the pollutants with State standards is presented in Table 2-5 for the Basin and the Riverside County portion of the SSAB (Coachella Valley).

TABLE 2-5

CALIFORNIA AMBIENT AIR QUALITY STANDARDS (CAAQS) ATTAINMENT STATUS SOUTH COAST AIR BASIN AND COACHELLA VALLEY PORTION OF SALTON SEA AIR BASIN

Pollutant	Averaging Time and Level[b]	Designation[a]	
		South Coast Air Basin	Coachella Valley
Ozone (O3)	**1-Hour** (0.09 ppm)	Nonattainment	Nonattainment
	8-Hour (0.070 ppm)	Nonattainment	Nonattainment
PM2.5	**Annual** (12.0 $\mu g/m^3$)	Nonattainment	Attainment
PM10	**24-Hour** (50 $\mu g/m^3$)	Nonattainment	Nonattainment
	Annual (20 $\mu g/m^3$)	Nonattainment	Nonattainment
Lead (Pb)	**30-Day Average** (1.5 $\mu g/m^3$)	Attainment	Attainment
CO	**1-Hour** (20 ppm)	Attainment	Attainment
	8-Hour (9.0 ppm)	Attainment	Attainment
NO_2	**1-Hour** (0.18 ppm)	Attainment	Attainment
	Annual (0.030 ppm)	~~Nonattainment[d]~~ Attainment[d] ~~(CA 60 Near-road Portion of San Bernardino, Riverside and Los Angeles Counties) Attainment (remainder of Basin)~~	Attainment
SO_2	**1-Hour** (0.25 ppm)	Attainment	Attainment
	24-Hour (0.04 ppm)	Attainment	Attainment
Sulfates	**24-Hour** (25 $\mu g/m^3$)	Attainment	Attainment
H_2S[c]	**1-Hour** (0.03 ppm)	Unclassified	Unclassified [c)]

a) CA State designations shown were updated by CARB in 2019, based on the 2016-2018 3-year period; stated designations are based on a 3-year data period after consideration of outliers and exceptional events; Source: http://www.arb.ca.gov/desig/statedesig.htm#current.

b) CA State standards, or CAAQS, for ozone, CO, SO_2, NO_2, PM10 and PM2.5 are values not to be exceeded; lead, sulfates, and H_2S standards are values not to be equaled or exceeded; CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

c) The South Coast AQMD began monitoring H_2S in the southeastern Coachella Valley in November 2013 due to odor events related to the Salton Sea; this area has not yet been classified, but nonattainment is anticipated for the H_2S CAAQS in at least part of the Coachella Valley.

d) The CA-60 near-road portion of San Bernardino, Riverside and Los Angeles Counties has recently been redesignated as an attainment area based on data collected between 2018 and 2020. ~~While this region is currently in Nonattainment, the California Air Resources Board approved a redesignation to attainment based on 2018-2020 data on February 24, 2022. See https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2022/res22-4.pdf. This redesignation will not be official until the Office of Administrative Law (OAL) approves the rulemaking filed with the Secretary of State, expected in the fall of 2022.~~

Ozone

Despite substantial improvements in air quality over the past few decades, some air monitoring stations in the Basin still exceed the NAAQS and frequently record the highest ozone levels in the United States. In 2020, one or more stations in the Basin exceeded the most current federal standards on a total of 181 days (49 percent of the year), including: 8-hour ozone (157 days over the 2015 ozone NAAQS), 24-hour PM2.5 (39 days),[10]~~,~~ PM10 (3 days), and NO_2 (1 day). Nine of the top 10 stations in the nation most frequently exceeding the 2015 8-hour ozone NAAQS in 2020 were located within the Basin,[11]~~,~~ including stations in San Bernardino, Riverside, and Los Angeles Counties. Regarding the former ozone NAAQS,[12] 142 days exceeded the revised 2008 8-hour ozone NAAQS, 97 days exceeded the revoked 1997 8-hour ozone NAAQS, and 27 days exceeded the revoked 1-hour ozone NAAQS at one or more stations in the Basin in 2020. Table 2-6 summarizes the number of days exceeding current and former federal and State 1-hour and 8-hour ozone standard levels by county in the Basin and the Coachella Valley in 2020.

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[10] Data includes both FRM filter-based and continuous measurements.

[11] The only station outside the Basin in the top 10 most 8-hour ozone exceedances is located on Ash Mountain in Sequoia and Kings Canyon National Park.

[12] While the former federal 8-hour and 1-hour ozone NAAQS have been revised or revoked by the U.S. EPA, nonattainment areas, including the Basin, still have continuing obligations under each standard until it is attained.

TABLE 2-6

2020 NUMBER OF DAYS EXCEEDING CURRENT AND FORMER OZONE STANDARDS AT THE PEAK STATION BY BASIN AND COUNTY

Basin/ County	2020 # Days > Current (2015) 8-Hour Ozone NAAQS (0.070 ppm)	Area of Max Current Federal Standard Exceedances	2020 # Days > Former (2008) 8-Hour Ozone NAAQS (0.075 ppm)	2020 # Days > Former (1997) 8-Hour Ozone NAAQS (0.08 ppm)	2020 # Days > Former (1979) 1-Hour Ozone NAAQS (0.12 ppm)	2020 # Days > Current 8-Hour State Ozone Standard (0.07 ppm)	2020 # Days > Current 1-Hour State Ozone Standard (0.09 ppm)
South Coast Air Basin							
Los Angeles	97	East San Gabriel Valley	71	32	17	100	76
Orange	32	Saddleback Valley	25	10	3	34	20
Riverside	89	Metropolitan Riverside County	62	32	7	96	51
San Bernardino	**141**	**East San Bernardino Valley**	**127**	**78**	**16**	**145**	**104**
Salton Sea Air Basin							
Riverside	49	Coachella Valley (Palm Springs)	28	5	0	53	9

Bold text denotes the peak value.

PM2.5

PM2.5 levels in the Basin have improved significantly in recent years. Since 2015, none of the monitoring stations[13] in the Basin have recorded violations of the former 1997 annual PM2.5 NAAQS (15.0 µg/m^3). On July 25, 2016 the U.S. EPA finalized a determination that the Basin attained the 1997 annual (15.0 µg/m^3) and 24-hour PM2.5 (65 µg/m^3) NAAQS, effective August 24, 2016. However, the Basin does not meet the 2012 annual PM2.5 NAAQS (12.0 µg/m^3), with six monitoring stations having design values above the standard for the 2018-2020 period.[14]~~.~~ These stations include: Ontario-Route 60 Near Road (Basin

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[13] South Coast AQMD employs continuous monitors at several stations in the Basin to provide real-time data for the public and to support daily air quality forecasting. Continuous PM2.5 monitors at seven stations, including Anaheim, Central Los Angeles, Long Beach-Route 710 Near Road, Long Beach (South), Ontario-Route 60 Near Road, Mira Loma, and Rubidoux are FEM monitors. On scheduled sampling days, when FRM measurements are not available at a FEM station, FEM measurements are used to replace missing FRM measurements for regulatory/attainment determination purpose. In the 2018-2020 period, the U.S. EPA has granted South Coast AQMD a waiver from using the FEM monitor at Central LA for regulatory/attainment determination purposes since it does not meet the accuracy requirements to be considered comparable to the NAAQS.

[14] Six stations exceed the 2012 annual PM2.5 standard after removing likely exceptional events.

maximum at 13.8 μg/m^3), Mira Loma, Rubidoux, Long Beach-Route 710 Near Road station, Pico Rivera, and Compton. The Coachella Valley is in attainment of both the annual and 24-hour PM2.5 NAAQS.

In 2020, 16 stations in the Basin had one or more PM2.5 daily average concentrations exceeding the level of the federal 24-hour PM2.5 NAAQS (35.4 μg/m^3), with a total of 28 days[15] over that standard in the Basin. However, in the 2018-2020 period, after removing likely exceptional events, the Basin met the 24-hour PM2.5 NAAQS.[16]

PM10

The Basin attains the current 1987 PM10 24-hour NAAQS after removing three 2019 exceedances caused by high winds that can be reasonably considered exceptional events based on criteria established by the U.S. EPA.[17] However, the Coachella Valley does not attain the 1987 PM10 24-hour NAAQS due to exceedances at the Mecca monitoring station. The vast majority of exceedances at this station are associated with high-wind events and would likely be approved as exceptional events. PM10 measurements at this station are routinely evaluated to better understand the causes of exceedances in this region. Additional monitoring as part of the AB617 program in the Eastern Coachella Valley community may provide additional information to assist in bringing the region into attainment of the PM10 NAAQS.

Lead

The U.S. EPA designated the Los Angeles County portion of the Basin (excluding the San Clemente and Santa Catalina Islands and the Antelope Valley) as nonattainment for the revised (2008) federal lead standard (0.15 μg/m^3, rolling 3-month average). This designation was based on two source-specific monitors in Vernon and in the City of Industry exceeding the 2008 standard over the 2007-2009 period. For the most recent seven design value periods, 2012-2014 through 2018-2020, no stations in Los Angeles County showed violations of the federal lead standard, with a maximum 3-month rolling average design value in the most recent period (2018-2020) of 0.01 μg/m^3. The remainder of the Basin outside the Los Angeles County nonattainment area, as well as the Coachella Valley, remain in attainment of the 2008 lead standard, including both ambient monitors and source-oriented monitors.

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[15] Data includes exceptional events. FRM filter-based measurements and NAAQS-comparable FEM continuous measurements were used to do the calculation.

[16] The 24-hour PM2.5 design value is based on the annual 98^{th} percentile concentration for each station averaged over the 3-year period; for stations that monitor every day, this is typically the eighth highest concentration.

[17] A PM10 measurement conducted at the Long Beach Hudson monitor on July 19, 2018 resulted in an exceedance of the 24-hour PM10 standard. While South Coast AQMD staff believes that this exceedance does not meet the U.S. EPA criteria for removal as an exceptional event, it was recorded on a day with heavy construction immediately adjacent and underneath the monitoring station, and thus is not representative of local conditions. Following the South Coast AQMD data validation procedures, this measurement has been invalidated using the U.S. EPA Air Quality System (AQS) null data code for Construction/Repairs in Area (AC).

Other Criteria Pollutants

The South Coast AQMD continues to attain the NAAQS for SO_2, CO, and NO_2. While the concentration level of the current 1-hour NO_2 federal standard (100 ppb) was exceeded in the Basin at one station on one day in 2020 (in San Bernardino at the CA-60 near-road station), the NAAQS NO_2 design value[18] has not been exceeded. Therefore, the Basin remains in attainment of the NO_2 NAAQS. The peak 1- and 8-hour CO values of 4.5 and 3.1 ppm, respectively are well below the value of the federal standards of 35 and 20 ppm, respectively. The design value for 1-hour SO_2 is 4 ppb, which is well below the federal standard of 75 ppb.

Current Air Quality

While the 2022 Air Quality Management Plan is specifically designed to address attainment of the 2015 8-hour ozone standard, levels of all other criteria pollutants are also summarized in this document.

In 2020, ozone, PM2.5, PM10, and NO_2 peak values exceeded federal standard concentration levels at one or more of the routine monitoring stations in the Basin, while ozone and PM10 exceeded those standard levels in the Coachella Valley. However, an exceedance of the concentration level does not necessarily mean a violation of the NAAQS. This is because the design value form of the standard must also be considered for attainment determination. For example, the 2020 1-hour maximum NO_2 concentration in the Basin was 101.6 ppb at the CA-60 near-road station in Ontario station, but the Basin did not violate the federal NO_2 NAAQS, because the station's design value – in this case the 98th percentile daily maximum hourly concentration – was under the federal standard of 100 ppb for the 2018-2020 period.

At this time, the only pollutants in the Basin with design values in violation of the respective NAAQS are ozone, (all current and former federal standards) and PM2.5 (current annual federal standard, after removing exceptional events). In the Coachella Valley, design values for ozone violate the NAAQS for the current and former 8-hour federal ozone standards and design values for PM10 violate the federal 24-hr PM10 standard.

Figure 2-2 shows the trend of the Basin maximum 3-year design value concentrations for ozone (1-hour and 8-hour) and PM2.5 (24-hour and annual) since 1995, as percentages of the corresponding current federal standards (note that PM2.5 monitoring began in 1999 so the first 3-year design value was only available in 2001). In this plot, PM2.5 concentrations above the 24-hour standard attributed to the Bobcat and El Dorado fire in 2020 are excluded because these events meet the exclusion criteria specified in the U.S. EPA Exceptional Event Rule. Although there is some year-to-year variability, PM2.5 concentrations show significant improvement over the years while ozone design values have been relatively flat over the past decade.

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[18] The 1-hour NO_2 design value is the 3-year average of the annual 98th percentile of the daily 1-hour maximums.

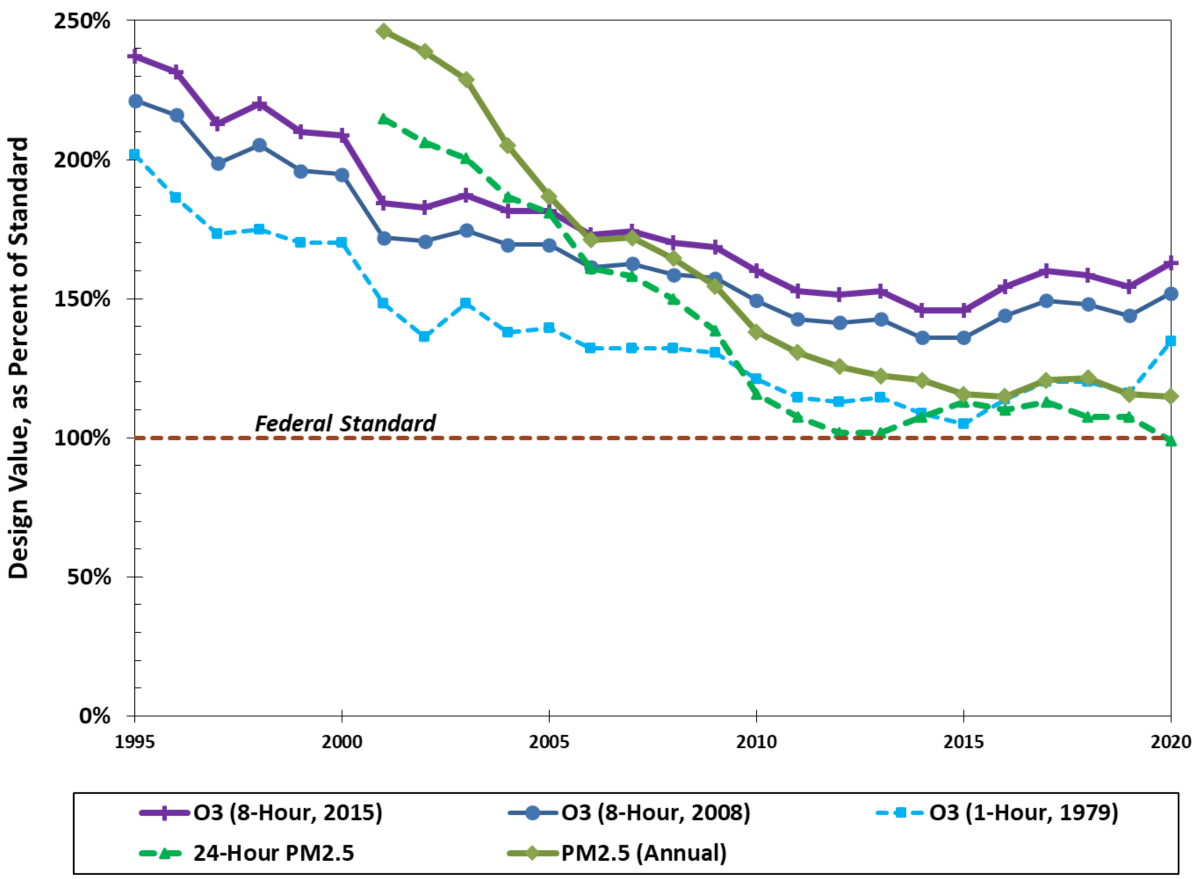

FIGURE 2-2

TRENDS OF SOUTH COAST AIR BASIN MAXIMUM 3-YEAR DESIGN VALUES FOR OZONE (2015 8-HOUR, 2008 8-HOUR, AND 1979 1-HOUR NAAQS) AND PM2.5 (24-HOUR AND ANNUAL), 1995-2020

(AS PERCENTAGES OF CURRENT FEDERAL STANDARDS. 24-HOUR PM2.5 DESIGN VALUES EXCLUDE EXCEPTIONAL EVENTS CAUSED BY THE BOBCAT AND EL DORADO FIRES IN 2020)

Monitoring Network Status

The U.S. EPA has set monitoring requirements for the criteria pollutants, including ozone, PM (including both PM10 and PM2.5), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). In 2020, the South Coast AQMD measured concentrations of air pollutants at 38 routine ambient air monitoring stations in its jurisdiction, with primary focus on these criteria pollutants. In addition to the ambient air monitoring, lead concentrations are monitored at four source-oriented monitoring sites, immediately downwind of stationary lead sources.

There have been three changes to the South Coast AQMD ambient air monitoring network since the 2016 AQMP. The long-term monitoring station at Costa Mesa was closed in 2017 because the lease was terminated by the owner due to the sale of the property. Two new monitoring stations were added in

January 2020. The North Hollywood station was added to represent the East San Fernando Valley and the Signal Hill station was added to represent the South Coastal LA County region.

Ozone (O3)

Health Effects, Ozone

The adverse effects of ozone air pollution exposure on health have been studied for many years, as documented by a significant body of peer-reviewed scientific research, including studies conducted in Southern California. The 2020 U.S. EPA document, *Integrated Science Assessment of Ozone and Related Photochemical Oxidants*,[19] describes these health effects and discusses the state of the scientific knowledge and research. A summary of health effects information and additional references can also be found in Appendix I: Health Effects. The U.S. EPA is currently reconsidering the decision to retain the 2015 ozone standard in 2020 based on the existing scientific record. This decision is expected by the end of 2023.[20]

Individuals working outdoors, children (including teenagers), older adults, people with preexisting lung disease, such as asthma, and individuals with certain nutritional deficiencies are considered to be the sub-groups most susceptible to 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. Elevated ozone levels are associated with asthma exacerbation, chronic obstructive pulmonary disease (COPD) exacerbation, respiratory infection, increased school absences and hospital admissions and emergency department (ED) visits for combined respiratory diseases, as well as increased mortality. An increased risk for asthma has been found in children who participate in multiple sports and live in high-ozone communities.

Ozone exposure under exercising conditions is known to increase the severity of respiratory symptoms. Although lung volume and airway 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.

In addition, recent evidence indicates that short-term exposure to ozone is likely to induce metabolic effects. There is also some evidence that ozone exposure can affect the cardiovascular and nervous systems, reproduction and development, and mortality, although there are more uncertainties associated with interpretation of the evidence for these effects.

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[19] U.S. EPA. (2020). Integrated Science Assessment of Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-20/012. https://www.epa.gov/isa/integrated-science-assessment-isa-ozone-and-related-photochemical-oxidants.

[20] https://www.epa.gov/ground-level-ozone-pollution/epa-reconsider-previous-administrations-decision-retain-2015-ozone.

Air Quality, Ozone

Ozone is formed in the atmosphere from the reaction of NOx and volatile organic compounds (VOCs) in the presence of sunlight. ~~Nox~~ NOx and VOC emissions are produced from a wide variety of sources such as vehicles, consumer products, industrial processes, and vegetation. See Chapter 3. Ozone levels are also highly dependent on temperature with the highest ozone concentrations typically measured on the hottest days each summer. The reactions that form ozone are faster at higher temperatures and many VOC emission sources are temperature dependent, with higher emissions on hotter days. Since sunlight is a key ingredient in the formation of ozone, season also plays an important role. In general, ozone concentrations are higher on long days with plentiful sunshine. Mixing and ventilation of the Basin also influence ozone concentrations. Inversion layers that trap emissions and ozone near the ground are common in Southern California. Stagnant summer days under high pressure limit ventilation of the Basin and allow for the accumulation of pollution. See Figure 2-3.

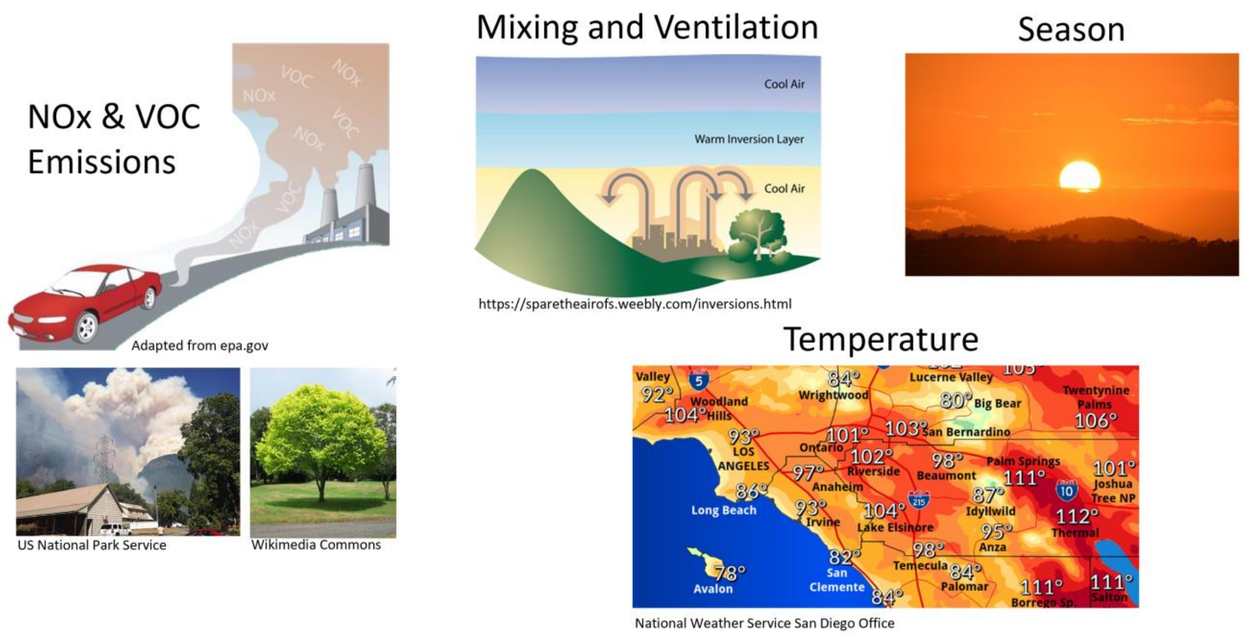

FIGURE 2-3
FACTORS INFLUENCING OZONE CONCENTRATIONS

In 2020, the South Coast AQMD routinely monitored ambient ozone at 29 locations in the Basin and the Coachella Valley portion of the SSAB. The 2020 Basin maximum ozone concentrations continued to exceed federal standards by wide margins, although significant improvement has been achieved over the past several decades. Figure 2-4 shows the trend from 1980 through 2020 of the annual number of Basin days exceeding various metrics for ozone. These metrics include the 1-hour Stage 1[21] level (0.20 ppm), the 1-hour Health Advisory level (0.15 ppm), the former (1979) 1-hour NAAQS (0.12 ppm), the former (1997 and 2008) 8-hour NAAQS (0.08 and 0.075 ppm), and the new 2015 8-hour NAAQS (0.070 ppm). All the ozone trends show significant improvements achieved through the period. However, they also show the need for continued efforts in order to meet all the 8-hour ozone standards and the 1979 1-hour standard.

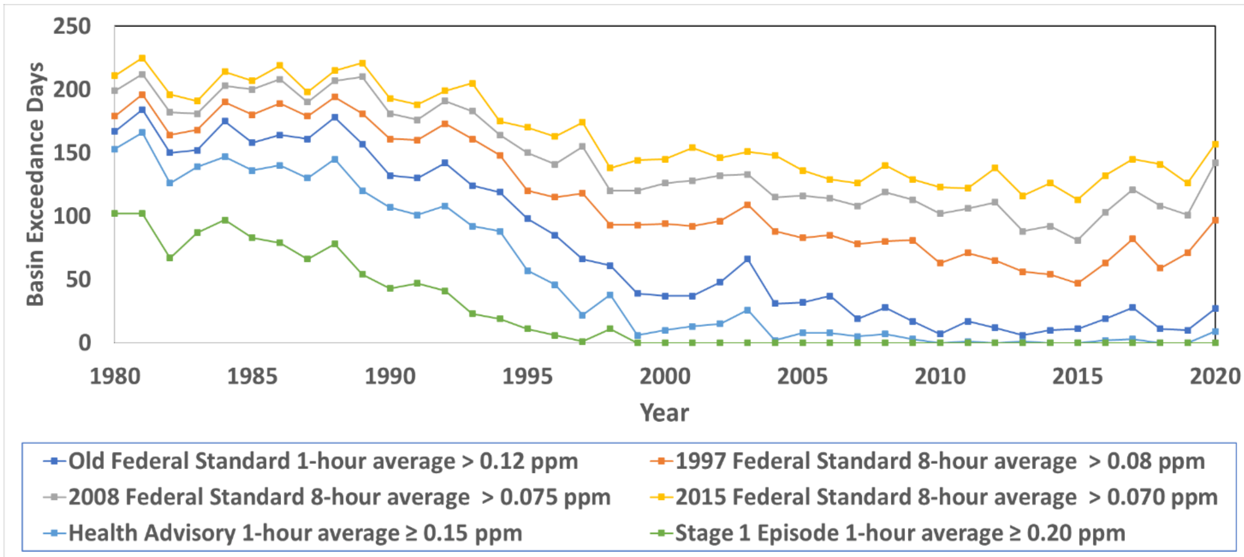

FIGURE 2-4

TREND OF NUMBER OF BASIN DAYS EXCEEDING CURRENT AND FORMER OZONE NAAQS AND 1-HOUR OZONE EPISODE LEVELS (HEALTH ADVISORY AND STAGE-1), 1980 THROUGH 2020

All counties in the Basin, as well as the Coachella Valley, exceeded the level of the 2015 (0.070 ppm) and the former 2008 (0.075 ppm) and 1997 (0.08 ppm) 8-hour ozone NAAQS in 2020. While not all stations had days exceeding the previous 8-hour standards, all monitoring stations had at least one day over the 2015 federal standard.

The 2015 ozone federal standard was exceeded at a minimum of one station on a total of 157 days in 2020 (142 days over the 2008 standard and 97 days over the 1997 standard). The 8-hour State ozone standard (0.070 ppm, although the rounding convention differs from federal standard) was exceeded in the Basin on 160 days in 2020. The Coachella Valley exceeded the 2015 8-hour ozone NAAQS on 64 days (38 days for the 2008 ozone NAAQS, six days for the 1997 ozone NAAQS, and 63 days for the State 8-hour ozone NAAQS). The station with the highest number of days in 2015 over the 2015, 2008, and 1997 8-hour federal ozone standards (141, 127, and 78 days, respectively) was in the Eastern San Bernardino

[21] While the 1-hour ozone episode levels and the related 1-hour ozone health warnings still exist, they are essentially replaced by the more protective health warnings associated with the current 8-hour ozone NAAQS. The 1-hour ozone episode warning levels include the State Health Advisory (0.15 ppm), Stage 1 (0.20 ppm), Stage 2 (0.35 ppm), and Stage 3 (0.50 ppm). The Basin's last 1-hour ozone Stage 1 episode occurred in 2003. The last 1-hour ozone Stage 2 episode occurred in 1988 and the last Stage 3 episode occurred in 1974.

Valley (Redlands). The 2015 maximum 8-hour average ozone concentration of 0.139 ppm was measured at the Central San Bernardino Mountains station (Crestline-Lake Gregory).

When compared to the design value form of the federal standard, all four of the Basin's counties were above the 2015, 2008 and 1997 8-hour ozone NAAQS for the 2018-2020 design values. The Basin's highest 2018-2020 8-hour ozone design value (0.114 ppm, measured in the Central San Bernardino Mountains at Crestline-Lake Gregory) was 163 percent of the 2015 8-hour ozone NAAQS (152 percent of the 2008 NAAQS and 143 percent of the 1997 NAAQS). Table 2-7 shows the 2020 maximum 8-hour ozone concentrations and design values by air basin and county, compared to current and former federal, and current State standards.

TABLE 2-7

2020 MAXIMUM 8-HOUR AVERAGE OZONE CONCENTRATIONS AND DESIGN VALUES BY BASIN AND COUNTY

Basin/ County	2020 Maximum 8-Hour Ozone Average (ppm)	2018-2020 8-Hour Ozone Design Value (ppm)	Percent of Current (2015) 8-Hour Ozone NAAQS (0.070 ppm)	Percent of Former (2008) 8-Hour Ozone NAAQS (0.075 ppm)	Percent of Former (1997) 8-Hour Ozone NAAQS (0.08 ppm)	Area of Design Value Maximum	2018-2020 8-Hour Ozone State Designation Value# (ppm)	Percent of State 8-hour Ozone Standard (0.070 ppm)
South Coast Air Basin								
Los Angeles	0.138	0.107	153	143	127	East San Gabriel Valley	0.121	173
Orange	0.122	0.082	117	109	98	Saddleback Valley	0.092	131
Riverside	0.117	0.098	140	131	117	Metropolitan Riverside County	0.109	156
San Bernardino	**0.139**	**0.114**	**163**	**152**	**136**	**East San Bernardino Valley**	**0.126**	**180**
Salton Sea Air Basin								
Riverside	0.094	0.088	126	117	105	Coachella Valley (Palm Springs)	0.095	136

Bold text denotes the peak value

The *State 8-Hour Designation Value* is the highest State 8-hour ozone average, rounded to three decimal places, during the last 3 years (State designation value source: https://www.arb.ca.gov/adam/select8/sc8start.php).

All monitored locations measured maximum 1-hour average ozone concentrations well below the Stage 1 episode level (0.20 ppm, 1-hour) in 2020. Except for one day in 2003 (at a special-purpose monitor in the San Bernardino Mountains), the Stage 1 ozone episode level has not been exceeded in the Basin since 1998.

The Basin exceeded the level of the revoked (1979) 1-hour federal ozone standard (0.12 ppm) on 27 days in 2020, with exceedances in all four Counties. The most exceedances of the former 1-hour standard in 2020 (17 days) occurred in the Eastern San Gabriel Valley at the Glendora air monitoring station. The 2020 peak 1-hour ozone concentration in the Basin was 0.185 ppm, measured in metropolitan Los Angeles (downtown Los Angeles air monitoring station). In the Coachella Valley, 1-hour ozone concentrations did not exceed the revoked 1-hour federal standard in 2020. The State 1-hour ozone standard (0.09 ppm) was exceeded in the Basin on 133 days and in the Coachella Valley on 9 days.

The calculated peak 2018-2020 1-hour ozone design value[22] (0.167 ppm in metropolitan Los Angeles at the downtown Los Angeles air monitoring station) was 134 percent of the former 1-hour NAAQS. The Coachella Valley design value did not exceed the former 1-hour federal ozone standard in 2020 and has remained in attainment of the former NAAQS since 2008. Table 2-8 shows the 2020 maximum 1-hour ozone concentrations and calculated design values by air basin and county, compared to the former federal and current State standards.

[22] The former 1979 1-hour ozone NAAQS allows for one exceedance per year on average when averaged over three years. The calculated design value is the fourth highest value over a 3-year period, allowing the design value to be expressed in terms of a concentration. When shown in parts-per-million to 3 decimal places, the design value is compared to 0.125 ppm, which would exceed the NAAQS.

TABLE 2-8

2020 MAXIMUM 1-HOUR AVERAGE OZONE CONCENTRATIONS AND DESIGN VALUES BY BASIN AND COUNTY

Basin/ County	2020 Maximum 1-Hour Ozone Average (ppm)	2018-2020 1-Hour Ozone Design Value (ppm)	Percent of Former (1979) 1-Hour Ozone NAAQS (0.12 ppm)	Area of Design Value Max	2018-2020 1-Hour Ozone State Designation Value# (ppm)	Percent of State 1-Hour Ozone Standard (0.09 ppm)
South Coast Air Basin						
Los Angeles	**0.185**	**0.167**	**135**	**East San Gabriel Valley**	**0.19**	**211**
Orange	0.171	0.113	91	North Orange County	0.17	189
Riverside	0.150	0.131	106	Metropolitan Riverside County	0.15	167
San Bernardino	0.173	0.155	125	Eastern San Bernardino Valley	0.17	189
Salton Sea Air Basin						
Riverside	0.102	0.106	85	Coachella Valley (Palm Springs)	0.11	122

Bold text denotes the peak value.

The *State 1-Hour Designation Value* is the highest hourly ozone measurement during the last 3 years, rounded to two decimal places. In practice, the designation value is the highest measured concentration in the 3-year period that remains, after excluding measurements identified as affected by highly irregular or infrequent events (State designation value source: https://www.arb.ca.gov/adam/select8/sc8start.php).

The number of days exceeding the current and former ozone standards in the Basin varies widely by area. Figures 2-5 through 2-7 map the number of days in 2020 exceeding the 2015 8-hour ozone NAAQS and the former 2008 and 1997 8-hour ozone NAAQS in different areas of the Basin. The number of exceedances of the federal 8-hour ozone standards was lowest in the coastal areas, due in large part to the prevailing sea breeze which transports emissions inland before photochemistry produces high ozone concentrations. The concentrations increase downwind towards the Riverside County valleys and the San Bernardino County valleys and adjacent mountain areas, as well as the area around Santa Clarita in Los Angeles County. The Eastern San Bernardino Valley area recorded the greatest number of exceedances of the current and former 8-hour federal standards (141 days for the 2015 ozone NAAQS, 127 days for the 2008 NAAQS, and 78 days for the 1997 NAAQS).

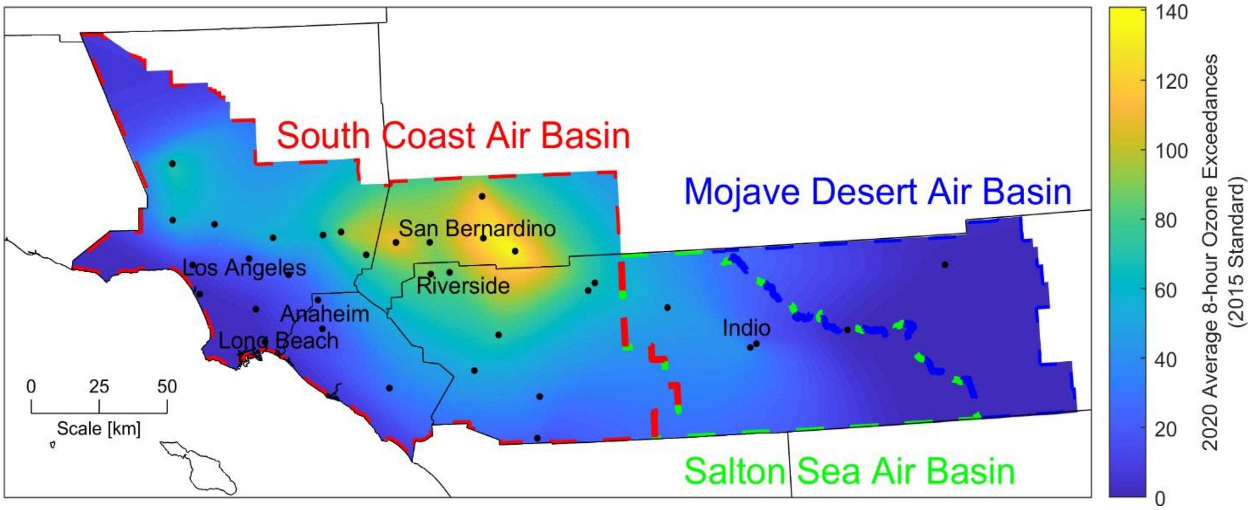

FIGURE 2-5

NUMBER OF DAYS IN 2020 EXCEEDING THE 2015 8-HOUR OZONE FEDERAL STANDARD

(8-HOUR AVERAGE OZONE > 0.070 PPM)

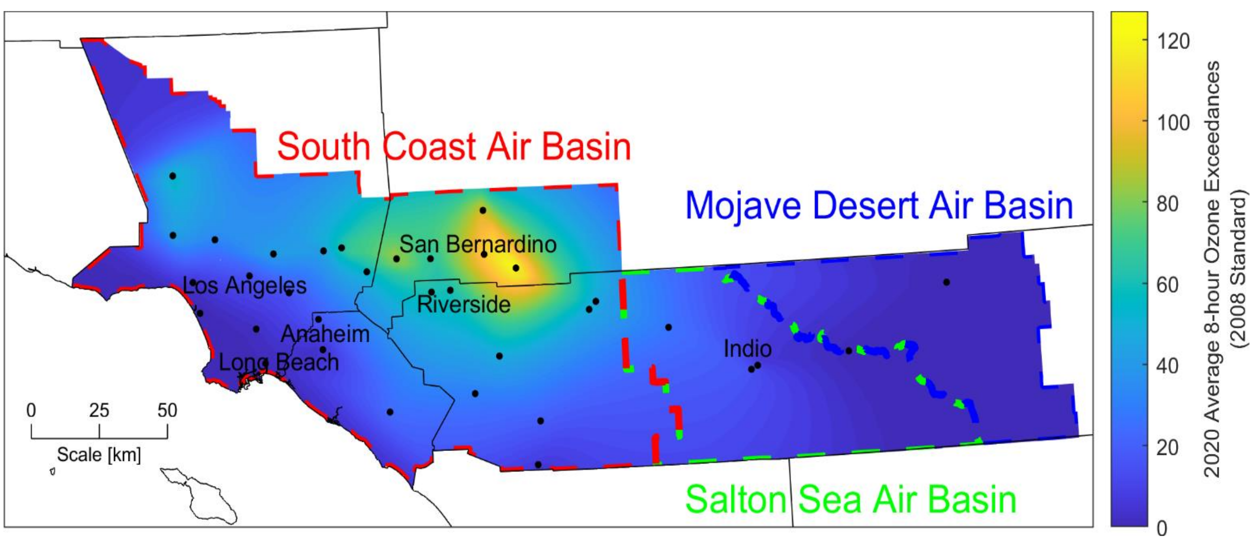

FIGURE 2-6

NUMBER OF DAYS IN 2020 EXCEEDING THE REVISED 2008 8-HOUR OZONE FEDERAL STANDARD

(8-HOUR AVERAGE OZONE > 0.075 PPM)

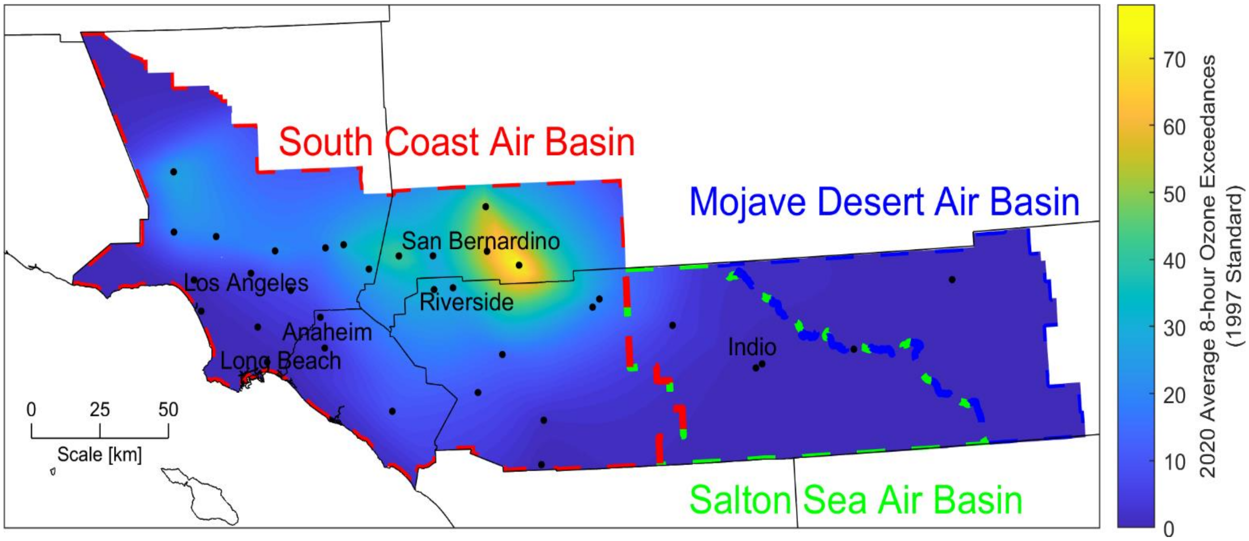

FIGURE 2-7
NUMBER OF DAYS IN 2020 EXCEEDING THE REVOKED 1997 8-HOUR OZONE FEDERAL STANDARD
(8-HOUR AVERAGE OZONE > 0.08 PPM)

Figure 2-8 maps the number of days in 2020 exceeding the revoked 1979 1-hour ozone NAAQS in different areas of the Basin. The former 1-hour federal standard was exceeded in a large portion of the Basin. It was exceeded the most (17 days) in the Eastern San Gabriel Valley at the Glendora air monitoring station. Exceedances of the 1-hour ozone standard extended to all areas monitored in San Bernardino County and in Metropolitan Riverside County, as well as in Santa Clarita and the eastern San Gabriel Valley in Los Angeles County. The Coachella Valley did not exceed the former 1-hour ozone standard in 2020.

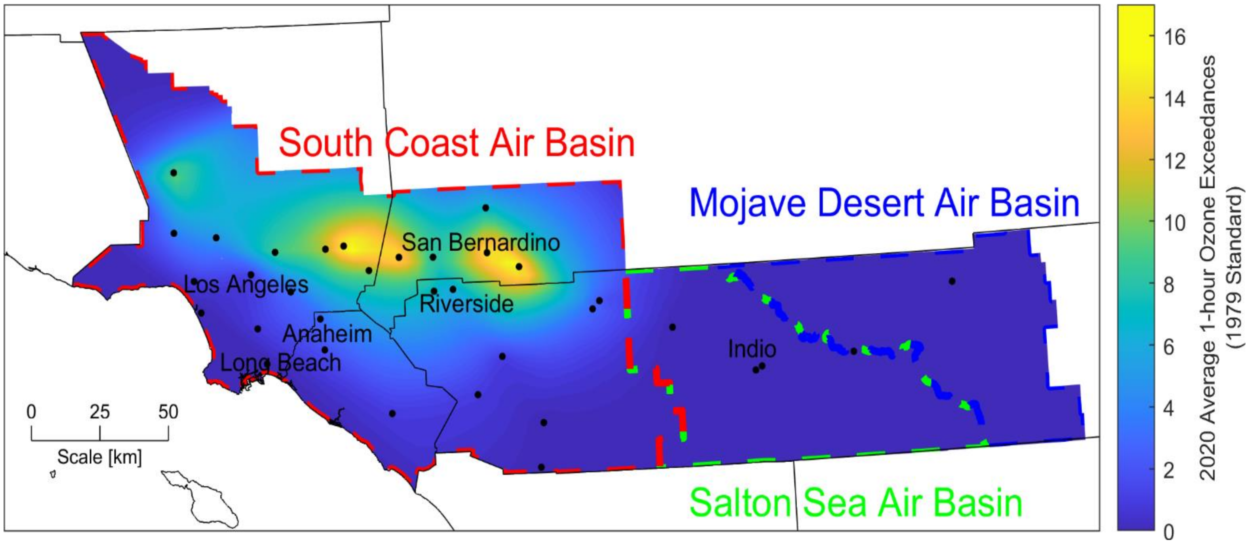

FIGURE 2-8
NUMBER OF DAYS IN 2020 EXCEEDING THE REVOKED 1979 1-HOUR FEDERAL OZONE STANDARD
(1-HOUR AVERAGE OZONE > 0.12 PPM)

Particulate Matter (PM2.5 and PM10)

Health Effects, Particulate Matter

A significant body of peer-reviewed scientific research, including studies conducted in Southern California, points to adverse impacts of particulate matter air pollution on both increased illness (morbidity) and increased death rates (mortality). The 2019 U.S. EPA *Integrated Science Assessment for Particulate Matter*[23] as well as the Supplement to the 2019 Integrated Science Assessment for Particulate Matter[24] describe these health effects and discusses the state of the scientific knowledge. As of early 2022, the U.S. EPA is evaluating the need to strengthen the standards for fine particulate matter based on the best available science and recommendations from the Clean Air Scientific Advisory Committee (CASAC).[25]. A summary of health effects information and additional references can also be found in Appendix I: Health Effects.

Several studies have found correlations between elevated ambient particulate matter levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks, chronic

[23] U.S. EPA. (2019). Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188. https://www.epa.gov/isa/integrated-science-assessment-isa-particulate-matter.
[24] U.S. EPA. (2021). Supplement to Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-21/198. https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=352823.

[25] U.S. EPA. (2021) Policy Assessment Updates for the PM NAAQS Reconsideration. https://casac.epa.gov/ords/sab/f?p=105:18:7422383326691:::RP,18:P18_ID:2607#report.

obstructive pulmonary disease exacerbation, combined respiratory-diseases and the number of hospital admissions in different parts of the United States and in various areas around the world.

Higher levels of PM2.5 have also been related to increased mortality due to cardiovascular or respiratory diseases, hospital admissions for acute respiratory conditions, school absences, lost work days, a decrease in respiratory function in children, and increased medication use in children and adults with asthma.

Long-term exposure to PM has been found to be associated with reduced lung function growth in children, changes in lung development, development of asthma in children, and increased risk of cardiovascular diseases in adults. In recent years, studies have reported an association between long-term exposure to PM2.5 and increased total mortality (reduction in life-span and increased mortality) from lung cancer.

The U.S. EPA, in its most recent review, has concluded that both short-term and long-term exposure to PM2.5 are causally related to cardiovascular effects and increased mortality risk. In addition, new evidence is suggestive of metabolic, nervous system, and reproductive and developmental effects for short-term and long-term exposure to PM2.5.

Young children and non-white populations appear to be most susceptible to the effects of PM10 and PM2.5. With lesser evidence, people with pre-existing conditions of cardiovascular disease; respiratory illness; and obesity; individuals with certain genetic polymorphisms that control antioxidant response, regulate enzyme activity, or regulate procoagulants; older adults (for cardiovascular effects); individuals with lower socioeconomic status and smokers also appear to be more susceptible to the effects of PM10 and PM2.5.

An expanded discussion of studies relating to PM exposures and mortality, including a brief description of how studies accounted for potential confounding factors, is contained in Appendix I of this document.

Air Quality, PM2.5

The South Coast AQMD began regular monitoring of PM2.5 in 1999 following the U.S. EPA's adoption of the national PM2.5 standards in 1997. In 2020, ambient PM2.5 concentrations were monitored at 27 locations throughout the South Coast AQMD, including two stations in the SSAB in the Coachella Valley and two near-road sites. Filter-based Federal Reference Method (FRM) PM2.5 sampling was employed at 19 of these stations and nine of the FRM measurement stations sampled daily to improve temporal coverage with the FRM measurements beyond the required 1-in-3-day sampling schedule, including the two near-road sites. Seventeen stations,[26] including two near-road sites, employed continuous PM2.5 monitors and nine of these were collocated with FRM measurements. PM2.5 continuous monitors at seven stations are federal equivalent method (FEM) PM2.5 monitors. Data collected at six out of these seven FEM continuous PM2.5 monitors are comparable to the NAAQS. On scheduled sampling days, when FRM measurements are not available at a FEM station, FEM measurements are used to replace missing FRM measurements for regulatory/attainment determination purposes. In the 2018-2020 period, one

[26] The special purpose monitoring of continuous PM2.5 at the North Hollywood station and the Compton station began operation January 1, 2020 and July 1, 2020, respectively.

FEM continuous PM2.5 monitor in the Basin does not meet the U.S. EPA criteria to be used for NAAQS comparison[27] and the South Coast AQMD has been granted annual waivers by the U.S. EPA precluding the use of FEM monitors that do not pass comparability criteria for NAAQS attainment consideration. The continuous data is used for forecasting, real-time air quality alerts, real-time AQI dissemination, and for evaluating hour-by-hour variations.

The 2018-2020 24-hour PM2.5 design values are summarized in Table 2-9. PM2.5 concentrations were higher in the inland valley areas of metropolitan Riverside County and in south central Los Angeles County. The Basin met the 24-hour PM2.5 NAAQS for the 2018-2020 period after removing exceedances collected during the Bobcat and El Dorado fires as these events meet the criteria for exclusion under the U.S. EPA Exceptional Events Rule. The highest 24-hour design value was measured in Metropolitan Riverside County (Mira Loma), with a design value of 35 µg/m^3. If exceptional events are included, the highest 2018-2020 PM2.5 24-hour design value was measured at the Central Los Angeles and South San Gabriel Valley stations (37 µg/m^3). The 2018-2020 24-hour design values measured at the Metropolitan Riverside County (Mira Loma) and CA-60 Near Road stations (36 µg/m^3) also violate the 24-hour PM2.5 NAAQS (35 µg/m^3). There is no State 24-hour PM2.5 standard.

PM2.5 is both directly emitted and also forms in the atmosphere. The higher PM2.5 concentrations in the Basin are mainly due to the secondary formation of smaller particulates resulting from precursor gas emissions (i.e., NOx, SOx, NH3, and VOC) that are converted to PM in the atmosphere. The precursors are from mobile, stationary and area sources, with the largest portion resulting from fuel combustion. Most of the 24-hour PM2.5 exceedances in the Basin occur in the late fall and winter months. Cold and humid weather conditions favor the conversion of inorganic vapors into particles in the atmosphere, resulting in high PM2.5 levels. Other unfavorable weather conditions such as a low and stable boundary layer and the lack of storms and rainfall can also contribute to high PM2.5 concentrations, as the precursors and particles are not dispersed or washed out as frequently. During the winter months, especially the holiday season, residential wood burning is also a major contributor to particulate mass and precursors, leading to high PM2.5 concentrations in the coastal and inland valley areas.

In contrast to PM10, PM2.5 concentrations were relatively low in the Coachella Valley area of the SSAB. PM10 concentrations are normally higher in the desert areas due to windblown and fugitive dust emissions; PM2.5 is relatively low in the desert area due to fewer combustion-related emissions sources and less secondary aerosol formation in the atmosphere. The PM2.5 federal standards were not exceeded in the Coachella Valley in 2020 and the highest 24-hour and annual average 2018-2020 design values (17 and 8.0 µg/m^3, respectively, both at the Indio air monitoring station) are well below the PM2.5 NAAQS.

[27] The U.S. EPA waiver from NAAQS compliance for the continuous FEM PM2.5 samplers is re-evaluated annually as part of the South Coast AQMD Annual Air Quality Monitoring Network Plan [http://www.aqmd.gov/home/library/clean-air-plans/monitoring-network-plan].

TABLE 2-9

2018-2020 PM2.5 24-HR DESIGN VALUES BY BASIN AND COUNTY*

Basin/ County	Regulatory Significant Exceptional Events Removed**			All Data Included#		
	2018-2020 PM2.5 24-Hour Design Value (µg/m^3)	Percent of Current (2006) PM2.5 NAAQS (35 µg/m^3)	Area of Design Value Max	2018-2020 PM2.5 24-Hour Design Value (µg/m^3)	Percent of Current (2006) PM2.5 NAAQS (35 µg/m^3)	Area of Design Value Max
South Coast Air Basin						
Los Angeles	**35**	**100##**	**East San Gabriel Valley (Azusa), South Central Los Angeles County, and I-710 Near Road**	**37**	**106**	**Central Los Angeles and South San Gabriel Valley**
Orange	33	94	Central Orange County	33	94	Central Orange County
Riverside	**35**	**100##**	**Metropolitan Riverside County (Mira Loma)**	36	103	Metropolitan Riverside County (Mira Loma)
San Bernardino	**35**	**100##**	**Central San Bernardino Valley (Fontana)**	36	103	CA-60 Near Road
Salton Sea Air Basin						
Riverside	17	49	Coachella Valley (Indio)	17	49	Coachella Valley (Indio)

Bold text denotes the peak value.

* Based on FRM filter data and NAAQS-comparable FEM continuous data.

** Regulatory significant exceptional events are exceptional events whose removal from the design value calculation influences a regulatory decision such as attainment vs. nonattainment. 24-Hour PM2.5 samples exceeding the 24-hour PM2.5 NAAQS during September 11, 2020 - September 16, 2020 at the Central Los Angeles, Pico Rivera, Route 60 Near Road, and Mira Loma stations were removed to calculate design values; these exceedances were caused by smoke from the Bobcat and El Dorado Fires. The South Coast AQMD is preparing an exceptional event demonstration consistent with U.S. EPA exceptional event guidance for this event.

\# Data includes exceptional events.

\## 100 percent of the NAAQS is not in violation of that standard.

The 2018-2020 annual PM2.5 design values are summarized in Table 2-10, based on the FRM and continuous PM2.5 measurements. The Basin maximum 2018-2020 annual average design value was 14.2

µg/m^3 at the CA-60 Near Road station (118 percent of the current 2012 annual average PM2.5 NAAQS, 12.0 µg/m^3). This design value is below the former 1997 annual average PM2.5 NAAQS (15.0 µg/m^3), for which the Basin remains in attainment. The annual PM2.5 State standard is based on the highest annual average over the 3-year period. It is still violated in all counties of the Basin, but not in the Coachella Valley. Figure 2-9 shows the distribution of 2018-2020 annual PM2.5 design values in different areas of the Basin.

TABLE 2-10

2018-2020 PM2.5 ANNUAL DESIGN VALUES BY BASIN AND COUNTY

Basin/ County	2018-2020 PM2.5 Annual Design Value (µg/m^3)*#	Percent of Current (2012) PM2.5 Annual NAAQS (12.0 µg/m^3)	Percent of Former (1997) Annual NAAQS (15.0 µg/m^3)	Area of Design Value Max	2018-2020 3-Year High State Annual Average PM2.5 Designation Value (µg/m^3)##	Percent of State PM2.5 Annual Standard (12 µg/m^3)
South Coast Air Basin						
Los Angeles	13.0	108	87	South Central Los Angeles County	16.2	135
Orange	11.0	92	73	Central Orange County	12.3	103
Riverside	13.8	115	92	Metropolitan Riverside County (Mira Loma)	**16.4**	**137**
San Bernardino	**14.2**	**118**	**95**	**CA-60 Near Road**	15.4	128
Salton Sea Air Basin						
Riverside	8.0	67	53	Coachella Valley (Indio)	8.4	70

Bold text denotes the peak value.

* Based on FRM filter data and NAAQS-comparable FEM continuous data; the federal design value is based on the average of the 3 annual averages in the period.

\# Value includes all exceptional events, however, removal of suspected exceptional events result in a lower design value.

\## Based on combined FRM filter and continuous FEM data (federal FEM waiver is not applied to State designation value); data includes exceptional events; the State annual designation value is the highest year in the 3-year period.

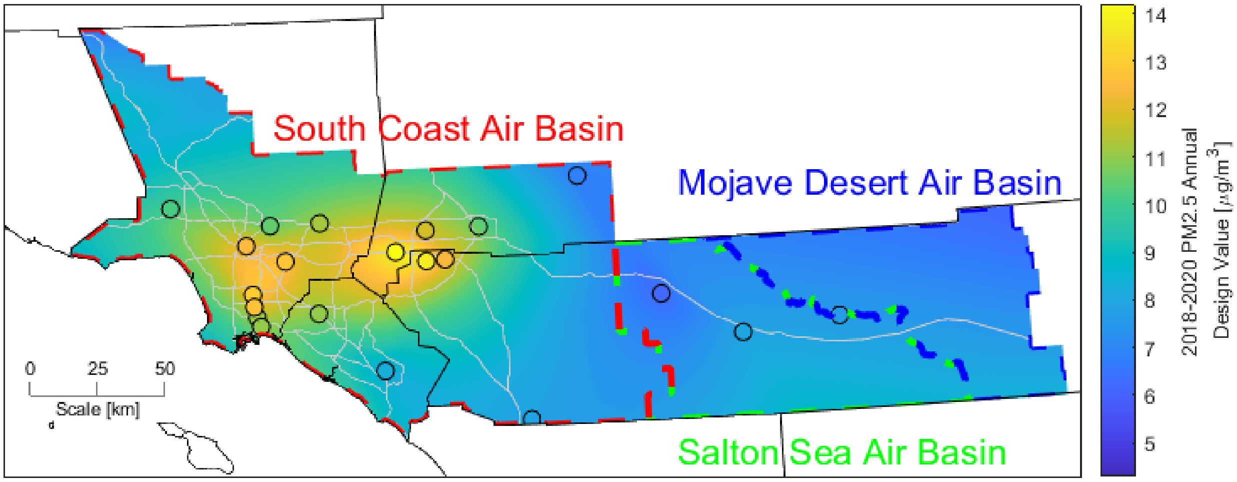

FIGURE 2-9
2018-2020 PM2.5 ANNUAL AVERAGE FEDERAL DESIGN VALUE

Near-Road PM2.5

On December 14, 2012, the U.S. EPA strengthened the NAAQS for PM2.5 and, as part of the revisions, added a requirement to monitor near the most heavily trafficked roadways in large urban areas. Particle pollution is expected to be higher along these roadways as a result of direct emissions from cars and heavy-duty diesel trucks and buses. The South Coast AQMD installed the two required PM2.5 monitors before January 1, 2015, at locations selected based upon the existing near-roadway NO_2 sites that were ranked higher for heavy-duty diesel traffic. The locations are: (1) I-710, located at Long Beach Blvd. in Los Angeles County near Compton and Long Beach; and (2) CA-Route 60, located west of Vineyard Avenue near the San Bernardino/Riverside County border near Ontario, Mira Loma and Upland. These near-road sites measure PM2.5 daily with both FRM filter-based measurements and FEM continuous measurements.

Table 2-11 summarizes the 2018-2020 annual and 24-hour PM2.5 design values from the near-road sites and nearby ambient monitoring stations. The 2018-2020 PM2.5 annual design values from the Route 710 and Route 60 Near-Road sites were 12.7 and 14.2 µg/m^3, respectively. The nearby ambient stations in South Coastal Los Angeles County (North Long Beach Station) and in Metropolitan Riverside County (Mira Loma station) measured 11.1 and 13.8 µg/m^3, respectively, for the 2018-2020 annual design values. Thus, the PM2.5 annual design values of these sites for 2018-2020 indicate that the near-road sites do indeed measure higher than the nearby ambient stations, on average. The CA-60 near-road station became the 3-year design value site for the Basin for the PM2.5 annual average NAAQS beginning in 2017 when the first 3-year design value was available.

After removing the regulatory significant exceptional events,[28]~~;~~ the 2018-2020 24-hour PM2.5 design value is higher at the I-710 Near-Road than at the nearby N. Long Beach station. However, the 2018-2020 24-hour PM2.5 design value remains higher at Mira Loma (35 μg/m^3) than at the CA-60 Near-Road site (34 μg/m^3). PM2.5 24-hour concentrations at the Mira Loma station are likely higher than the near-road site on the highest days, due to the influence of nearby residential wood burning and the influence of enhanced secondary particle formation at Mira Loma.

TABLE 2-11

2018-2020 ANNUAL PM2.5 DESIGN VALUES AND 24-HOUR PM2.5 DESIGN VALUES AT THE SOUTH COAST AIR BASIN NEAR-ROAD SITES AND NEARBY AMBIENT STATIONS

Near-Road PM2.5*			Nearby Ambient PM2.5*		
Near-Road Station	2018-2020 Annual PM2.5 Design Value (μg/m^3)#	2018-2020 24-Hour PM2.5 Design Value (μg/m^3)##	Ambient Station	2018-2020 Annual PM2.5 Design Value (μg/m^3)#	2018-2020 24-Hour PM2.5 Design Value (μg/m^3)##
Route 710 N. R.	12.7	**35**	**North Long Beach**	11.1	33
Route 60 N. R.	**14.2**	34	**Mira Loma**	13.8	**35**

Bold text denotes the peak value.

* Filter-based FRM measurements and NAAQS-comparable FEM measurements were used to calculate the design values

\# Data includes exceptional events.

\## 24-Hour PM2.5 samples exceeding the 24-hour PM2.5 NAAQS during September 11, 2020 - September 16, 2020 at the Route 60 Near Road and Mira Loma stations were removed to calculate design values; these exceedances were caused by smoke from the Bobcat and El Dorado Fires. The South Coast AQMD is preparing an exceptional event demonstration consistent with U.S. EPA exceptional event guidance for this event. Events with an exceptional event demonstration that the U.S. EPA has concurred upon may be removed from the design value determination.

The annual PM2.5 NAAQS is 12.0 μg/m^3; the 24-hour PM2.5 NAAQS is 35 μg/m^3.

I-710 N. R. is located on Interstate 710 at Long Beach Bl. in Long Beach in Los Angeles County.

CA-60 N.R. is located on California Route 60 west of Vineyard Av. in Ontario in San Bernardino County.

Impacts of Meteorology on PM2.5 Air Quality

PM2.5 concentrations are influenced by atmospheric pollutant transport and dispersion. Winds and turbulence mix air pollution with the cleaner air in the atmosphere and transport pollutants out of the South Coast AQMD jurisdiction. Rainfall and associated storms also help to reduce PM2.5 concentrations. To analyze the impact of meteorology on PM2.5, we constructed two indexes that quantify the influence of atmospheric transport and dispersion on concentrations. The indexes are calculated using equations 1

[28] Regulatory significant exceptional events are exceptional events whose removal from the design value calculation influences a regulatory decision.

and 2 in Appendix II. The meteorological indexes were calculated using hourly historical measurements of wind speed, temperature, and total sky cover at several of the South Coast AQMD and Automated Surface Observing Systems (ASOS) monitoring stations. See Appendix II for details of the meteorological index calculation. Appendix II also provides an analysis of the relationship between hourly PM2.5 concentrations measured at Mira Loma (Van Buren) and the meteorological indexes, demonstrating that they are useful for quantifying the influence of meteorology on concentrations.

The trend of normalized quarterly meteorological indexes is shown in Figure 2-34 (Appendix II). Both indexes increased over time at both Compton and Mira Loma (Van Buren), the stations with the highest PM2.5 98th percentile values in recent years, relative to the baseline period of 2010 - 2020. Meteorological conditions were slightly favorable to higher concentrations in recent years, although there is significant variation. This shows that the transport and dispersion related meteorological conditions in the design value period of 2018 - 2020 were somewhat favorable to higher PM2.5 concentrations.

The net impact of the drought on air quality in the Basin from 2013 through 2015 has been to disrupt the steady progress seen in prior years toward attainment of the 24-hour PM2.5 NAAQS. Lower rainfall results in less washing of road surfaces and brings drier ground surfaces, which reduces the natural crusting of soils that is improved by moisture. This can lead to enhanced resuspension of fugitive dust by moving vehicles and winds. Fugitive dust can raise concentrations of both PM10 and PM2.5. More importantly, less rain reduces the natural air pollution cleansing effect of precipitation due to washout - particulate matter and its precursors captured and removed by raindrops. The reduced frequency of storms also translates to fewer days of enhanced pollutant dispersion. Without the storm systems and related winds, there is less mixing of air pollutants with cleaner air in the atmosphere and less of the transport that moves pollutants out of the region. The lack of windy, unstable weather conditions during storms results in longer episodes of stagnant air when particulate pollution builds to unhealthful levels. Dry conditions also contributed to increased frequency and intensity of wildfire events throughout the State, with resulting impacts to both particulate and ozone air quality.

The total rainfall during quarters 1 and 4, averaged over 3-years at the Los Angeles International Airport (KLAX) and Ontario International Airport (KONT) National Weather Service meteorological stations from 2001-2020 are shown in Figure 2-10 along with the trend of 24-hour PM2.5 design values. KLAX is located on the western side of the Basin and KONT is located towards the center of the Basin. The first and fourth quarters are the most important to consider, since the vast majority of the days that exceed the federal 24-hour standard in the Basin occur during this period. This is also the time period that the Basin typically experiences the most rainfall and more frequent storm events.

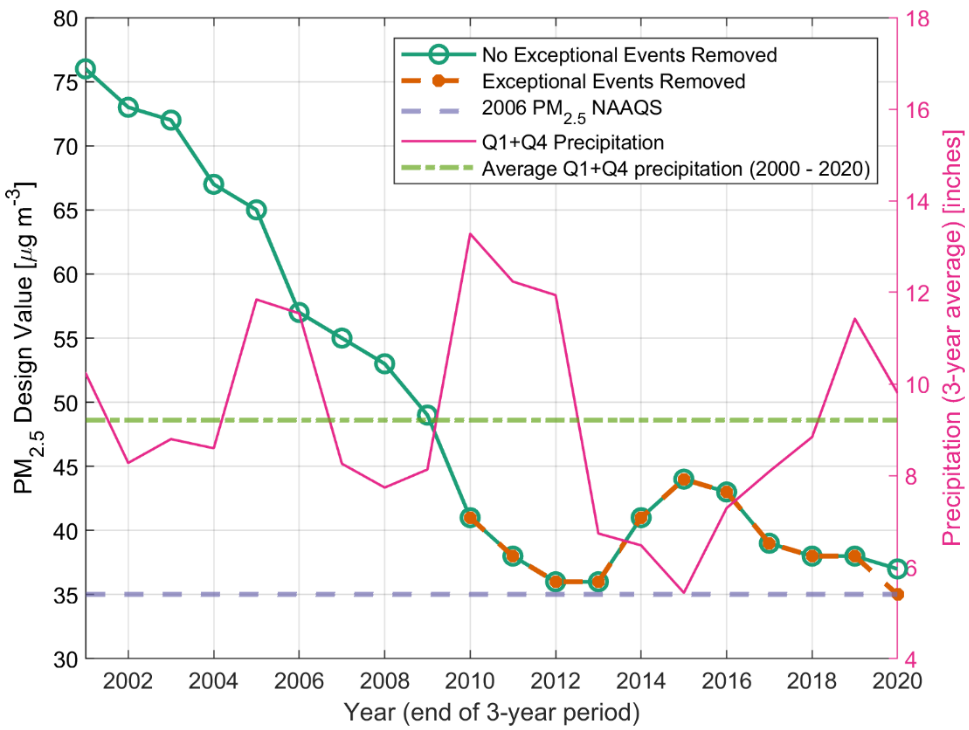

FIGURE 2-10

TREND OF SOUTH COAST AIR BASIN MAXIMUM 24-HOUR PM2.5 DESIGN VALUES AND 3-YEAR AVERAGE OF RAINFALL IN QUARTERS 1 (JAN.-MAR.) AND 4 (OCT.-DEC.) AT KLAX AND KONT.

After the drought from 2013 - 2015, annual precipitation totals in recent years (9.80 inches from 2018 - 2020) have been slightly above average (9.21 inches from 2000 - 2020). After 2015, due to rainfall returning to near-average levels, PM2.5 concentrations have resumed the long-term decreasing trend. The design value in 2020 was 35 µg/m^3 after removing exceedances caused by the Bobcat and El Dorado fires, which caused high PM2.5 measurements in the fall of 2020. After removing these exceptional events, the Basin has met the 2006 24-hour PM2.5 NAAQS based on the 2018-2020 design value period.

As a result of the disrupted progress toward attainment of the federal 24-hour PM2.5 standard, the South Coast AQMD submitted a request and the U.S. EPA approved, a “bump up” to the nonattainment classification from “moderate” to “serious.” This reclassification required that the Basin attain the standard as soon as practicable, but not beyond December 31, 2019. Because of the failure to attain the 2006 24-hour PM2.5 NAAQS by 2019, the South Coast AQMD developed a Section 189(d) Plan) to address the attainment planning requirements for the Basin. In 2021, after meeting the 2006 24-hour PM2.5 NAAQS with 2018 - 2020 data, the South Coast AQMD developed a redesignation request and maintenance plan for 24-hour average PM2.5, requesting the U.S. EPA to redesignate the Basin to attainment of the 1997 and 2006 24-hour PM2.5 NAAQS.

Air Quality, PM10

In 2020, the South Coast AQMD routinely monitored PM10 concentrations at 23 locations in the Basin and the Coachella Valley. Of these, 18 employed FRM filter samplers. The FRM PM10 minimum sampling schedule set by the U.S. EPA requires one 24-hour filter sample every sixth day. At the Riverside-Rubidoux, Mira Loma, and Indio stations, the 24-hour filter sample is collected once every three days. In addition, ten stations have FEM[29] continuous monitors. Both FEM and FRM instruments are used for determining attainment. Attainment is considered at each instrument separately[30], even if they are collocated at the same station.

In the second quarter of 2020, the FRM monitors were not operated from March 28, 2020 to June 26, 2020 due to the COVID-19 Pandemic. As a result, only the continuous monitors had complete data for the second quarter of 2020.

Attainment of the 24-hour PM10 NAAQS is based on the design value, which represents the average number of exceedances of the standard in a three-year period. This form is not useful for analyzing trends of concentrations over time because a single exceedance with a concentration just over the standard is treated the same as an exceedance with a concentration well over the standard. We therefore also use a different but related form, referred to as the concentration-based design value in this section.

For this analysis, the concentration-based design value is defined as the fourth highest concentration at a monitor in a three-year period, after simulating days without measurements. To simulate days without measurements, each measurement is repeated n times in each year, where $n = round\left(\frac{dyear}{d}\right)$, where $dyear$ is the number of days in the year (365 or 366), d is the number of measurements at the monitor, and $round()$ rounds to the nearest integer. The concentration-based design value can be complete or incomplete. The value is complete if all quarters in the three-year period are at least 75 percent complete or the concentration-based design value is 155 µg m^{-3} or larger. Completeness is calculated by dividing the number of valid samples by the number of scheduled samples. This methodology produces similar conclusions as the official exceedance-based design values, but also provides additional context when tracking trends in measured concentrations over time. In general, concentration-based design values of 155 µg m^3 correspond to an exceedance of the standard.

The 24-hour PM10 design values in 2020 are summarized by county and basin in Table 2-12, along with the State designation values. The federal 24-hour standard level (155 µg/m^3 is the exceedance level) was exceeded at seven stations in the Basin on nine different days during the 2018 through 2020 period. These high 24-hour averages were due to high-wind exceptional events and also do not jeopardize the attainment status because exceptional events are removed from design value calculations if they are concurred upon by U.S. EPA. The Basin has remained in attainment of the PM10 NAAQS since 2006. The Basin maximum concentration-based design value for 24-hour PM10, without exceptional events removed, is 170 µg/m^3, 110 percent of the NAAQS in Metropolitan Riverside County at the Mira Loma

[29] The continuous FEM PM10 monitors deployed by South Coast AQMD are primarily Beta Attenuation Monitor (BAM) instruments, although some PM10 Tapered Element Oscillating Microbalance (TEOM) instruments are also used, most notably in the Coachella Valley.

[30] At the Indio and Mira Loma stations, two monitors that sample every sixth day are operated with a three day offset to simulate a once every third day sample schedule and are treated as a single monitor.

(Van Buren) monitoring station. After removing exceptional events due to high-winds the maximum concentration-based design value is 152 µg/m^3, 98 percent of the NAAQS, in East San Gabriel Valley at the Azusa monitoring station. The much more stringent State 24-hour PM10 standard (50 µg/m^3) was exceeded at many stations in the Basin and in the Coachella Valley.

The Coachella Valley had eighteen days in 2018-2020 exceeding the 24-hour PM10 NAAQS, with concentrations as high as 680 µg/m^3 at the Mecca (Saul Martinez) monitoring station, almost all of which were due to windblown dust and sand associated with high-wind exceptional events. The Palm Springs monitoring station only exceeded on two of those days. The FEM monitor at Saul Martinez Elementary School, in the town of Mecca in the southeastern portion of the Coachella Valley, exceeded the standard on seventeen days from 2018-2020, almost all related to high-wind events. The Coachella Valley 2018-2020 concentration-based design value for 24-hour PM10 is 204 µg/m^3 at Mecca (Saul Martinez) after the exclusion of exceptional events with wind speeds exceeding 25 mph in the Coachella Valley. The official design value that is used to determine attainment is 2.0, which exceeds the PM10 NAAQS even after the exclusion of suspected exceptional events. The other exceedances at Mecca (Saul Martinez) were also likely caused by windblown dust and sand, but wind speeds in upwind regions were likely not high enough to entrain undisturbed natural soils, and thus these exceedances may not be exceptional events.

TABLE 2-12

2018-2020 24-HOUR PM10 DESIGN VALUES BY BASIN AND COUNTY

Basin/ County	2018-2020 PM10 24-Hour Concentration-Based Design Value ($\mu g/m^3$)	2018-2020 Percent of PM10 NAAQS (150 $\mu g/m^3$)#	2018-2020 PM10 24-Hour Design Value	Area of Design Value Max	2018-2020 High State PM10 24-Hour Designation Value ($\mu g/m^3$)##	2018-2020 Percent of State PM10 24-Hour Standard (50 $\mu g/m^3$)
South Coast Air Basin						
Los Angeles	155 (152)	100 (98)	2.0 (0.7)	East San Gabriel Valley	95	190
Orange	127	82	0.3	Central Orange County	94	188
Riverside	**170 (148)**	**110 (95)**	**1.7 (1.0)**	**Metropolitan Riverside County**	**134**	**268**
San Bernardino	117	75	0.8	Northwest San Bernardino Valley	95	190
Salton Sea Air Basin						
Riverside	**274 (204)**	**177 (132)**	**5.8 (2.0)**	**Coachella Valley - Mecca (Saul Martinez)**	**Insufficient data**	**Insufficient data**

Bold text denotes the peak design value.

Values in parenthesis are calculated after removing suspected exceptional events. PM10 concentrations that were related to high-wind events have been flagged for exclusion from NAAQS comparison in accordance with the U.S. EPA Exceptional Events Rule; U.S. EPA concurrence is required for exclusion of exceptional events after submittal of supporting documentation.

\# 155 $\mu g/m^3$ is needed to exceed the level of the PM10 NAAQS.

\## The State 24-hour Expected Peak Day Concentration (EPDC) is a calculated 3-year value after accounting for statistical outliers; the State 24-hour Designation Value is the highest concentration at or below the EPDC over the 3-year period; State data may include exceptional events; State PM10 24-hour average designation value includes FRM and BAM FEM data, but not TEOM FEM instruments since the TEOM is not a California Approved Sampler (CAS) for standard compliance (SCAQMD uses TEOM instruments to supplement FEM measurements in the Coachella Valley).

While the annual PM10 NAAQS standard was revoked in 2006, the annual PM10 design values and State designation values in 2020 are summarized by county and air basin in Table 2-13. Suspected exceptional events were removed before calculating the design values. The annual PM10 design value for 2018-2020 exceeded the former NAAQS at Mira Loma (Van Buren), at 51 $\mu g/m^3$. No other stations in the Basin or the Coachella Valley exceeded the former NAAQS for the 2018-2020 design value. The much more stringent

State annual PM10 standard (20 µg/m^3) was exceeded at most stations in each county in the Basin and in the Coachella Valley.

TABLE 2-13

2018-2020 ANNUAL PM10 DESIGN VALUES BY BASIN AND COUNTY

Basin/County	2018-2020 PM10 Annual Design Value (µg/m^3)	2018-2020 Percent of Former PM10 Annual NAAQS** (50 µg/m^3)	Area of Design Value Max	2018-2020 3-Yr. High State PM10 Annual Designation Value (µg/m^3)#	2018-2020 Percent of Current PM10 State Standard (20 µg/m^3)
South Coast Air Basin					
Los Angeles	33*	66	East San Gabriel Valley	34	170
Orange	27*	54	Central Orange County	28	140
Riverside	**51**	**102**	**Metropolitan Riverside County**	**45**	**225**
San Bernardino	35*	70	Central San Bernardino Valley	34	170
Salton Sea Air Basin					
Riverside	**38***	**76**	**Coachella Valley - Mecca (Saul Martinez)**	**39**	**195**

Bold text denotes the peak value.

* All quarters do not have at least 75 percent data completeness.

** The federal annual PM10 standard was revoked in 2006.

\# State data may include exceptional events; State PM10 annual average designation value includes FRM and BAM FEM data, but not TEOM FEM instruments since the TEOM is not a California Approved Sampler (CAS) for standard compliance (the South Coast AQMD uses TEOM instruments to supplement FEM measurements in the Coachella Valley); State annual designation value is the highest year in the 3-year period.

Other Criteria Air Pollutants

Carbon Monoxide (CO)

Health Effects, CO

The adverse effects of ambient carbon monoxide air pollution exposure on health have been reviewed in the 2010 U.S. EPA *Integrated Science Assessment for Carbon Monoxide.*[31] This document presents a review of the available scientific studies and conclusions on the causal determination of the health effects

[31] U.S. EPA. (2010). Integrated Science Assessment for Carbon Monoxide (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/019F. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=218686.

of CO. A summary of health effects information and additional references can also be found in Appendix I: Health Effects.

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 delivery to the heart.

Inhaled CO has no known direct toxic effect on the lungs, but instead 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, people with conditions requiring an increased oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include patients with diseases involving heart and blood vessels, fetuses, and patients with chronic hypoxemia (oxygen deficiency), such as is seen at high altitudes.

Recent studies suggest that ambient CO may increase the risk of pulmonary disease. CO is also associated with emergency department visits for respiratory diseases overall and visits for asthma. 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, including pre-term births and heart abnormalities.

Air Quality, CO

Ambient carbon monoxide concentrations were measured at 23 locations in the South Coast AQMD jurisdiction, including one station in the Coachella Valley and two near-road monitors. Tables 2-14 and 2-15 summarize the 2020 maximum 1-hour and 8-hour average concentrations of CO by air basin and county. In 2020, no areas in the Basin or the Coachella Valley exceeded the CO air quality standards, including the near-road stations. The highest concentrations of CO continued to be recorded in the areas of Los Angeles County, where vehicular traffic is most dense, with the maximum 8-hour and 1-hour concentration (3.1 ppm and 4.5 ppm, respectively) recorded in the South Central Los Angeles County area. The near-road monitors in Orange and San Bernardino counties did not increase the Basin's maximum CO values or design values in 2020 over that from Los Angeles County, although the near-road concentrations were often higher than the nearest ambient stations.

All areas of the Basin have continued to remain below the federal standards (35 ppm 1-hour and 9 ppm 8-hour) since 2003. The U.S. EPA re-designated the Basin to attainment of the federal CO standards, effective June 11, 2017. The Basin and the Coachella Valley are also well below the State CO standards (20 ppm 1-hour and 9.0 ppm 8-hour).

TABLE 2-14

2020 MAXIMUM 1-HOUR CO CONCENTRATIONS AND 2020 DESIGN VALUES BY BASIN AND COUNTY

Basin/County	2020 Maximum CO 1-Hour Average (ppm)	2019-2020 CO 1-Hour Design Value* (ppm)	Percent of CO 1-Hour NAAQS (35 ppm)	Area of Design Value Max	Percent of CO 1-Hour State Standard (20 ppm)
South Coast Air Basin					
Los Angeles	**4.5**	**3.8**	**11**	**South Central L.A. County**	**19**
Orange	2.4 *(2.4 at I-5 N.R.)*	2.5 *(2.5 at I-5 N.R.)*	7 *(7)*	North Orange County	13 *(13)*
Riverside	1.9	1.8	5	Metropolitan Riverside County	9
San Bernardino	1.9 *(1.5 at I-10 N.R.)*	2.2 *(1.5 at I-10 N.R.)*	6 *(4)*	Central San Bernardino Valley	11 *(8)*
Salton Sea Air Basin					
Riverside	0.8	0.8	2	Coachella Valley	4

Bold text denotes Basin maximum; I-5 and I-10 near-road monitors are shown in parenthesis.

* The 1-hour CO design value is the maximum in a two-year period 2nd highest daily maximum 1-hour average concentration at the most polluted station.

I-5 N. R. is located on Interstate 5 at Vernon St. in Anaheim in Orange County.

I-10 N.R. is located on Interstate 10 at Etiwanda Av. in Ontario in San Bernardino County.

TABLE 2-15

2020 MAXIMUM 8-HOUR CO CONCENTRATIONS AND 2020 DESIGN VALUES BY BASIN AND COUNTY

Basin/ County	2020 Maximum CO 8-Hour Average (ppm)	2020 CO 8-Hour Design Value* (ppm)	Percent of CO 8-Hour NAAQS (9 ppm)	Area of Design Value Max	Percent of CO 8-Hour State Standard (9.0 ppm)
South Coast Air Basin					
Los Angeles	**3.1**	**2.9**	**32**	**South Central L.A. County**	**32**
Orange	2.0 *(2.0 at I-5 N.R.)*	1.8 *(1.8 at I-5 N.R.)*	20 *(20)*	I-5 Near Road	20 *(20)*
Riverside	1.5	1.5	17	Metropolitan Riverside County	17
San Bernardino	1.4 *(1.2 at I-10 N.R.)*	1.4 *(1.1 at I-10 N.R.)*	16 *(12)*	Central San Bernardino Valley	16 *(12)*
Salton Sea Air Basin					
Riverside	0.5	0.5	6	Coachella Valley	6

Bold text denotes Basin maximum; I-5 and I-10 near-road monitors are shown in parentheses

* The 8-hour CO design value is the 2nd highest daily maximum 8-hour average concentration at the most polluted station in a two year-period.

I-5 N. R. is located on Interstate 5 at Vernon St. in Anaheim in Orange County

I-10 N.R. is located on Interstate 10 at Etiwanda Av. in Ontario in San Bernardino County

Near-Road CO

On August 12, 2011, the U.S. EPA issued a decision to retain the existing NAAQS for CO, determining that those standards provided the required level of public health protection. However, the U.S. EPA added a monitoring requirement for near-road CO monitors in urban areas with population of 1 million or more, utilizing stations that would be implemented to meet the 2010 NO_2 near-road monitoring requirements. The two CO monitors are at the I-5 Near-Road site, located in Orange County near Anaheim, and the I-10 Near-Road site, located near Etiwanda Avenue in San Bernardino County near Ontario, Rancho Cucamonga and Fontana.

The near-road CO measurements began at these two locations in late December 2014. From that time to the end of 2020, the data show that while the near-road measurements were often higher than the nearest ambient monitors, as would be expected in the near-road environment, they did not exceed the levels of the 1-hour or 8-hour CO NAAQS. Tables 2-16 and 2-17 compare the available near-road measurements for annual peak 1-hour and 8-hour CO, respectively, to the comparable measurements from the nearby ambient stations at Anaheim and Fontana. The form of the CO standard is such that the peak concentration is not to be exceeded more than once per year. The tables include the second highest concentration for comparison to this design value form of the standard.

The 2020 near-road peak 1-hour CO concentration measured was 2.4 ppm, measured at the I-5 Near-Road site, while the peak 8-hour CO concentration was 2.0 ppm at the I-10 Near-Road site, both well below the respective NAAQS levels (35 ppm and 9 ppm, respectively). The 2020 I-5 near-road CO design values were higher than that of the nearest ambient stations for both federal standards while the I-10 near-road design values were comparable to the nearest ambient stations. South Central Los Angeles (Compton) continues to be the station with the highest design values in the South Coast Air Basin.

TABLE 2-16

2018 THROUGH 2020 MAXIMUM AND SECOND HIGHEST 1-HOUR CO CONCENTRATIONS AT SOUTH COAST AIR BASIN NEAR-ROAD SITES AND NEARBY AMBIENT STATIONS

Near-Road Station	Near-Road Sites CO						Ambient Station	Nearby Ambient CO					
	Peak 1-Hour CO (ppm)			2nd Maximum 1-Hour CO (ppm)				Peak 1-Hour CO (ppm)			2nd Maximum 1-Hour CO (ppm)		
	2018	2019	2020	2018	2019	2020		2018	2019	2020	2018	2019	2020
I-5 N. R.	**2.7**	**2.6**	**2.4**	**2.7**	**2.3**	**2.1**	**Anaheim**	2.3	2.4	2.3	2.2	2.4	2.1
I-10 N. R.	1.6	1.5	1.5	1.5	1.4	1.5	**Fontana**	**1.9**	**2.7**	**1.7**	**1.6**	**2.2**	**1.5**

Bold text denotes maximum concentration between near-road and nearby ambient stations.
I-5 N. R. is located on Interstate 5 at Vernon St. in Anaheim in Orange County.
I-10 N.R. is located on Interstate 10 at Etiwanda Av. in Ontario in San Bernardino County.

TABLE 2-17

2018 THROUGH 2020 MAXIMUM AND SECOND HIGHEST 8-HOUR CO CONCENTRATIONS AT SOUTH COAST AIR BASIN NEAR-ROAD SITES AND NEARBY AMBIENT STATIONS

Near-Road Station	Near-Road Sites CO						Ambient Station	Nearby Ambient CO					
	Peak 8-Hour CO (ppm)			2nd Maximum 8-Hour CO (ppm)				Peak 8-Hour CO (ppm)			2nd Maximum 8-Hour CO (ppm)		
	2018	2019	2020	2018	2019	2020		2018	2019	2020	2018	2019	2020
I-5 N. R.	**2.2**	**1.6**	**2.0**	**2.0**	**1.5**	**1.8**	**Anaheim**	1.9	1.3	1.7	1.8	1.3	1.6
I-10 N. R.	**1.3**	**1.1**	**1.2**	**1.3**	**1.1**	**1.1**	**Fontana**	1.1	1.0	1.1	1.1	1.0	1.1

Bold text denotes maximum concentration between near-road and nearby ambient stations.
I-5 N. R. is located on Interstate 5 at Vernon St. in Anaheim in Orange County.
I-10 N.R. is located on Interstate 10 at Etiwanda Av. in Ontario in San Bernardino County.

Nitrogen Dioxide (NO_2)

Health Effects, NO_2

The adverse effects of ambient nitrogen dioxide air pollution exposure on health were reviewed in the 2008 U.S. EPA *Integrated Science Assessment for Oxides of Nitrogen - Health Criteria*,[32] and more recently in the 2016 U.S. EPA *Integrated Science Assessment for Oxides of Nitrogen - Health Criteria*.[33] These documents present detailed reviews of the available scientific studies and conclusions on the causal determination of the health effects of NO2. A summary of health effects information and additional references can also be found in Appendix I: Health Effects.

The 2016 U.S. EPA review noted the respiratory effects of NO_2, and evidence suggestive of impacts on cardiovascular health, mortality and cancer. Epidemiological studies indicate that long-term exposure to NO_2, is associated with a higher risk of all-cause, cardiovascular, and respiratory mortality. Recent studies also show that both short and long term NO_2 exposure is also associated with chronic obstructive pulmonary disease (COPD) risk. The 2016 ISA also indicated a causal relationship between short-term NO_2 exposures and asthma exacerbations ("asthma attacks") and a long-term link with asthma development. Experimental studies have found that NO_2 exposures increase responsiveness of airways, pulmonary inflammation, and oxidative stress, and can lead to the development of allergic responses. These biological responses provide evidence of a plausible mechanism for NO_2 to cause asthma. Additionally,

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[32] U.S. EPA. (2008). Integrated Science Assessment for Oxides of Nitrogen - Health Criteria (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/071. http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=194645.

[33] U.S. EPA. (2016). Integrated Science Assessment for Oxides of Nitrogen - Health Criteria (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-15/068. https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310879.

results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (airway responsiveness) or after inhaled allergens.

Animal studies also provide evidence that NO_2 exposures have negative effects on the immune system, and therefore increase the host's susceptibility to respiratory infections. Epidemiological studies showing associations between NO_2 levels and hospital admissions for respiratory infections support such a link, although the studies examining respiratory infections in children are less consistent.

Air Quality, NO_2

In 2020, ambient NO_2 concentrations were monitored at 27 locations, including one in the Coachella Valley and four near-road monitoring stations. The Basin has not exceeded the federal annual standard for NO_2 (0.053 ppm) since 1991, when the Los Angeles County portion of the Basin recorded the last violation of that standard in the U.S. The current 1-hour average NO2 NAAQS (100 ppb) was exceeded on one day in 2020 at the CA-60 near road site in San Bernardino County. However, the 98th percentile form of the standard was not exceeded and the 2018-2020 design value is not in violation of the NAAQS.

The higher relative concentrations in the Los Angeles area are indicative of the concentrated emission sources, especially heavy-duty vehicles. Although the Basin is in attainment of the State and federal standards, NO_2 is still of concern, since oxides of nitrogen (NOx) are precursors to both ozone and particulate matter. Further control of NOx will be required to attain the ozone and particulate standards.

Tables 2-18 and 2-19 summarize the 2020 maximum 1-hour and annual average concentrations of NO_2 by air basin and county. The near-road NO_2 data is summarized further below.

TABLE 2-18

2020 MAXIMUM 1-HOUR NO_2 CONCENTRATIONS AND 2018-2020 DESIGN VALUES BY BASIN AND COUNTY

Basin/ County	2020 Maximum NO2 1-Hour Average (ppb)	2018-2020 NO2 1-Hour Design Value (ppb)	Percent of NO2 1-Hour NAAQS (100 ppb)	Area of Design Value Max	2018-2020 NO2 1-Hour State Designation Value (ppm)	Percent of NO2 1-Hour State Standard (0.18 ppm)
South Coast Air Basin						
Los Angeles	90.3	81	81	I-710 Near Road	**0.100**	**56**
Orange	70.9	53	53	I-5 Near Road	0.060	33
Riverside	66.4	52	52	Metropolitan Riverside County	0.060	33
San Bernardino	**101.6**	**74**	**74**	**CA-60 Near Road**	0.090	50
Salton Sea Air Basin						
Riverside	47.4	34	34	Coachella Valley	0.040	22

Bold text denotes the peak value.

The 1-hour NO_2 design value is the annual 98th percentile daily maximum 1-hour concentration, averaged over 3 years at a station.

* Although the maximum 1-hour concentrations exceeded the standard on one day, the 98th percentile form of the design value did not exceed the NAAQS.

TABLE 2-19

2020 MAXIMUM ANNUAL AVERAGE NO_2 CONCENTRATIONS AND 2018-2020 DESIGN VALUES BY BASIN AND COUNTY

Basin/County	2020 Maximum NO2 Annual Average (ppm)	2018-2020 NO2 Annual Design Value (ppm)	Percent of NO2 Annual NAAQS (0.053 ppm)	Area of Design Value Max	2018-2020 NO2 Annual State Designation Value# (ppm	Percent of NO2 Annual State Standard (0.030 ppm)
South Coast Air Basin						
Los Angeles	0.0223	0.023	43	710 Near Road	0.023	77
Orange	0.0188	0.019	36	I-5 Near Road	0.020	67
Riverside	0.0136	0.015	28	Metropolitan Riverside County	0.014	47
San Bernardino	**0.0291**	**0.029**	**55**	**CA-60 Near Road**	**0.030**	**100**
Salton Sea Air Basin						
Riverside	0.0066	0.007	13	Coachella Valley	0.007	23

Bold text denotes the peak value.
The annual NO_2 design value is the annual average of the quarterly averages, averaged over 3 years at a station.
This table does not include near-road stations since the data period is insufficient for the design value calculation.

Near-Road NO_2

With the revised NO_2 federal standard in 2010, near-road NO_2 measurements were required to be phased in for larger cities. The four near-road monitoring stations are: (1) I-5 Near-Road, located in Orange County near Anaheim; (2) I-710 Near-Road, located at Long Beach Blvd. in Los Angeles County near Compton and Long Beach; (3) CA-60 Near-Road, located west of Vineyard Avenue near the San Bernardino/Riverside County border near Ontario, Mira Loma and Upland; and (4) I-10 Near-Road, located near Etiwanda Avenue in San Bernardino County near Ontario, Rancho Cucamonga and Fontana.

Even with the addition of the near-road sites, all of the standards remain in attainment. There have been exceedances of the peak 1-hour standard, at the I-710 near-road station in 2017, and the CA-60 near-road in 2020. However, the 98^{th} percentile value has not exceeded the standard. Tables 2-20 and 2-21 show that while the near-road stations have higher values than nearby stations, they do not cause a violation of the federal standards.

TABLE 2-20

2018 THROUGH 2020 MAXIMUM AND 98TH PERCENTILE 1-HOUR NO_2 CONCENTRATIONS AT SOUTH COAST AIR BASIN NEAR-ROAD SITES AND NEARBY AMBIENT STATIONS

Near-Road Station	Near-Road Sites NO_2 Annual Peak 1-Hour NO_2 (ppb)			Near-Road Sites NO_2 98th Percentile 1-Hour NO_2 (ppb)			Ambient Station	Nearby Ambient NO_2 Annual Peak 1-Hour NO_2 (ppb)			Nearby Ambient NO_2 98th Percentile 1-Hour NO_2 (ppb)		
	2018	2019	2020	2018	2019	2020		2018	2019	2020	2018	2019	2020
I-5 N. R.	61.7	59.4	69.9	55.8	50.4	52.6	**Anaheim**	66.0	59.4	70.9	54.5	49.2	52.1
I-710 N. R.	**90.3**	**97.7**	90.3	**79.1**	**78.3**	**79.1**	**Compton**	**68.3**	70.0	**72.3**	55.6	52.8	**60.5**
CA-60 N. R.	79.4	87.7	**101.6**	71.3	73.9	78.0	**Upland**	58.7	57.9	55.4	48.9	46.4	44.8
I-10 N. R.	88.3	86.3	94.2	67.7	70.5	75.1	**Fontana**	63.0	**76.1**	66.4	**55.9**	**57.7**	57.9

Bold text denotes maximum concentration between near-road and nearby ambient stations.
N/A = data not available (monitoring not started).
The 1-hour NO_2 NAAQS is 100 ppb.
I-5 N. R. is located on Interstate 5 at Vernon St. in Anaheim in Orange County.
I-710 N. R. is located on Interstate 710 at Long Beach Bl. in Long Beach in Los Angeles County.
CA-60 N.R. is located on California Route 60 west of Vineyard Av. in Ontario in San Bernardino County.
I-10 N.R. is located on Interstate 10 at Etiwanda Av. in Ontario in San Bernardino County.

TABLE 2-21

2018 THROUGH 2020 ANNUAL NO_2 CONCENTRATIONS AT SOUTH COAST AIR BASIN NEAR-ROAD SITES AND NEARBY AMBIENT STATIONS

Near-Road Station	Near-Road NO_2 Annual Average NO_2 (ppb)			Ambient Station	Nearby Ambient NO_2 Annual Average NO_2 (ppb)		
	2018	2019	2020		2018	2019	2020
I-5 N. R.	20.8	19.2	18.8	**Anaheim**	13.7	12.7	13.3
I-710 N. R.	22.3	22.8	22.3	**Compton**	15.0	14.1	14.5
CA-60 N. R.	**30.4**	**29.0**	**29.1**	**Upland**	14.7	14.0	13.9
I-10 N. R.	27.2	27.6	28.7	**Fontana**	**18.3**	**14.3**	**14.9**

Bold text denotes maximum concentration between near-road and nearby ambient stations.
N/A = data not available (monitoring not started).
The annual average NO_2 NAAQS is 0.053 ppm, or 53 ppb.
I-5 N. R. is located on Interstate 5 at Vernon St. in Anaheim in Orange County.
I-710 N. R. is located on Interstate 710 at Long Beach Bl. in Long Beach in Los Angeles County.
CA-60 N.R. is located on California Route 60 west of Vineyard Av. in Ontario in San Bernardino County.
I-10 N.R. is located on Interstate 10 at Etiwanda Av. in Ontario in San Bernardino County.

Sulfur Dioxide (SO_2)

Health Effects, SO_2

The adverse effects of SO_2 air pollution exposure on health were reviewed in the 2017 U.S. EPA *Integrated Science Assessment (ISA) for Sulfur Oxides - Health Criteria*.[34] This document presents a review of the available scientific studies and conclusions on the causal determination of the health effects of SO_2. A summary of health effects information and additional references can also be found in Appendix I: Health Effects.

The most recent ISA concludes that there is a causal relationship between short-term SO_2 exposure and respiratory effects, particularly in individuals with asthma. The clearest evidence for this conclusion comes from controlled human exposure studies showing lung function decrements and respiratory symptoms in individuals with asthma exposed to SO_2 (0.2 to 0.6 ppm) for 5−10 minutes. Increased resistance to air flow and reduction in breathing capacity leading to severe breathing difficulties, are observed after acute high exposure to SO_2 in asthmatics. This is supported by epidemiologic evidence reporting positive associations for asthma hospital admissions and emergency department visits with short-term SO_2 exposures,

[34] U.S. EPA. (2017). Integrated Science Assessment (ISA) for Sulfur Oxides - Health Criteria (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-17/451. https://www.epa.gov/isa/integrated-science-assessment-isa-sulfur-oxides-health-criteria.

specifically for children. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

Animal studies suggest that SO_2 at ambient concentrations can cause allergic sensitization and airway inflammation. 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.

For long-term SO_2 exposure and respiratory effects, the evidence is suggestive of, but not sufficient to infer, a causal relationship. There are a limited number of new epidemiologic studies showing associations between long-term SO_2 exposure and increases in asthma incidence among children and results of animal toxicological studies that provide a pathophysiologic basis for the development of asthma. However, uncertainty remains regarding the influence of other pollutants or mixtures of pollutants on the observed associations with SO_2 because these new epidemiologic studies have not examined the potential for co-pollutant confounding. Some epidemiologic evidence regarding respiratory symptoms and/or respiratory allergies among children also provides limited support for a possible relationship between long-term SO_2 exposure and the development of asthma.

Air Quality, SO_2

No exceedances of federal or State standards for sulfur dioxide occurred in 2020, or in any recent year, at any of the four South Coast AQMD ambient monitoring locations. The annual and 24-hour federal standards were last exceeded in the 1960's and the State standards were last exceeded in 1990. Though sulfur dioxide concentrations remain well below the standards, sulfur dioxide is a precursor to sulfate, which is a component of fine particulate matter. Table 2-22 summarizes the 2020 maximum 1-hour concentrations of SO_2 by air basin and county. Sulfur dioxide was not measured at any of the Orange County or Coachella Valley sites in 2020. Historical measurements and source emission profiles show that expected concentrations in the Orange County or Coachella Valley will be well below State and federal standards.

TABLE 2-22

2020 MAXIMUM 1-HOUR SO_2 CONCENTRATIONS AND 2018-2020 DESIGN VALUES BY BASIN AND COUNTY

Basin/County	2020 Maximum SO_2 1-Hour Average (ppb)	2018-2020 SO_2 1-Hour Design Value (ppb)	Percent of SO_2 1-Hour NAAQS (75 ppb)	Area of Design Value Max	Percent of SO_2 1-Hour State Standard (0.25 ppm = 250 ppb)
South Coast Air Basin					
Los Angeles	**6.0**	**4**	**5**	**Southwest Coastal LA County**	**2**
Orange	N.D.	N.D.	N.D.	North Coastal Orange County	N.D.
Riverside	2.2	2	3	Metropolitan Riverside County	1
San Bernardino	2.5	2	3	Central San Bernardino Valley	1
Salton Sea Air Basin					
Riverside	N.D.	N.D.	N.D.	Coachella Valley	N.D.

Bold text denotes the peak value.
N.D. = No Data. Historical measurements and lack of emissions sources indicate concentrations are well below standards.
The 1-hour SO_2 design value is the annual 99th percentile 1-hour daily maximum concentration, averaged over 3 years at a station.

Sulfates (SO_4^{2-})

Health Effects, SO_4^{2-}

In 2002, CARB reviewed and retained the State standard for sulfates, retaining the concentration level (25 µg/m^3) but changing the basis of the standard from a Total Suspended Particulate (TSP) measurement to a PM10 measurement. In their 2002 staff report,[35] CARB reviewed the health studies related to exposure to ambient sulfates, along with particulate matter, and found an association with mortality and the same range of morbidity effects as PM10 and PM2.5, although the associations were not as consistent as with PM10 and PM2.5. The 2019 U.S. EPA Integrated Science Assessment for Particulate Matter[36] and the

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[35] CARB. (2002). Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates. California Air Resources Board, Sacramento, CA. http://www.arb.ca.gov/regact/aaqspm/isor.pdf.

[36] U.S. EPA. (2019). Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188. https://www.epa.gov/isa/integrated-science-assessment-isa-particulate-matter.

Supplement to the 2019 Integrated Science Assessment for Particulate Matter[37] also review sulfate studies.

Most of the health effects associated with fine particles and SO_2 at ambient levels are also associated with sulfates. These include reduced lung function, aggravated asthmatic symptoms, and increased risk of emergency department visits, hospitalizations, and death in people who have chronic heart or lung diseases. Groups having higher risk of experiencing adverse health effects with sulfates exposure include children, asthmatics, and older adults who have chronic heart or lung diseases. Both mortality and morbidity effects have been observed with an increase in ambient sulfate concentrations. However, efforts to separate the effects of sulfates from the effects of other pollutants have generally not been successful.

Air Quality, SO_4^{2-}

Sulfates, as measured from FRM PM10 filters, were sampled at 7 stations in 2020 in the South Coast AQMD jurisdiction, including one location in the Coachella Valley. Since the sulfate measurement is analyzed in the laboratory from the collected 24-hour PM10 filters, the sulfate network is only conducted at locations in the FRM PM10 monitoring network. The measurements are done every sixth day, except that two stations in Metropolitan Riverside County (Rubidoux and Mira Loma) and one in the Coachella Valley (Indio) measure every third day.

In 2020, the State 24-hour PM10-sulfate standard (25 µg/m^3) was not exceeded anywhere in the Basin or the Coachella Valley, nor has it been exceeded since 1990. The peak Basin sulfate concentration of 5.2 µg/m^3 (21 percent of the State standard) was measured in Metropolitan Riverside. There is no corresponding federal standard for sulfates. Maximum 24-hour concentrations and 3-year maximum State designation values by air basin and county are summarized in Table 2-23.

[37] U.S. EPA. (2021). Supplement to Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-21/198. https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=352823.

TABLE 2-23

2020 MAXIMUM 24-HOUR AVERAGE SULFATE (SO_4^{2-} FROM PM10) CONCENTRATIONS BY BASIN AND COUNTY

Basin/County	2020 Maximum SO_4^{2-} 24-Hour Average (µg/m³)	2018-2020 SO_4^{2-} 24-Hour State Designation Value (µg/m³)	2020 Percent of SO_4^{2-} State Standard (25 µg/m³)	Area of Max
South Coast Air Basin				
Los Angeles	**3.3**	**6.9**	**28**	**Metropolitan Los Angeles County**
Orange	3.3	4.2	17	Central Orange County
Riverside	5.2	4.2	17	Metropolitan Riverside County
San Bernardino	3.0	4.6	18	Central San Bernardino Valley
Salton Sea Air Basin				
Riverside	2.7	2.6	10	Coachella Valley (Indio)

Bold text denotes the peak value.

Lead (Pb)

Health Effects, Lead

The adverse effects of ambient lead exposures on health were reviewed in the 2013 U.S. EPA document, *Integrated Science Assessment for Lead: Final Report*.[38] This document presents a review of the available scientific studies and conclusions on the causal determination of the health effects of lead. A summary of health effects information and additional references can also be found in Appendix I: Health Effects.

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Long-term 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 quotients. In adults, increased lead levels are associated with increased blood pressure and risk of coronary heart disease. Lead is linked to important hematological effects, such as impaired red blood cell function. Disorders of various body systems and the role of inflammation due to lead exposure has been shown in various recent studies. These studies indicate that lead exposure may cause respiratory, neurologic, digestive, cardiovascular and urinary diseases. The increased inflammatory cells and mediators due to lead exposure including cytokines and chemokines due to lead exposure may cause

[38] U.S. EPA. (2013). Integrated Science Assessment for Lead (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-10/075F. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=255721#Download.

these various organ disorders. Additionally, several recent studies also indicate negative effects on the male reproductive system from lead exposure.

Lead poisoning can cause anemia, lethargy, seizures, and death. Lead can be stored in the bone from early-age environmental exposure, and elevated blood lead levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

Air Quality, Lead

Lead (Pb), as analyzed from Total Suspended Particulate (TSP) samples, was measured at eight ambient locations and an additional four source-specific stations in the Basin in 2020. Based on the review of the NAAQS for lead, the U.S. EPA established the current standard of 0.15 $\mu g/m^3$ for a rolling 3-month average, effective October 15, 2008. There have been no violations of the lead standards at the South Coast AQMD's regular population-based ambient air monitoring stations since 1982, primarily as a result of removal of lead from gasoline. However, monitoring at two stations immediately adjacent to stationary sources of lead recorded exceedances of the current standard in Los Angeles County over the 2007-2009 time period. These data were used for designations under the revised standard that also included new requirements for near-source monitoring. As a result, a nonattainment designation was finalized for much of the Los Angeles County portion of the Basin when the current standard was implemented.

Table 2-24 summarizes the Basin's maximum 3-month rolling average lead concentrations recorded in 2020 and in the 2018-2020 design value period, by county. The current lead concentrations in Los Angeles county are now well below the NAAQS, including the monitoring at the source-oriented locations, the highest of which is now 40 percent of the NAAQS for the maximum 3-month rolling average occurring near the beginning of the 3-year design value period. More recent lead data from the source-specific locations have been even lower due, in part, to the implementation of stricter South Coast AQMD rules for these sources. The peak 3-month average in 2020 (0.02 $\mu g/m^3$) was only 13 percent of the NAAQS. The other three counties in the Basin have also remained well below the NAAQS. The less-stringent State 30-day standards for lead were not exceeded in any area of the South Coast AQMD in 2020, or in recent years.

The current design values are all less than the NAAQS. However, filter-based measurements for lead from March 28, 2020 to June 26, 2020 are not available due to the COVID-19 Pandemic thus, the values for 2020 are considered invalid since they fail the completeness requirement. It will not be possible to request redesignation as attainment until there are three complete years of data. The earliest this can happen is after 2023. The South Coast AQMD plans to petition the U.S. EPA for redesignation as attainment for lead after data completeness requirements are met.

TABLE 2-24

2020 MAXIMUM 3-MONTH ROLLING AVERAGE LEAD (PB) CONCENTRATIONS AND 2018-2020 DESIGN VALUES BY BASIN AND COUNTY *

Basin/ County	2020 Max Pb 3-Month Rolling Average (µg/m³)	2018-2020 Max Pb 3-Month Rolling Average Design Value (µg/m³)	Percent of Current Pb NAAQS (0.15 µg/m³)	Area of Design Value Max	2020 Max Pb 30-Day Average (µg/m³)	Percent of State Pb Standard (1.5 µg/m³)
South Coast Air Basin						
Los Angeles**	**0.02**	**0.06**	**40**	**Metropolitan Los Angeles**	**0.025**	**4**
Orange	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Riverside	0.01	0.010	7	Metropolitan Riverside County	0.016	1
San Bernardino	0.01	0.01	7	Central San Bernardino Valley	0.010	1
Salton Sea Air Basin						
Riverside	N.D.	N.D.	N.D.	Coachella Valley	N.D.	N.D.

Bold text denotes the peak value.
N.D. = No Data. Historical measurements and emissions profiles indicate concentrations would be well below standards.

* Filter-based measurements for lead from March 28, 2020 to June 26, 2020 have limited availability due to the COVID-19 Pandemic. As a result, none of the values presented here meet the U.S. EPA completeness criteria except for the near-source ATSF station.

** The maximum 3-month average design value was measured at a near-source station in Los Angeles County (Uddelholm).

Air Quality Compared to Other U.S. Metropolitan Areas

Despite significant improvements, the Basin continues to experience some of the worst air quality in the nation. In 2020, nine of the country's top ten locations most frequently exceeding the 2015 8-hour ozone NAAQS were located within the Basin, including stations in San Bernardino, Riverside and Los Angeles Counties.[39] The location with the highest number of days over the 2015 8-hour ozone NAAQS was in the Basin's Eastern San Bernardino Valley (141 days at the Redlands station). The Basin exceeded the 2008 8-hour ozone NAAQS on 142 days, more days than any other areas in the country. The Basin exceeded the 2015 ozone NAAQS on 157 days. The Basin also recorded the highest 8-hour average ozone concentrations of any area in the nation, with stations in the Basin making up all of the country's top ten locations with the highest fourth maximum 8-hour average ozone concentrations (0.105-0.125 ppm). The single highest maximum 8-hour average ozone concentration recorded in 2020 was also measured at a Basin station (0.139 ppm in the Central San Bernardino Mountains area, almost 200 percent of the 2015 ozone NAAQS).

Figures 2-11 and 2-12 show the number of days exceeding federal standards by Air Quality Index (AQI) category for ozone, PM2.5, and PM10 in the Basin compared to other major metropolitan areas in the U.S. and California air basins, respectively. These totals include days influenced by exceptional events, such as wildfires and high wind dust events, which may be excluded with the U.S. EPA concurrence when calculating regulatory design values. All areas recorded at least one exceedance of the 2015 8-hour ozone NAAQS, with the Basin, San Joaquin Valley, and South Central Coast all recording at least one Very Unhealthy AQI (8-hour average concentration ≥ 0.106 ppm) day. Similarly, all areas recorded at least one exceedance of the 24-hour PM2.5 standard, with much higher exceedance totals in California air basins and Phoenix metro area compared to other areas. Some of the days with the highest recorded PM2.5 concentrations in these areas were influenced by the particularly severe wildfire season throughout the western U.S. in 2020. In California, the 2020 wildfire season was the largest in modern history to date, with a total burn area of more than 4 million acres, or 4 percent of California's total land area. The 24-hour PM10 standard was exceeded in the Basin, Phoenix, and Chicago, as well as in all California air basins shown. As for PM2.5, wildfire smoke likely contributed to PM10 exceedances throughout California. High wind dust events may have also impacted PM10 levels, particularly in the Phoenix metro area.

Exceedances of CO, NO2, and SO2 federal standards are generally rare in California and other major metropolitan areas in the U.S. Of the areas shown in Figures 2-11 and 2-12, the only exceedance of the 1-hour NO2 NAAQS in 2020 was recorded in the Basin at the Ontario near-road station, and the only exceedances of the 1-hour SO2 standard were recorded in Chicago (five exceedances) and San Francisco Bay Area (one). Federal CO standards were not exceeded at any station in the U.S. in 2020. Nationwide,

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[39] The top ten stations in the nation for number of exceedances of the 2015 8-hour ozone NAAQS in 2020 include Basin stations in the areas of East San Bernardino Valley (Redlands), Central San Bernardino Mountains (in the Crestline-Lake Gregory community), Central San Bernardino Valley (San Bernardino and Fontana), Northwest San Bernardino Valley (Upland), Pomona/Walnut Valley (Pomona), East San Gabriel Valley (Glendora) and Metropolitan Riverside County (Riverside-Rubidoux and Mira Loma), as well as one station in the San Joaquin Valley Air Basin (Sequoia and Kings Canyon National Park).

the federal lead standard (not shown) was exceeded at two locations in 2020 at source-oriented monitoring stations in Missouri.

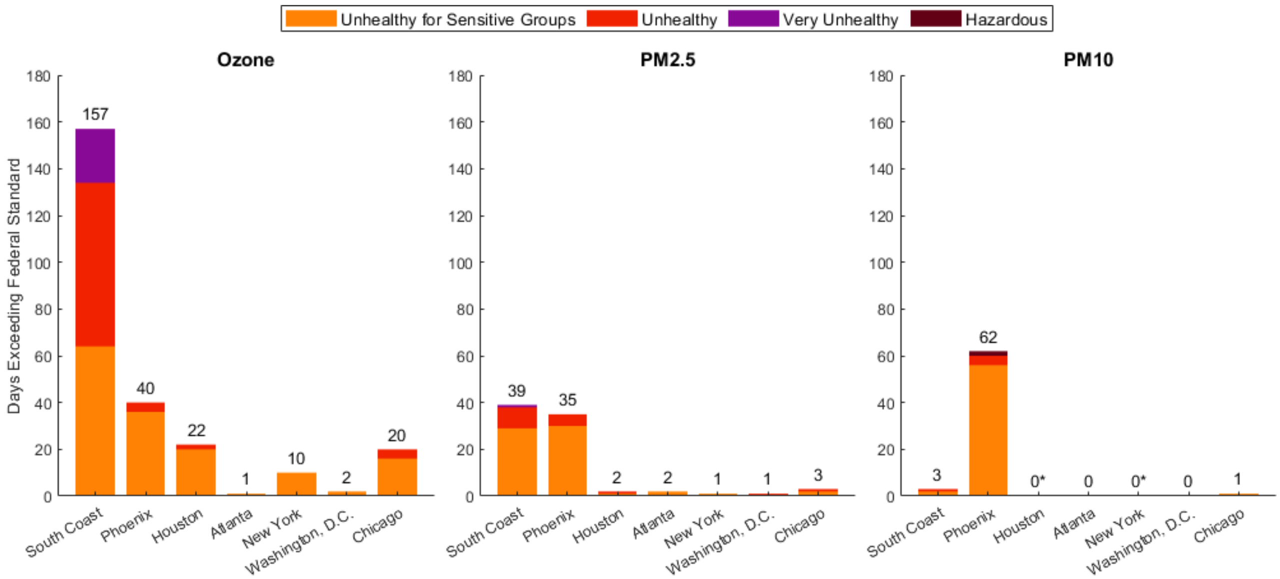

FIGURE 2-11

2020 SOUTH COAST AIR BASIN AIR QUALITY COMPARED TO OTHER U.S. METRO AREAS

(DAYS EXCEEDING FEDERAL STANDARD BY MAXIMUM POLLUTANT-BASED AQI RECORDED IN AREA. AIR QUALITY DATA FOR METRO AREAS WAS COLLECTED FROM ALL STATIONS WITHIN CORE-BASED STATISTICAL AREAS AS DEFINED BY THE U.S. CENSUS BUREAU. ASTERISKS INDICATE AREAS WHERE DAILY MEASUREMENTS ARE NOT AVAILABLE AND ANNUAL EXCEEDANCES HAVE BEEN ESTIMATED FROM 1-IN-3 DAY OR LESS FREQUENT SAMPLING.)

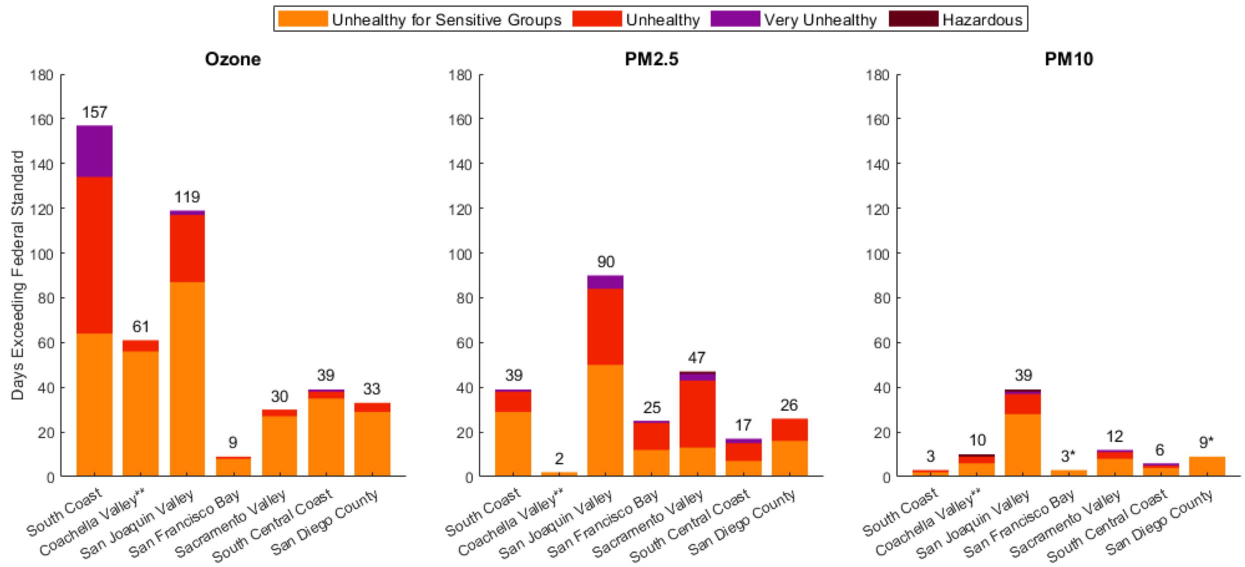

FIGURE 2-12

2020 SOUTH COAST AIR BASIN AIR QUALITY COMPARED TO OTHER CALIFORNIA AIR BASINS

*(DAYS EXCEEDING FEDERAL STANDARD BY MAXIMUM AQI RECORDED IN AREA. ASTERISKS INDICATE AREAS WHERE DAILY MEASUREMENTS ARE NOT AVAILABLE AND ANNUAL EXCEEDANCES HAVE BEEN ESTIMATED FROM 1-IN-3 DAY OR LESS FREQUENT SAMPLING. **COACHELLA VALLEY IS DEFINED AS THE RIVERSIDE COUNTY PORTION OF THE SALTON SEA AIR BASIN.)*

As noted previously, federal standard exceedances do not necessarily indicate NAAQS violations and subsequent attainment/nonattainment designation changes, which is determined by the design value form of the NAAQS. Figures 2-13 and 2-14 show the 2018-2020 3-year design values for the Basin compared to other urban areas in the U.S. and California, respectively. These design values reflect monitoring data as of May 2021, but values may be updated as the U.S. EPA concurs on exceptional event demonstrations submitted by local air agencies.

For the 2018-2020 period, 8-hour ozone design values in most urban areas and California air basins exceeded the 2015 8-hour federal standard. Design values in the San Francisco Bay Area basin and Atlanta were at or just below the standard, with values of 0.069 and 0.07 ppm, respectively. For the revoked 1979 1-hour ozone NAAQS, only the Basin had a design value over the federal standard for the 2018-2020 period. The design values for annual averaged PM2.5 were over the 2012 annual PM2.5 NAAQS for the Basin, Phoenix metro area, San Joaquin Valley, and Sacramento Valley. The 24-hour PM2.5 design values exceeded the 24-hour NAAQS in the Basin, San Joaquin Valley, San Francisco Bay Area, and Sacramento Valley. However, after removing PM2.5 exceedances caused by the Bobcat and El Dorado Fires in September 2020, the Basin meets the 24-hour federal standard. PM2.5 design values in other California air basins affected by wildfires may also decrease after the exceptional event process is completed. PM10 design values exceeded the 24-hour federal standard in the Basin and all other California air basins shown in Figure 2-14, as well as in the Phoenix metro area. These values will likely decrease as the exceptional event process is completed. Design values for NO_2, SO_2, and CO (not shown) did not violate the NAAQS in any of the urban areas or air basins shown for the 2018-2020 period.

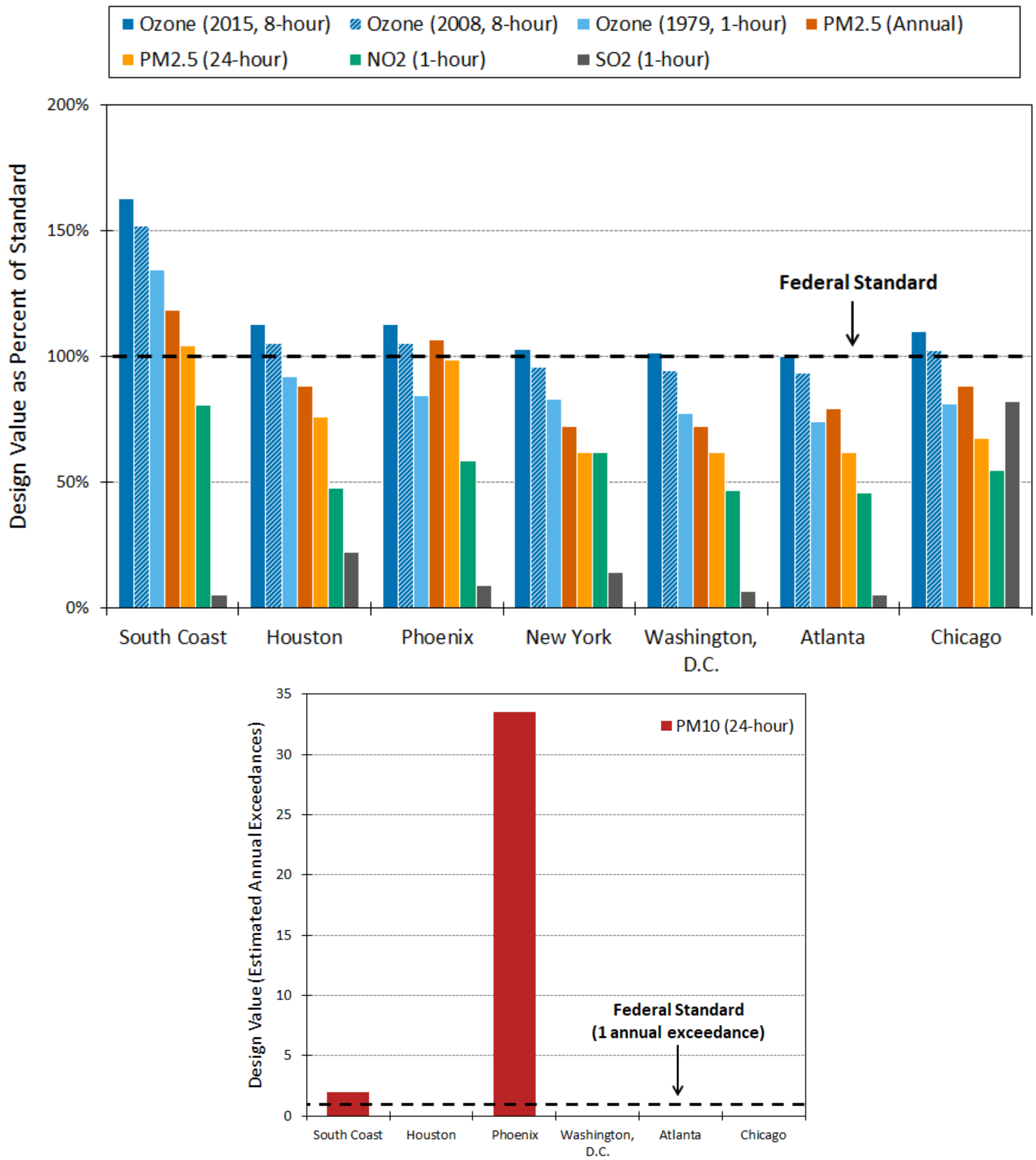

FIGURE 2-13

2018-2020 SOUTH COAST AIR BASIN DESIGN VALUES COMPARED TO OTHER U.S. METRO AREAS

(TOP PANEL SHOWS MAXIMUM 3-YEAR DESIGN VALUE CONCENTRATIONS AS PERCENTAGES OF THE CORRESPONDING NAAQS; BOTTOM PANEL SHOWS MAXIMUM 3-YEAR DESIGN VALUES FOR PM10, WHICH ARE BASED ON THE NUMBER OF AVERAGE ANNUAL EXCEEDANCES. NEW YORK IS NOT INCLUDED IN THE BOTTOM PANEL SINCE THERE ARE NO STATIONS WITH AVAILABLE PM10 DESIGN VALUES. FOR ALL POLLUTANTS, ONLY EXCEPTIONAL EVENTS THAT HAVE BEEN CONCURRED BY THE U.S. EPA HAVE BEEN REMOVED. DESIGN VALUES FOR METRO AREAS ARE BASED ON ALL STATIONS WITHIN CORE-BASED STATISTICAL AREAS AS DEFINED BY THE U.S. CENSUS BUREAU.)

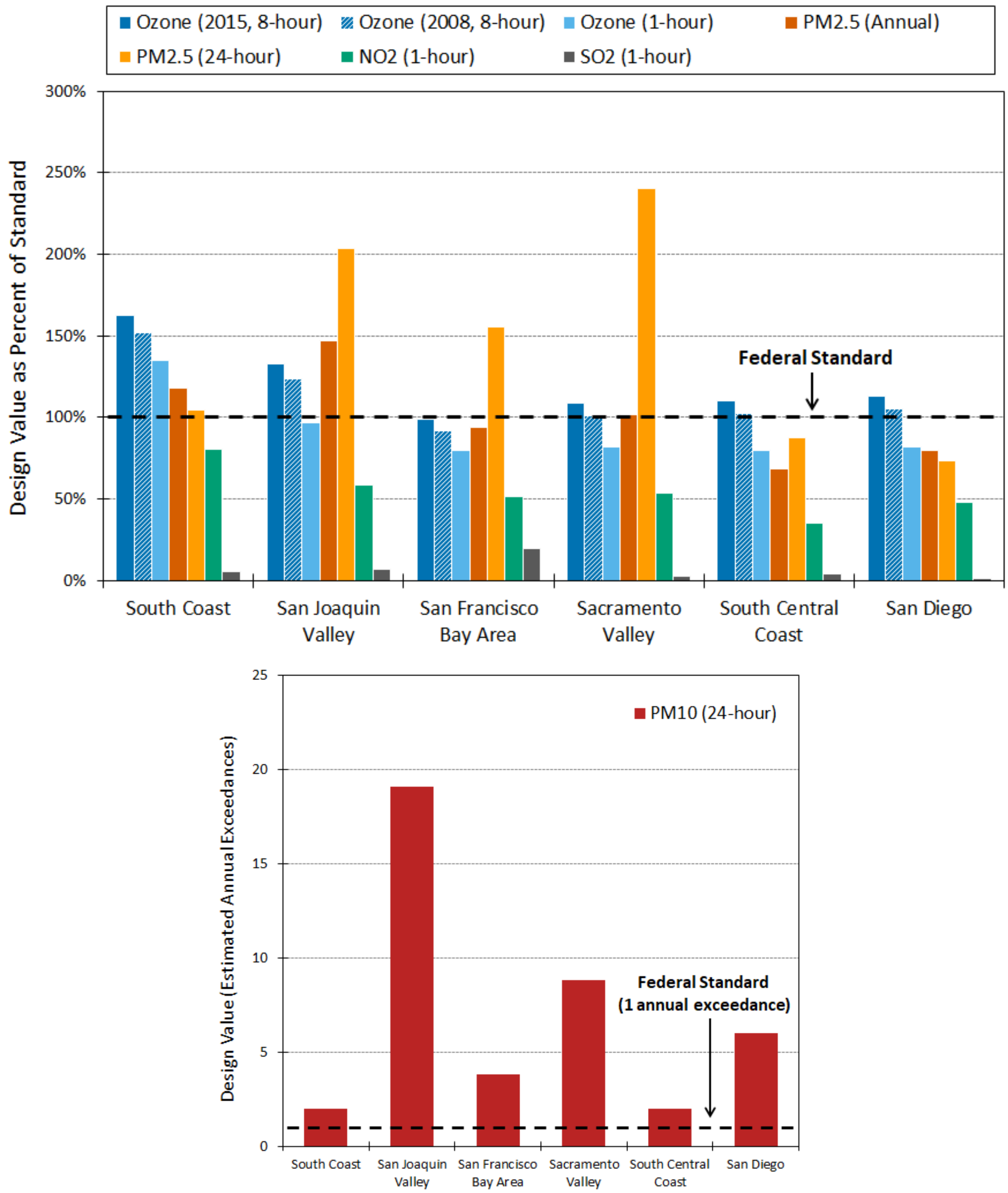

FIGURE 2-14

2018-2020 SOUTH COAST AIR BASIN DESIGN VALUES COMPARED TO OTHER CALIFORNIA AIR BASINS

(TOP PANEL SHOWS MAXIMUM 3-YEAR DESIGN VALUE CONCENTRATIONS AS PERCENTAGES OF THE CORRESPONDING NAAQS; BOTTOM PANEL SHOWS MAXIMUM 3-YEAR DESIGN VALUES FOR PM10, WHICH ARE BASED ON THE NUMBER OF AVERAGE ANNUAL EXCEEDANCES. FOR ALL POLLUTANTS, ONLY EXCEPTIONAL EVENTS THAT HAVE BEEN CONCURRED BY THE U.S. EPA HAVE BEEN REMOVED.)

Atypical Ozone in 2020: The COVID-19 Pandemic, Extreme Heat, and Wildfires

Ozone levels recorded in 2020 were higher than levels in the recent past. 2020 was unique on several fronts. The COVID-19 Pandemic influenced emissions, especially during the initial months of the "safer at home" orders. Record heat gripped the region throughout the ozone season and a record-setting wildfire season throughout the State led to increased emissions of ozone precursors.

The COVID-19 Pandemic Response

The COVID-19 Pandemic started to influence economic activity in March of 2020 in the South Coast AQMD region. During the initial months of "safer at home" orders, light duty vehicle traffic and aircraft activity were significantly curtailed. Activity at the ports of Los Angeles and Long Beach and heavy-duty vehicle traffic declined to a lesser extent. See Figure 2-15.

FIGURE 2-15

CHANGES IN MAJOR EMISSIONS INDICATORS IN 2020.

(The left-most box represents the approximate change in TEUs (Twenty foot equivalent units) comparing April—June 2020 to April—June 2019. The center box represents the approximate change in aircraft operations at LAX, LGB, SNA, BUR, PSP, ONT from April—June 2020 to April—June 2019 from FAA Operations Network (OPSNET). The right box represents the approximate maximum reduction in car and truck flow from pre-COVID orders (Feb 1 - Mar 7) to post-COVID orders (Apr 9 to Aug 6) calculated from CalTrans PeMS data.)

The initial stage of the pandemic from early March to mid-April coincided with a period of frequent rainstorms and strong Basin ventilation that both washed out and dispersed air pollution (Figure 2-16). However, elevated ozone concentrations began during the last week of April when a heatwave affected the region. Periods of high ozone were recorded frequently throughout the late Spring, Summer, and early Fall. While NOx concentrations were likely depressed as compared to previous years due to the pandemic response, it is unclear whether additional VOC emissions from increased use of cleaning or disinfecting supplies contributed to the elevated ozone levels. The South Coast AQMD's in-house chemical transport modeling analysis[40] indicates that changes in emissions from the COVID-19 mitigation measures likely lead to a 0-3 ppb 8-hour daily maximum ozone enhancement in metropolitan Los Angeles County and a 0-3 ppb ozone reduction in surrounding areas. A study recently conducted at CARB and described in a preprint publication[41] indicates that COVID-19 emission changes resulted in 8-hour daily maximum ozone increases up to 1.2 ppb from March to mid-April and up to a 2 ppb decrease from late-April to early July. Both of these analyses removed the influence of atypical meteorology in 2020, which is detailed below.

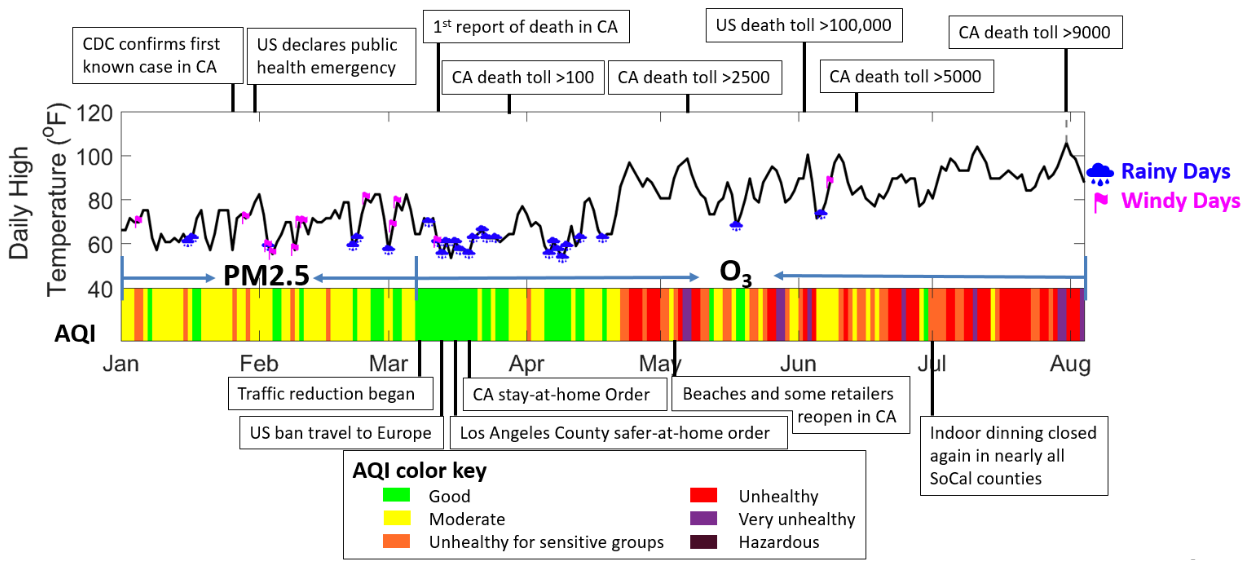

FIGURE 2-16

CHANGES IN AIR QUALITY, METEOROLOGY, AND IMPORTANT EVENTS DURING THE INITIAL PHASES OF THE COVID-19 PANDEMIC IN 2020

(*Temperature, wind speed, and rainfall are measured at Ontario International Airport. Days with more than 0.01" of precipitation are flagged as rainy days. Days with a highest hourly wind speed of greater than 20 mph are flagged as windy days.*)

Atypical Meteorology in 2020

The 2020 ozone season was atypically hot and stagnant. The summer of 2020 was the third hottest summer on record in the Basin and the hottest summer statewide. Several monthly average temperatures were much above normal or even set temperature records throughout the region (Figure 2-17).

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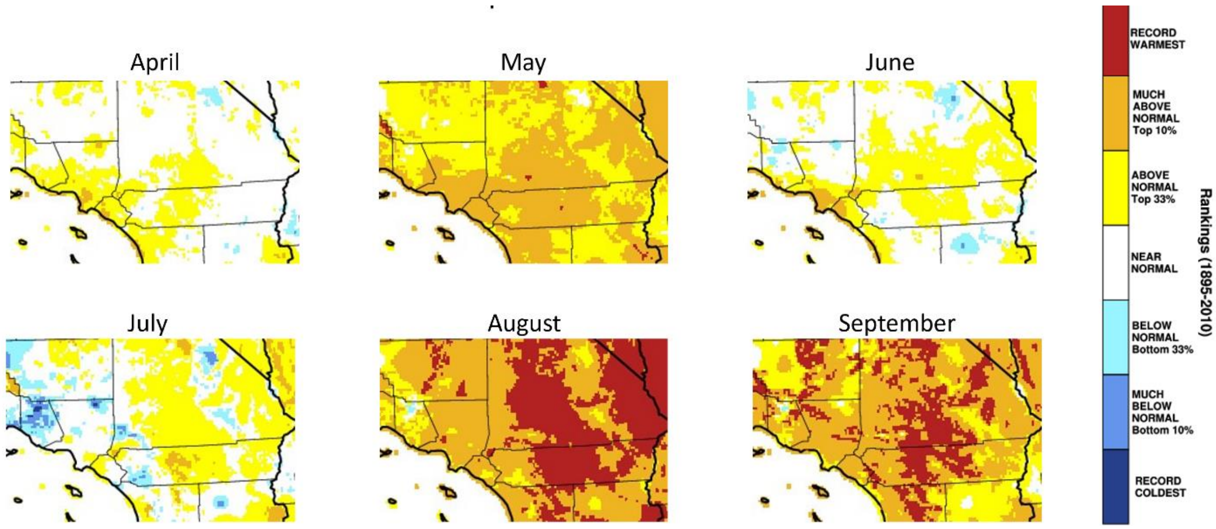
[40] See http://www.aqmd.gov/home/news-events/meeting-agendas-minutes/agenda?title=stmpr-meeting-agenda-january-21-2021 and http://www.aqmd.gov/home/news-events/webcast/live-webcast?ms=CzOlqqL5bKA.

[41] Schroeder, J., Cai, C., Xu, J., Ridley, D., Lu, J., Bui, N., Yan, F., and Avise, J.: Changing Ozone Sensitivity in the South Coast Air Basin during the COVID-19 Period, Atmos. Chem. Phys. Discuss. [preprint], https://doi.org/10.5194/acp-2022-178, in review, 2022.



FIGURE~~igure~~ 2-17

MEAN TEMPERATURE PERCENTILE IN SOUTHERN CALIFORNIA

(*DATA OBTAINED FROM WESTWIDE DROUGHT TRACKER, U IDAHO/WRCC DATA SOURCE: PRISM (PRELIM), CREATED 11 OCT 2020*.)

The highest ozone days in 2020 were also hotter and more stagnant than the highest ozone days in the previous five years. See Figure 2-18.

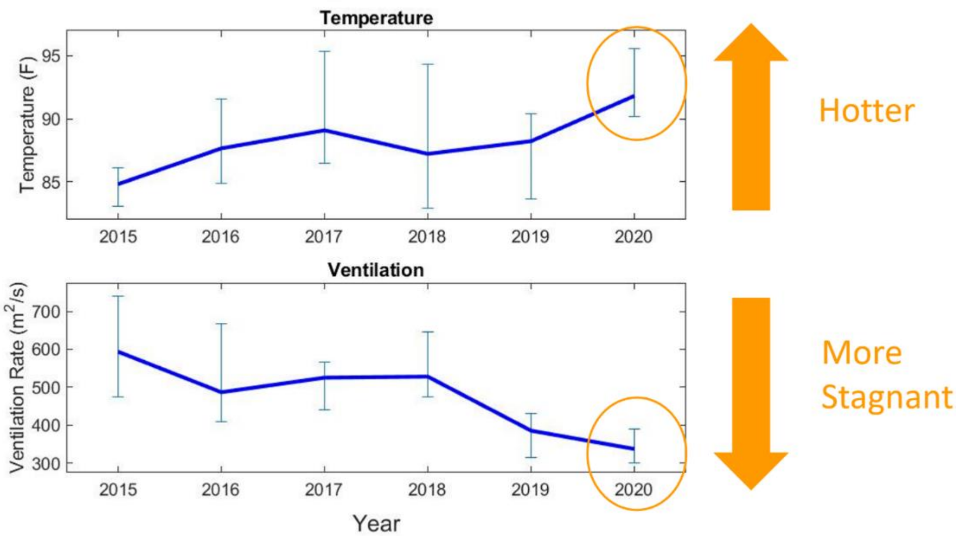


FIGURE 2-18

TEMPERATURE AND BASIN VENTILATION ON THE HIGHEST OZONE DAYS EACH YEAR IN LOS ANGELES[42]

2020 Wildfire Season

Wildfires are a significant source of both fine particulate matter and VOCs. Additional VOC emissions from wildfire activity may lead to increases in ozone throughout the Basin. The 2020 fire season was extremely active, with a record amount of acreage burned. Over 4 million acres burned in 2020, more than double the previous modern record set in 2018 (see Figure 2-19). Both fires within the South Coast Air Basin such as the Bobcat, El Dorado, Silverado, Blue Ridge, Ranch2, Apple and Snow fires and fires in Northern and Central California affected air quality in 2020.

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[42] Temperature (F) and ventilation rate (m^2/s) data were extracted from North American Mesoscale Forecast System (NAM) model weather data (which has a resolution of 12 km; https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00630), at the grid cell containing the Central Los Angeles station. The median ventilation and temperature were calculated for the top 19 days with the highest ozone at Central Los Angeles for each year from 2015 through 2020. There were 19 exceedances of the 2015 8-hour ozone standard in 2020 at the Central Los Angeles station. Error bars represent the 95 percent Confidence Interval.

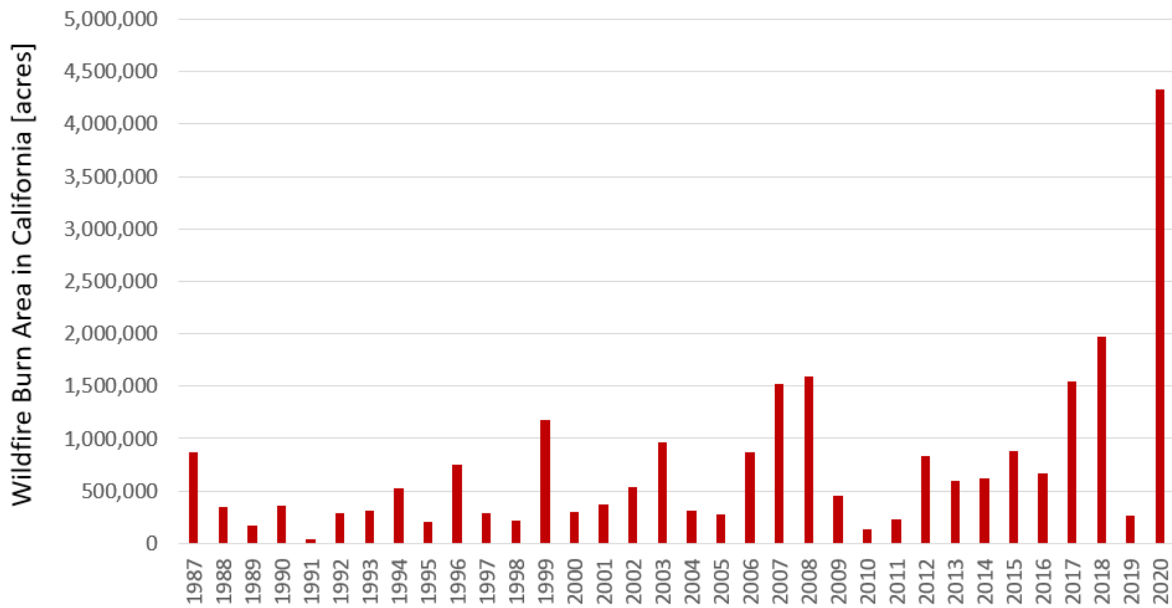

FIGURE 2-19
WILDFIRE BURN AREA IN CALIFORNIA SINCE 1987. SOURCE CALFIRE.

Summary

In the year 2020, the Basin exceeded the most recent federal standards on 49 percent of the days, mainly due to exceedances of ozone and to a lesser extent, PM2.5. The maximum measured concentrations for these pollutants in 2020 were among the highest in the country. In 2020, the Basin exceeded the level of the 2015 8-hour ozone NAAQS on 157 days, with exceedances in all four counties. It exceeded the 2008 and 1997 8-hour ozone NAAQS on 142 and 97 days, respectively. Nine of the top 10 stations in the nation most frequently exceeding the 8-hour federal ozone NAAQS in 2020 were located within the Basin, including stations in San Bernardino and Riverside Counties. While ozone trends had shown continual improvement historically, trends over the past decade have been mostly flat.

The Basin exceeded the PM2.5 24-hour standard on 39 days in 2020, including the near-road measurements (32 days for ambient stations only). Significant improvement has been seen over the past two decades for both 24-hour and annual PM2.5 concentrations. If the U.S. EPA concurs on certain exceptional events, the Basin could be in attainment for the 24-hour standard based on 2018-2020 data. However, the design value for the annual PM2.5 concentration is 108 percent of the standard.

The Coachella Valley area in the Riverside County portion of the Salton Sea Air Basin violated federal and State standards for ozone and PM10. However, the majority of high PM10 concentrations exceeding the federal 24-hour PM10 standard occurred on days influenced by high-wind natural events, which the South Coast AQMD has flagged in the U.S. EPA AQS database. For the stations in the Coachella Valley, the federal 3-year design values for 8-hour ozone have continued to exhibit downward trends through 2020.

The NO_2 concentrations in Los Angeles County exceeded the short-term (1-hour) federal standard on one day at one location in 2020 but did not exceed the standards anywhere on any other day in the Basin. The 98^{th} percentile form of the federal NO_2 standard was not violated and the Basin's attainment status remains intact. The Los Angeles County lead nonattainment area portion of the Basin no longer exceeds the 3-month rolling average lead NAAQS as of the 2018-2020 design value period, including the source-specific monitors. Unfortunately, due to pandemic related monitor shutdowns, the lead data fails the U.S. EPA completeness requirements. A request to the U.S. EPA for re-designation to attainment will be prepared when monitoring requirements are satisfied. Maximum concentrations for SO_2, CO, and sulfate (measured from PM10) continued to remain below the State and federal standards.

Chapter 3

Base Year and Future Emissions

- **With currently adopted regulations in place, NOx and VOC emissions are projected to decline ~~36.5~~ 47 percent and 17~~6.5~~ percent respectively from 2018 to 2037 in the South Coast Air Basin.**
- **In 2037, mobile sources will contribute ~~82~~ 78 percent of overall Basin NOx emissions.**
- **Top sources of NOx remain heavy-duty trucks, off-road equipment, and ships.**
- **NOx sources under federal control (e.g., ships, locomotives, aircraft, etc.) contribute ~~42~~ 46 percent of total NOx emissions in the Basin in 2037, compared to ~~25~~ 28 percent in 2018, indicating growing disparity between regulations on federal sources and sources under State and local control.**
- **Area Sources continue to be the major contributor to VOC emissions while contribution of on-road mobile sources decreases. VOC emissions from consumer products regulated by CARB, are projected to increase due to population growth in the region.**

In This Chapter

Introduction

The South Coast Air Basin (Basin) is classified as an "extreme" nonattainment area for the 2015 8-hour ozone standard and needs to attain the standard no later than 2037. This chapter summarizes criteria pollutant emissions that occurred in the Basin during the 2018 base year as well as projected emissions for the 2037 attainment year. A more detailed description of emissions and methodologies is presented in Appendix III.

The 2018 base year emissions inventory reflects actual and estimated emissions subject to regulations adopted as of 2018. The future baseline emissions inventory is based on economic projections and implementation of adopted regulations with both current and future compliance dates. A list of the South Coast Air Quality Management District (South Coast AQMD) and California Air Resources Board (CARB) rules and regulations that are part of the base year and future year baseline emissions inventories is presented in Appendix III. The South Coast AQMD continues to implement rules that are incorporated into the Draft Final 2022 Air Quality Management Plan (AQMP) future baseline emissions inventories.

The emissions inventory is divided into two major source classifications: stationary and mobile sources. Stationary sources include point sources and area sources. The 2018 base year point source emissions are based principally on reported data from facilities using the South Coast AQMD's Annual Emissions Reporting (AER) Program. Area source emissions are estimated jointly by CARB and the South Coast AQMD using established inventory methods. Mobile sources include on-road emissions and off-road emissions. On-road emissions are calculated using CARB's EMFAC 2017 model and travel activity data provided by the Southern California Association of Governments (SCAG) from their adopted 2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). CARB provides emissions inventories for off-road sources, which include construction and mining equipment, industrial and commercial equipment, lawn and garden equipment, agricultural equipment, ocean-going vessels, commercial harbor craft, locomotives, cargo handling equipment, pleasure craft, recreational vehicles, and fuel storage and handling. Aircraft emissions are based on an updated analysis by the South Coast AQMD developed in conjunction with commercial airports in the region. Future emissions forecasts are primarily based on demographic and economic growth projections provided by SCAG as well as the energy consumption projections by Southern California Gas Company (SoCalGas). In addition, emission reductions resulting from the South Coast AQMD's regulations amended or adopted by October 2020 and Rule 1109.1 and CARB regulations adopted by December ~~2020~~2021 are included in the future baseline projections. The South Coast AQMD's Rule 1109.1, Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations, ~~as~~was adopted in November 2021~~, considering~~. Considering the significant emission reductions from the implementation of the rule, its rule impact is reflected in the baseline emissions inventory.

This chapter summarizes the major components of developing base year and future baseline inventories. More detailed information, such as emission reductions resulting from adopted the South Coast AQMD and CARB rules and regulations since the 2016 AQMP, growth factors, and demographic trends, are presented in Appendix III. In addition, the top source categories contributing to the 2037 emissions inventories are described in this chapter. Understanding the highest emitting source categories allows for identification of potentially more effective control strategies for improving air quality in the basin.

Emission Inventories

Two inventories are prepared for the 2022 AQMP for the purpose of regulatory and State Implementation Plan (SIP) performance tracking, including transportation conformity[1]: an annual average inventory and a summer planning inventory. The summer planning inventory is used to capture emission levels during the high ozone season (May to October) when higher evaporative Volatile Organic Compounds (VOCs) emissions and more sunlight favor ozone formation. Baseline emissions data presented in this chapter are based on seasonally adjusted summer planning inventory emissions. Summer planning inventories are used to develop an attainment strategy, estimate the cost-effectiveness of ozone control measures, and to report emission reduction progress as required by the federal and California Clean Air Acts. Annual average day emission inventories for baseline and future milestone years are also presented in Appendix III.

Detailed information regarding the emissions inventory development for base and future years and emissions by major source category in the base year and future baseline emission inventories are presented in Appendix III. In an emissions inventory, base year is the year from which the future emissions are projected. Attachments A and B to Appendix III list annual average and summer planning emissions by major source category for 2018, 2023, 2024, 2025, 2031, 2032, 2035 and 2037. Attachment C to Appendix III lists the top VOC and NOx point source facilities that emitted greater than or equal to 10 tons per year in 2018. Attachment D to Appendix III contains on-road emissions by vehicle class and pollutant. Attachment E to Appendix III shows emissions associated with diesel fuel internal combustion engines for various source categories. Attachment F to Appendix III provides a summary of road construction dust emissions in the South Coast Air Basin.

Stationary Sources

Stationary sources are divided into two major subcategories: point sources and area sources. Point sources are permitted facilities with one or more emission sources at an identified location (e.g., power plants, refineries, and industrial processes factories). These facilities generally have annual emissions of 4 tons or more of either volatile organic compounds (VOCs), nitrogen oxides (NOx), sulfur oxides (SOx), or total particulate matter (PM), or annual emissions of over 100 tons of carbon monoxide (CO). Facilities are required to report their ~~criteria pollutant~~ emissions ~~pursuant to Rule 301~~of criteria pollutants and selected air toxics pursuant to Rule 301 to the South Coast AQMD on an annual basis, subject to audit, if any of these thresholds are exceeded. The 2018 annual reported emissions are used to update the stationary source inventory.

Area sources consist of many small emission sources (e.g., residential water heaters, architectural coatings, consumer products, and permitted sources that are smaller than the above thresholds) which are distributed across the basin and are not required to individually report their emissions. CARB and the South Coast AQMD jointly develop emission estimates for approximately 400 area source categories. Emissions from these sources are estimated using latest activity information and representative emission

[1] Transportation conformity is required under CAA Section 176(c) to ensure that federally supported highway and transit project activities "conform" to the purpose of the SIP. More details are provided in Chapter 4.

factors if available. Activity data are usually obtained from survey data or scientific reports, e.g., U.S. Energy Information Administration (EIA) reports for fuel consumption other than natural gas fuel, natural gas consumption data from Southern California Gas Company (SoCalGas), and solvent, sealant and architectural coatings sales reports required under the South Coast AQMD rules (Rules 314, 1113 and 1168). Some activity data, such as population, housing, and VMT, as well as a large portion for area sources are from SCAG. Emission factors are based on rule compliance factors, source tests, manufacturer's product or technical specification data, default factors (mostly from AP-42, the U.S. EPA's published emission factor compilation), or weighted emission factors derived from point source facilities' annual emissions reports. Additionally, emissions over a given area may be calculated using socioeconomic data, such as population, number of households, or employment in different industry sectors.

Appendix III provides further details on emissions from specific source categories such as architectural coatings, dairy cattle, oil and gas production operations, gasoline dispensing facilities, green waste composting, and livestock. Since the 2016 AQMP was finalized, new area source inventory updates include:

- Consumer products

Consumer product emissions were updated by CARB using data from the latest survey conducted in 2015. Consumer products survey categories were grouped into seven different series. The "Personal Care Products" series followed by the "Household and Institutional Products" series showed the highest VOC emissions and ozone forming potentials. Baseline VOC emissions in 2018 increased by around 20 tons per day compared with projected 2018 emissions in the 2016 AQMP.

- Fugitive emissions from tanker ships

A new emission category was created to estimate the pressure-related fugitive VOC emissions through the mast riser, pressure vacuum (P/V) valves, and other components of ocean-going vessel (OGV) tankers during marine transit of crude oil and other petroleum products. This category does not include fugitive losses at berth. VOC emissions in 2018 from this category is estimated to be 7.83 tons per day.

- Paved and unpaved road dusts

PM emissions from paved road dust were updated using 2018 traffic volume data for road segments within the South Coast AQMD jurisdiction provided by SCAG. Emissions were scaled according to time of day (morning, midday, afternoon, evening, night) using the U.S. EPA's AP-42 emission factors. PM emissions from unpaved (non-farm) road dust were calculated according to the methodology outlined in CARB's unpaved (non-farm) roads guidance document. Unpaved road mileage by category was calculated using publicly available Geographic Information System (GIS) data.

- Architectural Coatings

Annual quantity and emissions data reported pursuant to Rule 314 were used to determine annual reported VOC emissions for 62 subcategories of emissions source (CES) codes in the architectural coatings category. Sales volumes for solvent-based and waterborne coatings reported annually under Rule 314 were used to estimate the total volume of thinning, additive, and cleanup solvents using typical usage ratios. Emissions from colorants were estimated under that assumption that colorant was added to 80 percent of all coatings, and four ounces of colorant were added to each liter of coating according to the current VOC quantity limit (with the unit grams per liter) under Rule 1113.

- Adhesives and Sealants

VOC emissions from adhesive and sealant applications were updated based on reported solvent- and water-based adhesive and sealants sales data for 2018. The South Coast AQMD Rule 1168 mandates the reporting of annual sales data. VOC emissions were calculated based on the throughput and percent VOC by weight.

- Natural gas combustion - Commercial and Industrial

Natural gas throughput data for 2018 was provided by SoCalGas for six emissions source categories in the industrial and commercial sectors, including industrial/commercial internal combustion engines, space heating, water heating, and other/unspecified sectors. To eliminate point source contributions, the sector-specific Annual Emissions Reporting (AER) throughput was subtracted from the total. The internal/external combustion ratio derived from AER throughput data was then applied to calculate the throughputs for the respective categories. Up-to-date NOx emissions factors were used in emission calculations to reflect compliance with a series of the South Coast AQMD rules including Rules 1146.2, 1110.2 and 1147.

- Natural gas combustion - Residential

~~Total suspended particulate (TSP),~~PM, SOx, NOx, total organic gases (TOG), and CO emissions from natural gas combustion in residential space heating, water heating, cooking, and other sectors were updated using 2018 natural gas throughput data provided by SoCalGas. Updated NOx emissions factors were used to reflect compliance with Rules 1111 and 1121.

- Green waste composting, co-composting, and "chipping and grinding"

VOC and ammonia (NH3) emissions from green waste composting operations and co-composting operations were estimated according to the methodology developed in the AER guideline document for green waste composting operations (South Coast AQMD, 2015) and the South Coast AQMD Rule 1133.3 requirements (South Coast AQMD, 2011). Emissions from chipped and ground mulch were estimated following the methodology developed for the 2016 AQMP Control Measure BCM-10 (South Coast AQMD, 2017). Annual throughput data for 2018 was reported directly by facilities according to new reporting requirements introduced by Rule 1133.

- LPG combustion - Industrial, Commercial and Residential

The total liquified petroleum gas (LPG) consumed in California in both the industrial and commercial sectors was obtained from the Energy Information Administration (EIA) of the U.S. Department of Energy for 2018. LPG combustion emissions were determined by multiplying the estimated area source consumption in external and internal portions of the industrial and commercial sectors by their respective AP-42 default emission factors.

- LPG transfer dispensing-fugitive loss

VOC emissions from LPG transfer and dispensing–fugitive losses at residential, commercial, industrial, chemical, agricultural, and retail sales facilities were estimated using updated activity data for 2018.

- Livestock

PM, NH3, and VOC emissions from dairy cattle, layers, and swine were updated using the latest available head count from the Santa Ana Water Control Board for 2018, and emission factors from the South Coast AQMD 2011 Technology Assessment (TA) report. ~~the emission factors (EF) from the South Coast AQMD April 2011 Technology Assessment (TA) report. Throughput for each updated emission category of livestock were based on the latest available head count.~~

Mobile Sources

Mobile sources consist of two subcategories: on-road sources and off-road sources. On-road vehicle emissions were calculated with CARB's EMFAC 2017 model and travel activity data provided by SCAG from their adopted 2020 RTP/SCS. The Emission Spatial and Temporal Allocator (ESTA, https://github.com/mmb-carb/ESTA) tool developed by CARB was used to spatially and temporally distribute emissions to generate inputs for attainment demonstration air quality simulations. Off-road emissions were calculated using CARB's category-specific inventory models.

On-Road

CARB's EMFAC 2017 model has undergone extensive revisions from the previous version (EMFAC 2014) to make it more user-friendly and flexible and to allow incorporation of larger amounts of data demanded by current regulatory and planning processes. The U.S. EPA approved the EMFAC 2017 emissions model for SIP and conformity purposes in August 2019. EMFAC 2017 calculates exhaust and evaporative emission rates by vehicle type for different vehicle speeds and environmental conditions. Temperature and humidity profiles are used to produce monthly, annual, and episodic inventories. Emission rate data in EMFAC 2017 is collected from various sources, such as individual vehicles in a laboratory setting, tunnel studies, and certification data. The EMFAC 2017 model interface and overall design has not significantly changed as compared to EMFAC 2014, however, EMFAC 2017 includes more state-of-the-art information to better represent the real-world emissions from on-road sources. Major improvements include:

- New data and significant methodology changes for motor vehicle emission calculations and revisions to implementation data for control measures;
- Updated emission factors and activity data for cars and trucks, including emission reductions associated with new regulations on heavy-heavy duty diesel trucks and buses. New emission factors were developed based on data from U.S. EPA's In-Use Vehicle Program, CARB's Vehicle and Truck and Bus Surveillance Programs, CARB's Portable Emissions Measurement Systems (PEMS) and Transit Bus testing, and Integrated Bus Information Systems of West Virginia and Altoona; and
- Updates to the motor vehicle fleet age, vehicle types, and vehicle population based on 2013-2016 California Department of Motor Vehicle (DMV) data, International Registration Plan (IRP) data, Truck Regulation Upload, Compliance, and Reporting System (TRUCRS) data, Port Vehicle

Identification Number (VIN) data, California Highway Patrol School Bus Inspections, and National Transit Database information. Each of these changes affect emission factors for each area in California.

More detailed information on the changes incorporated in EMFAC 2017 can be found at ~~https://ww3.arb.ca.gov/msei/msei.htm~~https://ww3.arb.ca.gov/msei/msei.htm. The Draft Final 2022 AQMP on-road emissions incorporated regulations adopted post EMFAC2017, such as Advanced Clean Trucks (ACT)[2], Heavy-Duty Low NOx Omnibus Regulations[3] and Heavy-Duty Inspection and Maintenance Regulation[4].

Figure 3-1 shows 2018 on-road emissions estimated using EMFAC 2014 in the 2016 AQMP and EMFAC 2017 in the 2022 AQMP (top panel), as well as estimated emissions for 2037 for the 2022 AQMP only (bottom panel). It should be noted that the comparison for on-road emissions reflects changes with the combination of effects of EMFAC model update as well as the VMT estimates updates from SCAG. ~~EMFAC 2017 is the basis of the draft 2022 AQMP on-road emissions. In addition to the regulations reflected in EMFAC2017, Advanced Clean Trucks (ACT)[5], and Heavy-Duty Engine and Vehicle Omnibus Regulations[6] are reflected in the draft 2022 AQMP.~~

The Draft Final 2022 AQMP estimates show lower emissions of NOx and VOCs in 2018 than projected levels from the 2016 AQMP based on EMFAC 2014. For 2037, emissions are significantly lower than base-year 2018 emissions. These emission reductions can be attributed to ongoing implementation of regulations and programs such as CARB's 2010 Truck and Bus rule, Advanced Clean Cars Program, Federal Phase 2 GHG Standards, Advanced Clean Truck (ACT) and Heavy-Duty (HD) Omnibus low NOx requirements. Despite growth in vehicular activities, emissions from on-road mobile sources are expected to decrease in future years. NOx and VOC emissions in 2037 are ~~62~~76 and ~~55~~56 percent lower than in 2018, respectively.

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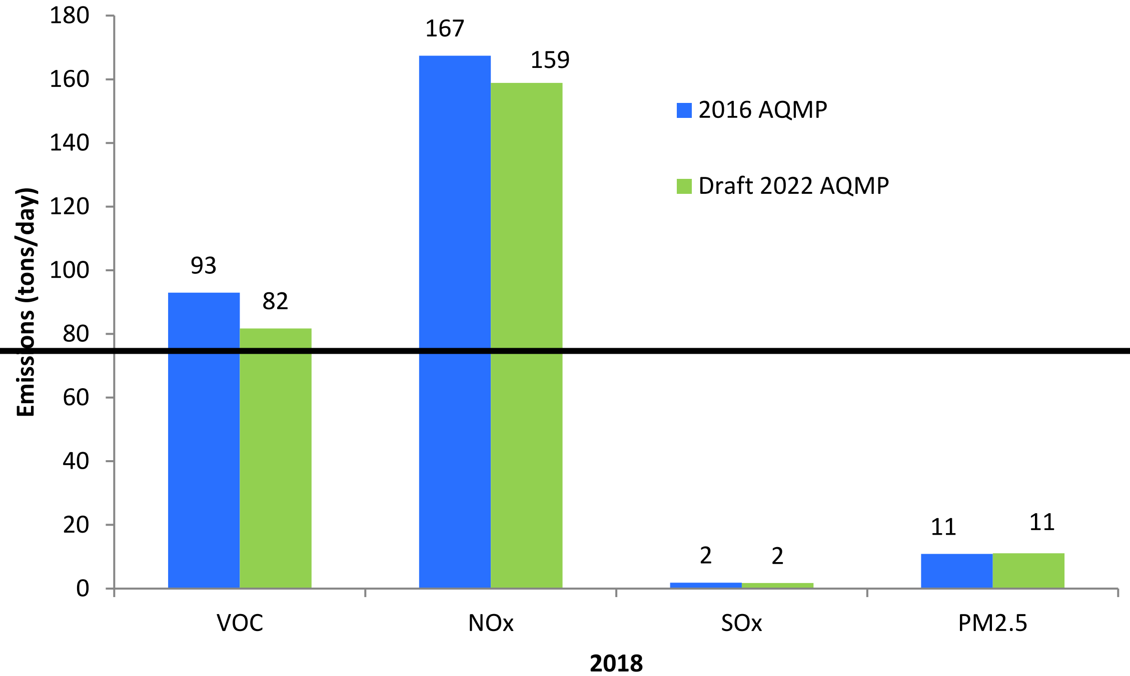
[2] Advanced Clean Trucks, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks.

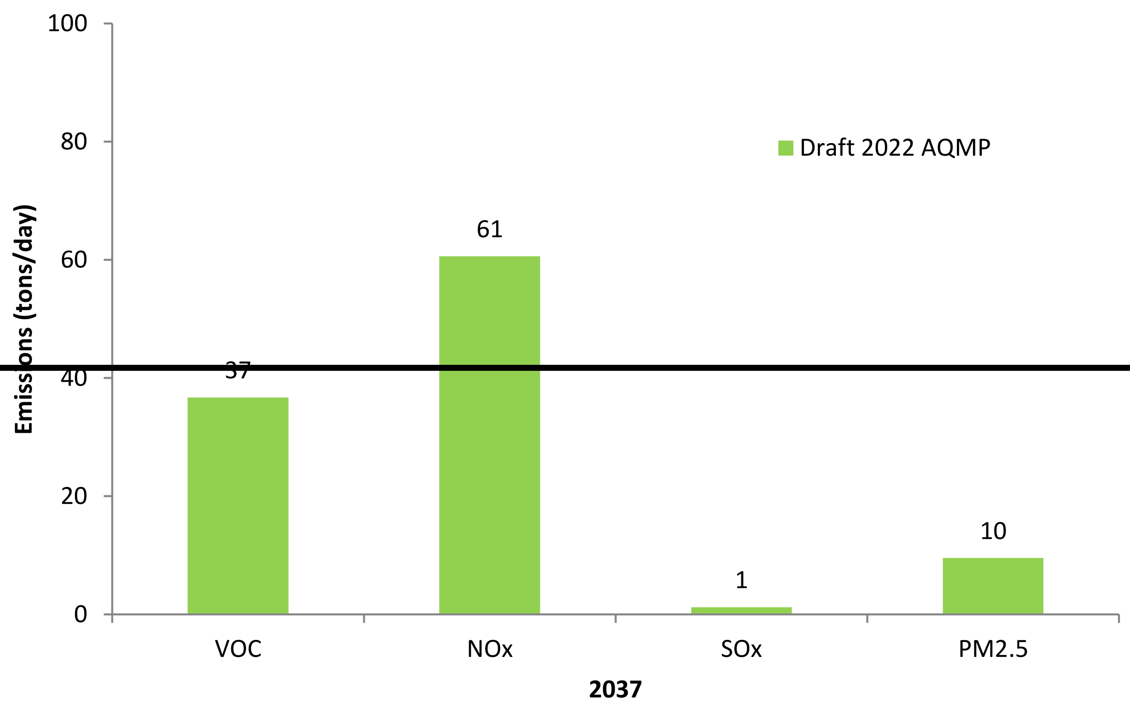
[3] Heavy-Duty Low NOx Omnibus Regulations, Available at: https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox.

[4] Heavy-Duty Inspection and Maintenance Regulations, Available at: https://ww2.arb.ca.gov/rulemaking/2021/hdim2021.

~~[5] Advanced Clean Trucks, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks.~~

~~[6] Heavy-Duty Engine and Vehicle Omnibus Regulations, Available at: https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox.~~


180
160
140
120
100
80
60
40
20
0
Emissions (tons/day)
167
159
93
82
2
2
11
11
2016 AQMP
Draft 2022 AQMP
VOC
NOx
SOx
PM2.5
2018


100
80
60
40
20
0
Emissions (tons/day)
Draft 2022 AQMP
61
37
1
10
VOC
NOx
SOx
PM2.5
2037

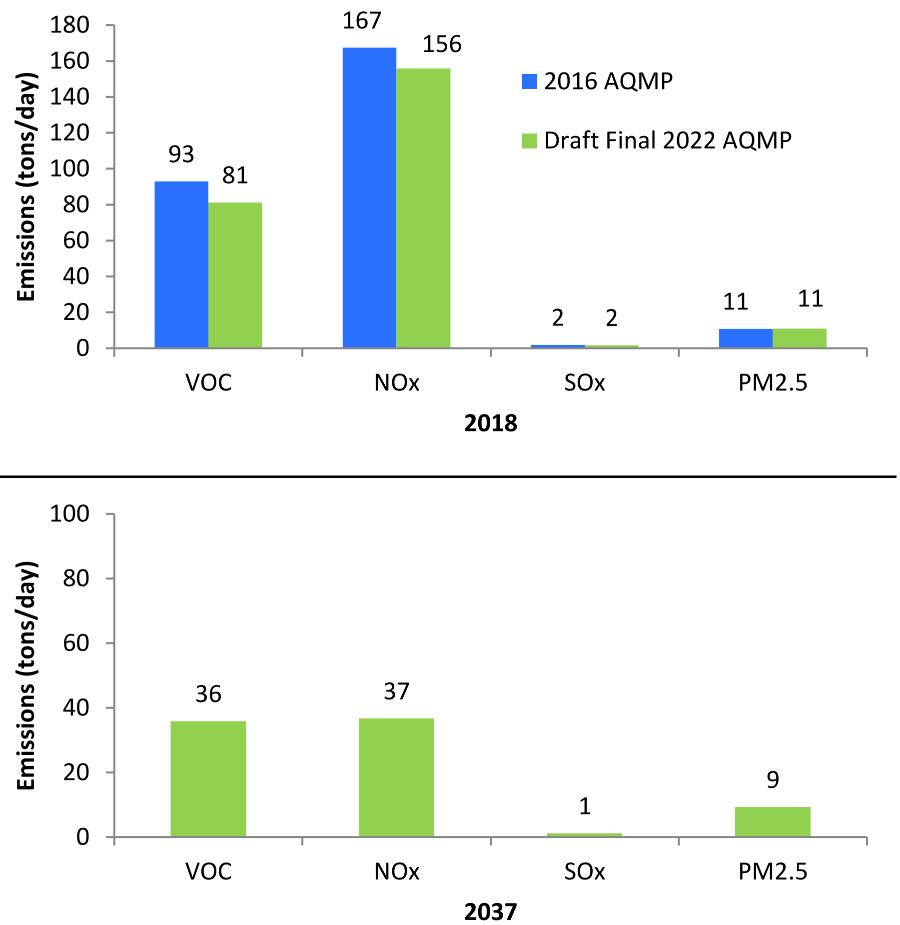


FIGURE 3-1

COMPARISON OF ON-ROAD EMISSIONS INCLUDED IN THE 2016 AQMP AND THE DRAFT FINAL ~~DRAFT~~ 2022 AQMP. SUMMER PLANNING INVENTORY.

Off-Road

Emissions from off-road vehicle categories are primarily based on estimated activity levels and emission factors using a suite of category-specific models or, where a new model was not available, the OFFROAD2007 model. Separate models have been developed for estimating emissions from different categories of off-road mobile sources. More information on these models can be found at the following link: https://ww3.arb.ca.gov/msei/msei.htm. Several of the newer models have been updated to support recent regulations since the release of the 2016 AQMP. Major updates have been made to the inventories for aircraft, ocean-going vessels, locomotives, in-use off-road equipment, harbor craft, small off-road engines and others. The sections below summarize the updates made by CARB to specific off-road categories.

- Aircraft

An updated aircraft emissions inventory was developed for the 2018 base year and 2037 attainment year based on the latest available activity data from airports and Federal Aviation Administration (FAA) databases and application of the FAA's Aviation Environmental Design Tool (AEDT) for airports with detailed aircraft activity data for commercial air carrier/taxi operations. For smaller general aviation (GA) and military airports, the U.S. EPA's average landing and takeoff emission factors were used to calculate emissions. Further details are available in Appendix III and the Revised ~~d~~Draft 2022 AQMP Aircraft Emissions Inventory Report.[7]

- Ocean-Going Vessels (OGVs)

OGV emission were updated in 2021 based on Automatic identification System (AIS) transponder data. This data, along with vessel information supplied by the South Coast AQMD and IHS Fairplay provides vessel visit counts, speed, engine size, and other vessel characteristics. The inventory adopts the U.S. EPA's methodology for emissions based on vessel speed, engine model year and horsepower. The inventory includes transit, maneuvering, anchorage, and at-berth emissions, updating the 2019 at-berth-only inventory. The comprehensive national model Freight Analysis Framework (FAF) was used to develop growth rates for forecasting (see further details on CARB's website[8]).

- Locomotives

All locomotive inventories were updated in 2020 and include linehaul (large national companies), switchers (used in railyards), passenger, and Class 3 locomotives (smaller regional companies). Data for each sector was supplied by rail operations, including Union Pacific and Burlington Northern, and Santa Fe Railway (BNSF) for linehaul and switcher operations. Data for other categories was supplied by the locomotive owners. Emission factors for all categories were based on the U.S. EPA emission factors for locomotives. The inventory reflects the 2005 memorandum of understanding (MOU) with Union Pacific

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[7] Revised Draft 2022 AQMP Aircraft Emissions Inventory Report. http://www.aqmd.gov/docs/default-source/Agendas/aqmp/2022-aqmp-ag/revised-draft-2022-aqmp-aircraft-emissions-inventory-report.pdf.

[8] https://ww2.arb.ca.gov/sites/default/files/2022-03/CARB_2021_OGV_Documentation_ADA.pdf.

and BNSF. Growth rates were primarily developed from the comprehensive national model Freight Analysis Framework (FAF; see further details on CARB's website[9]). A new category includes military and Industrial (M&I) locomotive emission inventory and relies on the annual fuel consumption and engine information collected from 2011 to 2018. The M&I locomotive data was supplied by 39 private companies, 4 military rail groups, with a total of 85 locomotives. The subject locomotives typically consist of smaller, older switchers and medium horsepower (MHP, 2,301 to 3,999 horsepower) locomotives operating within the boundaries of a granary, plant, or industrial facility. The online posting of M&L locomotive methodology update is being processed by CARB and will be available on CARB's website[6] upon completion.

- Commercial Harbor Craft

Commercial Harbor Crafts (CHC) are grouped into 18 vessel types: articulated tug barge (ATB), bunker barge, towed petrochemical barge, other barge, dredge, commercial passenger fishing, commercial fishing, crew and supply, catamaran ferry, monohull ferry, short run ferry, excursion, ATB tug, push and tow tug, escort/ship assist tug, pilot boat, research boat, and work boat.

The CHC inventory was updated in 2021 and includes vessels used around harbors such as tug and tow boats, fishing vessels, research vessels, barges, and similar. The inventory was updated based on CARB's reporting data for these vessels, as well as inventories from the Ports of Los Angeles and Long Beach and Oakland and Richmond. This supplied vessel characteristics, and the population was scaled up to match U.S. Coast Guard data on the annual number of vessels in California waters. Activity and load factors were based on a mix of reporting data and port-specific inventories. Emission factors were based on certification data for harbor craft engines. Population and activity growth factors were estimated based on historical trends in the past decade. Additional information on this methodology can be found on CARB webpage (see further details on CARB's website[10]).

- Small Off-Road Engines (SORE)

SORE are spark-ignition engines rated at or below 19 kilowatts (i.e., 25 horsepower). Typical engines in this category are used in lawn and garden equipment as well as other outdoor power equipment and cover a broad range of equipment. The majority of this equipment belongs to the Lawn & Garden (e.g., lawnmower, leaf blower, trimmer) and Light Commercial (e.g., compressor, pressure washer, generator) categories of CARB's SORE emissions inventory model.

The newly developed, stand-alone SORE2020 Model[11] reflects the recovering California economy from the 2008 economic recession and incorporates emission results from CARB's recent in-house testing as

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[9] https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road.

[10] https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/apph.pdf.

[11] https://ww2.arb.ca.gov/sites/default/files/2020-09/SORE2020_Technical_Documentation_2020_09_09_Final_Cleaned_ADA.pdf.

well as CARB's most recent Certification Database. CARB also has conducted an extensive survey of SORE operating within California through the Social Science Research Center (SSRC) at the California State University, Fullerton (CSUF). Data collected through this survey provides the most up-to-date information regarding the population and activity of SORE equipment in California. The final SORE emissions included the adopted SORE rule in December 2021 as well as the 15-day changes after the CARB Governing Board hearing which allowed the pressure washers (greater than 5 hp) extra time for meeting the regulation (see further details on CARB's website[8]). The SORE annual sales were forecasted using historic growth of the number of California households (DOF household forecasts, 2000 – 2008 and 2009 - 2018). For the Draft Final 2022 AQMP, the emission benefits of adopted SORE rule are reflected into the baseline emissions update.

- Diesel Agricultural Equipment

The agricultural equipment inventory covers all off-road vehicles used on farms or first processing facilities (of all fuel types). It was updated in 2021 using a 2019 survey of California farmers and rental facilities, and the 2017 U.S. Department of Agriculture (USDA) agricultural census. Emission factors are based on the 2017 off-road diesel emission factor update. The inventory reflects incentive programs for agricultural equipment that were implemented earlier than August 2019. Agricultural growth rates were developed using historical data from the County Agricultural Commissioners' reports (see further details on CARB's website[12]).

- In-Use Off-Road Equipment

This category covers off-road diesel vehicles over 25 horsepower in construction, mining, industrial, and oiling drilling categories. The inventory was updated in 2022 based on the DOORS[13] registration program. Activity was updated based on a 2021 survey of registered equipment owners, and emission factors were based on the 2017 off-road diesel emission factor update. The inventory reflects the In-Use Off-Road Equipment Regulations, as amended in 2011 (see further details on CARB's website[14]).

- Cargo Handling Equipment

The Cargo Handling Equipment (CHE) inventory covers equipment (of all fuels) used at California ports and intermodal railyards, such as cranes, forklifts, container handling equipment, and more. The inventory population and activity were updated in 2021 based on the port inventories for the Ports of Los Angeles and Long Beach and Richmond, and the CARB reporting data for other ports and railyards, which had a more comprehensive inventory than available through reporting. Load factors were based on the previous inventory in 2007, and emission factors were based on the 2017 off-road diesel emission factor update.

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[12] https://ww2.arb.ca.gov/sites/default/files/2021-08/AG2021_Technical_Documentation_0.pdf.

[13] https://ww2.arb.ca.gov/sites/default/files/classic/msprog/ordiesel/documents/userguide-initialreporting.pdf.

[14] https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road.

The inventory reflects the CHE Airborne Toxic Control Measures (ATCM), adopted in 2005 and completed in 2017 (see further details on CARB's website[15]).

- Transportation Refrigeration Units

The Transportation Refrigeration Units (TRU) inventory was updated in 2020 based on the TRU reporting program at CARB. The activity was developed based on 2010 surveys of facilities served by TRUs and 2017 to 2019 telematics data purchased from TRU manufacturers. Emission factors were developed specifically for TRUs based on TRU engine certification data reported to the U.S. EPA as of 2018. The inventory reflects the TRU ATCM and 2021 amendments. Forecasting was based on IBISWorld reports forecast for related industries, and turnover forecasting was based on the past 20 years equipment population trends (see further details on CARB's website[16]).

- Portable Equipment

Portable equipment inventory includes non-mobile diesel, such as generators, pumps, air compressors, chippers, and other miscellaneous equipment over 50 horsepower. This inventory was developed in 2017 based on CARB's registration program, 2017 survey of registered owners for activity and fuel, and the 2017 off-road diesel emission factor update. The inventory also reflects the Portable ATCM and 2017 amendments.

Because registration in Portable Equipment Registration Program (PERP) is voluntary, the PERP registration data was used as the basis for equipment population, with an adjustment factor used to represent the remaining portable equipment in the State. Estimates of future emissions beyond the base year were made by adjusting base year estimates for population growth, activity growth, and the purchases of new equipment (i.e~~.~~., natural and accelerated turnover; see further details on CARB's website[17]).

- Large Spark Ignition/Forklifts

The large spark ignition (LSI) inventory includes gasoline and propane forklifts, sweeper/scrubbers, and tow tractors. The inventory was updated in 2020 based on the LSI/forklift registration in the DOORS reporting system at CARB, and the sales data was provided by the Industrial Truck Association (ITA). Activity was based on a survey of equipment owners in the DOORS system, and emission factors were

15 https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road.

16 https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf.

17 https://ww3.arb.ca.gov/msei/ordiesel/perp2017report.pdf.

based on the U.S. EPA's latest guidance for gasoline and propane engines. The inventory reflects the LSI regulation requirements and 2016 amendments (see further details on CARB's website[18]).

- Recreational Marine Vessels

Pleasure craft or recreational marine vessel (RMV) is a broad category of marine vessel that includes gasoline-powered spark-ignition marine watercraft (SIMW) and diesel-powered marine watercraft. It includes outboards, sterndrives, personal watercraft, jet boats, and sailboats with auxiliary engines. This emissions inventory was last updated in 2014 to support the evaporative control measures. The population, activity, and emission factors were revised using new surveys, DMV registration information, and emissions testing.

Staff used economic data from a 2014 UCLA Economic Forecast to estimate the near-term annual sales of RMV (2014 to 2019). To forecast long-term annual sales (2020 and later), staff used an estimate of California's annual population growth as a surrogate (see further details on CARB's website[15]).

- Recreational Vehicles

Off-highway recreational vehicles include off-highway motorcycles (OHMC), all-terrain vehicles (ATV), off-road sport vehicles, off-road utility vehicles, sand cars, golf carts, and snowmobiles. A new model was developed in 2018 to update emissions from recreational vehicles. Input factors such as population, activity, and emission factors were re-assessed using new surveys, DMV registration information, and emissions testing. OHMC population growth is determined from two factors: incoming population as estimated by future annual sales and the scrapped vehicle population as estimated by the survival rate (see further details on CARB's website[15]).

- Fuel Storage and Handling

Emissions from portable fuel containers (gas cans) were estimated based on past surveys and CARB in-house testing. This inventory uses a composite growth rate that depends on occupied household (or business units), percent of households (or businesses) with gas cans, and average number of gas cans per household (or business) units (see further details on CARB's website[15]).

Figure 3-2 shows estimated off-road baseline emissions for 2018 in the 2016 AQMP and the ~~draft~~Draft Final 2022 AQMP, as well as projected emissions for 2037 (~~draft~~Draft Final 2022 AQMP only). Overall, estimated off-road VOC emissions and off-road NOx emissions for 2018 are ~~16~~6 percent and 3 percent higher in the ~~draft~~Draft Final 2022 AQMP compared to the 2016 AQMP~~ while NOx emissions remain almost unchanged.~~, respectively. SOx and PM2.5 emissions are ~~both 26~~23 percent and 21 percent lower, respectively. It should be noted that the comparison for 2018 reflects changes in methodology and activity data.

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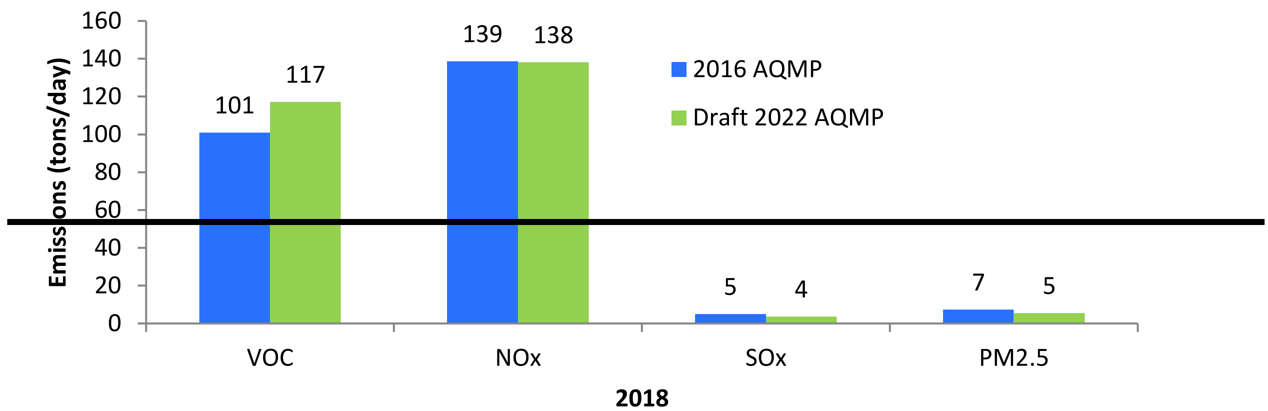
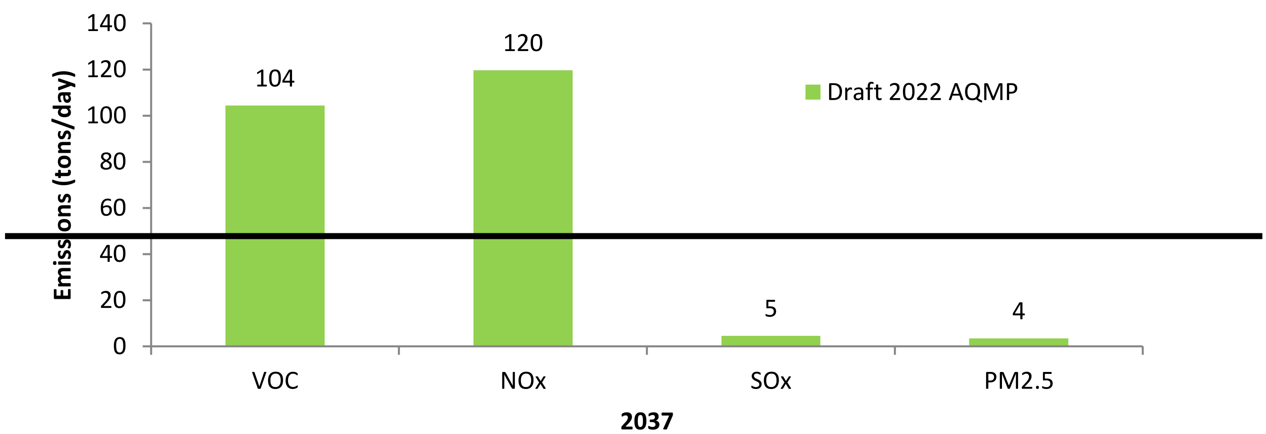
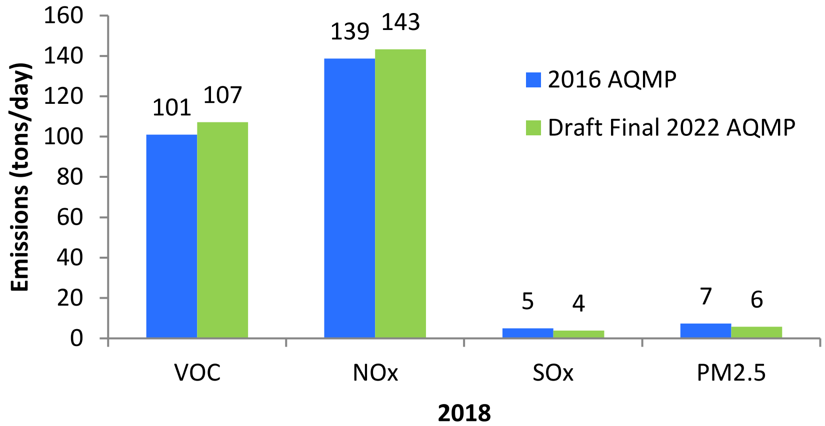
[18] https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road.

Estimated emissions in 2037 are lower than 2018 emissions for all pollutants, except SOx, due to ongoing implementation of regulations and programs~~.~~ and anticipated growth. SOx emissions are expected to increase by 25 percent from 2018 to 2037 due to increased emissions from aircraft, ~~and~~ ships and commercial boats. However, this seemingly large increase corresponds to less than 1 ton~~s~~ per day of additional SOx. The growth in SOx emissions from the OGV sector is expected to dominate the marginal growth in SOx emissions from stationary sources.







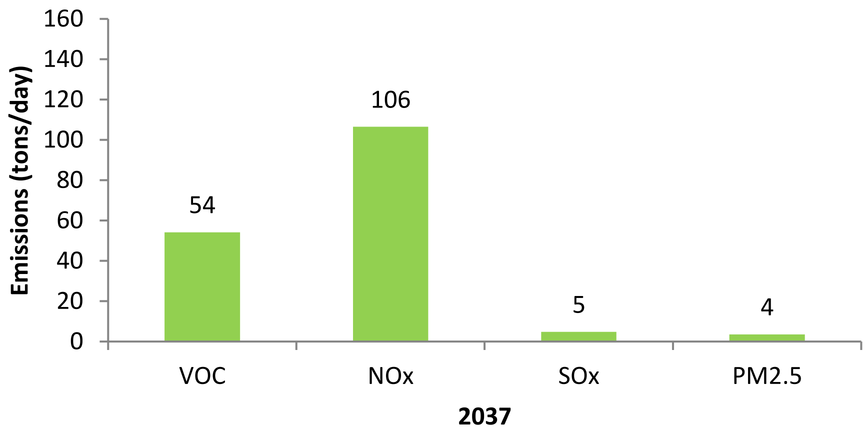


FIGURE 3-2
COMPARISON OF OFF-ROAD EMISSIONS BETWEEN 2016 AQMP AND DRAFT FINAL 2022 AQMP SUMMER PLANNING INVENTORY
(*NO EMISSION PROJECTION FOR 2037 IN 2016 AQMP*)

Uncertainties in the Emissions Inventory

An effective AQMP relies on a complete and accurate emissions inventory. Methods for quantifying different emission sources continue to improve, allowing for development of more effective control measures. Increased use of continuous monitoring and source testing has contributed to improved point source inventories. Technical assistance to facilities and auditing of reported emissions have also improved the accuracy of the emissions inventory. Area source inventories that rely on average emission factors and regional activities have inherent uncertainty. Industry-specific surveys and source-specific studies during rule development have provided much-needed refinement to these emissions estimates. Emission factors for many area sources are adapted from the U.S. EPA's AP-42, but some categories have not been updated for extended periods of time, posing additional uncertainties in estimated emissions. Mobile source inventories are also continuously updated and improved. As described earlier, many improvements are included in the on-road mobile source model EMFAC 2017, which estimates emissions from trucks, automobiles, and buses. Improvements and updates are also included in the off-road emissions models for locomotives, ocean going vessels, commercial harbor craft, pleasure craft and off-highway recreational vehicles, cargo handling equipment, and farm equipment. Overall, the 2022 AQMP inventory is based on the most current data and methodologies, resulting in the most accurate inventory available.

There are many challenges inherent in making accurate projections based on future growth, such as where vehicle trips will occur, the distribution between various modes of transportation (such as trucks and trains), as well as estimates for population growth and the number and type of jobs. Forecasts are made with the best information available; nevertheless, there is uncertainty in emissions projections. AQMP updates are generally developed every three to four years, thereby allowing for frequent updates and improvements to the inventories.

Gridded Emissions

The air quality modeling domain extends to southern Kern County in the north, the Arizona ~~border~~and Nevada borders to the east, northern Mexico to the south and more than 100 miles offshore to the west. The modeling domain is divided into a grid system comprised of 4 km by 4 km grid cells. Both stationary and mobile source emissions are allocated to individual grid cells within this system. In general, emissions are modeled as total daily emissions. Variations in temperature, hours of operation, speed of motor vehicles, or other factors are considered in developing gridded motor vehicle emissions. The "gridded" emissions data used for the ozone attainment demonstration differ from the annual average day or planning inventory emission data in several ways: (1) the modeling region covers larger geographic areas than the Basin, (2) emissions represent day-specific instead of average or seasonal conditions, and (3) emissions are adjusted with daily meteorological conditions such as temperature and humidity. The summer planning inventory is used to generate the gridded emission ozone modeling applications. The summer planning inventory reflects emissions for an operating day during the high ozone season from May to October. This season typically has higher evaporative VOC emissions and more sunlight playing an important role in ozone formation.

Base Year Emissions

2018 Emission Inventory

Table 3-1A compares the summer planning emissions in the ~~draft~~Draft Final 2022 AQMP base year inventory and projected 2018 emissions in the Final 2016 AQMP by major source category for VOCs and NOx. Table 3-1B shows this comparison for SOx and PM2.5 emissions. Emission comparisons for 2018 reflect updates in methodology, activity data, differences between growth projections and actual data, and adopted rules since the release of the 2016 AQMP.

Overall, ~~there is a minor net increase in~~ the VOC emissions ~~in the draft~~remain~~stay~~ almost unchanged between 2016 AQMP and 2022 AQMP ~~inventory as compared to 2016 AQMP~~ projections. Estimates of ~~both~~ stationary source and mobile source VOC emissions ~~have increased by about~~show 3 percent increase and 3 percent decrease, respectively. Among stationary sources, fuel combustion and consumer products emissions source categories show the largest changes, with ~~54~~52 percent lower and 23 percent higher VOC emissions compared to 2016 AQMP projected emissions, respectively. The increase in consumer products source category emissions reflects updated estimates based on category-wide 2015 survey data, which led to approximately 20 tons per day higher VOC emissions in 2018. Architectural coatings emissions were updated for the ~~draft~~Draft Final 2022 AQMP using information provided as part of the South Coast AQMD Rule 314 – "Fees for Architectural Coatings" annual reports, resulting in lower VOC emissions estimates (8 percent). Total NOx emissions show a modest ~~5~~4 percent decrease between 2016 AQMP projections and the ~~draft~~Draft Final 2022 AQMP inventory. Stationary source NOx emissions have decreased close to ~~17~~14 percent. Of note in the stationary source categories are the emission changes associated with RECLAIM (Regional Clean Air Incentives Market)[19] categories and natural gas and LPG combustion sources. The RECLAIM emissions cap was used to project NOx emissions for future years. The 2018 RECLAIM emissions from the 2016 AQMP inventory were the ~~projection from the 2016 AQMP base year (2012),~~allocation caps as defined in Rule 2002, while the 2022 AQMP uses actual reported emissions for 2018, which were lower than the cap by 6 tons per day for NOx. Use of additional actual reported information in lieu of projected emissions explains most of the remaining emission differences. Further detail can be found in Appendix III.

For the mobile source category, updates to EMFAC 2017 and travel activity data from the SCAG 2020 RTP/SCS resulted in ~~12~~13 percent and ~~5~~7 percent reductions in VOC and NOx emissions from on-road sources, respectively. Updates for off-road sources resulted in a ~~16~~6 percent increase in off-road VOC emissions and ~~no significant change~~3 percent increase in off-road NOx emissions compared to projected emissions from the 2016 AQMP. The increase of VOC emissions from off-road sources was mainly driven by an update to the emission estimates methodology for the Small Off-Road Engines (SORE) sector. The new emission category, tanker transit loss, which added 8 tons per day emissions to the OGV VOC, contributed to the increased VOC emissions compared to 2016 AQMP.

[19] http://www.aqmd.gov/home/programs/business/about-reclaim.

Estimates of SOx emissions are ~~16~~15 percent lower in the ~~draft~~Draft Final 2022 AQMP emissions inventory compared to 2016 AQMP projections. This is largely due to the use of actual reported information in lieu of ~~projected emissions~~the allocation cap for RECLAIM sources. Estimates of direct PM2.5 emissions from stationary and mobile sources are modestly lower (5 percent) in the ~~draft~~Draft Final 2022 AQMP. This revised estimate is largely due to the increases in the paved and unpaved road dust emission estimates and decreases in industrial process and petroleum production and marketing emission estimates.

Table 3-2 shows the 2018 summer planning emissions inventory by major source category. Stationary sources are subdivided into point sources (e.g., petroleum production and electric utilities) and area sources (e.g., architectural coatings, residential water heaters, consumer products, and permitted sources smaller than the emission reporting threshold – generally 4 tons per year). Mobile sources consist of on-road (e.g., passenger cars and heavy-duty trucks) and off-road sources (e.g., locomotives and ships).

Figure 3-3 illustrates the relative contribution of each source category to the 2018 inventory. Area sources, including architectural coatings and consumer products subcategories, are the major contributor to VOC emissions. Mobile sources, stationary point source, and stationary area source categories are the top contributors to NOx, SOx, and PM2.5 emissions, respectively. Overall, total mobile source emissions account for almost ~~48~~46 percent of VOC emissions and ~~86~~85 percent of NOx emissions, as well as ~~95~~89 percent of CO emissions. The on-road mobile category alone contributes over 20 percent and ~~46~~44 percent of VOC and NOx emissions, respectively. For directly emitted PM2.5, mobile sources represent ~~28~~29 percent of total emissions with an additional 18 percent from vehicle-related entrained dust from paved and unpaved roads. Stationary sources are responsible for most of the SOx emissions in the Basin, with the point source category (larger facilities subject to AER requirements) contributing 49 percent of total SOx emissions. Non-vehicle related area sources, such as commercial cooking are the predominant source of directly emitted PM2.5 emissions, contributing ~~42~~41 percent of total emissions.

Figure 3-4 shows the fraction of the 2018 inventory by responsible agency for VOC, NOx, SOx, and directly emitted PM2.5 emissions. NOx and VOCs are important precursors to ozone and PM2.5 formation, and SOx and directly emitted PM2.5 contribute to the region's PM2.5 nonattainment challenges. The U.S. EPA and CARB have primary authority to regulate emissions from mobile sources, while the South Coast AQMD has limited authority via fleet rules and facility-based mobile source measures. The U.S. EPA's authority applies to aircraft, locomotives, ocean-going vessels, military ~~and commercial~~ harbor ~~crafts~~craft, and other mobile categories, including California international registration plan (CAIRP) and out-of-state (OOS) medium- and heavy-duty trucks and pre-empt off-road equipment with less than 175 horsepower. CARB has authority over the remainder of mobile sources and consumer products, portions of area sources related with fuel combustion and petroleum production and marketing. The South Coast AQMD has authority over most area sources and all point sources. As shown in Figure 3-4, most NOx and VOC emissions in the Basin are from sources that fall under the primary jurisdiction of the U.S. EPA or CARB. For example, ~~85~~86 percent of NOx and ~~over 80~~77 percent of VOC emissions are from sources primarily under CARB and the U.S. EPA control. Conversely, 61 percent of SOx emissions and ~~71~~72 percent of directly emitted PM2.5 emissions are from sources under the South Coast AQMD control. This illustrates that actions at the local, State, and federal level are needed to ensure the region attains the federal ambient air quality standards.

TABLE 3-1A

COMPARISON OF VOC AND NOx EMISSIONS BY MAJOR SOURCE CATEGORY OF 2018 BASE YEAR IN DRAFT FINAL 2022 AQMP AND PROJECTED 2018 IN FINAL 2016 AQMP SUMMER PLANNING INVENTORY (TONS PER DAY[1])

Source Category	2016 AQMP	Draft Final 2022 AQMP	% Change	2016 AQMP	Draft Final 2022 AQMP	% Change
	VOC			NOx		
STATIONARY SOURCES						
Fuel Combustion	11.3	5.~~2~~4	-~~54~~52%	22.8	~~18.3~~20.1	-~~20~~12%
Waste Disposal	15.4	16.6	8%	2.5	1.5	-~~39~~38%
Cleaning and Surface Coatings	42.3	38.1	-10%	0.1	0.0	-~~80~~69%
Petroleum Production and Marketing	21.1	20.6	-2%	0.3	0.3	-~~11~~10%
Industrial Processes	12.3	10.~~9~~8	-12%	0.1	0.1	~~18~~13%
Solvent Evaporation:						
Consumer Products	87.6	107.4	23%	0.0	0.0	0%
Architectural Coatings	11.5	10.6	-8%	0.0	0.0	0%
Others	2.7	2.~~7~~3	~~0~~-14%	0.0	0.0	0%
Misc. Processes	7.1	5.~~8~~7	-~~18~~20%	10.3	11.~~8~~5	~~14~~11%
RECLAIM Sources	0.0	0.0	0%	24.2	18.2	-25%
Total Stationary Sources	**211**	**218**	**3%**	**60**	**~~50~~52**	**-~~17~~14%**
MOBILE SOURCES						
On-Road Vehicles	93	~~82~~81	-~~12~~13%	167	~~159~~156	-~~5~~7%
Off-Road Vehicles	101	~~117~~107	~~16~~6%	139	~~138~~143	~~0~~3%
Total Mobile Sources	**194**	**~~199~~188**	**-3%**	**306**	**~~297~~299**	**-~~3~~2%**
TOTAL	**405**	**~~417~~406**	**~~3~~0%**	**366**	**~~347~~351**	**-~~5~~4%**

[1] Values may not sum due to rounding

TABLE 3-1B

COMPARISON of SOx AND PM2.5 EMISSIONS BY MAJOR SOURCE CATEGORY OF 2018 BASE YEAR IN DRAFT FINAL 2022 AQMP AND PROJECTED 2018 IN 2016 AQMP SUMMER PLANNING INVENTORY (TONS PER DAY[1])

SOURCE CATEGORY	2016 AQMP	Draft Final 2022 AQMP	% Change	2016 AQMP	Draft Final 2022 AQMP	% Change
	SOx			PM2.5		
STATIONARY SOURCES						
Fuel Combustion	2.0	2.5	~~0~~22%	5.6	5.~~2~~4	~~-7~~3%
Waste Disposal	0.6	0.5	-22%	0.3	0.3	8%
Cleaning and Surface Coatings	0.0	0.0	0%	1.7	1.6	~~-8~~9%
Petroleum Production and Marketing	0.4	0.3	-~~29~~30%	1.5	0.9	-40%
Industrial Processes	0.12	0.14	~~17~~18%	7.4	5.0	-32%
Solvent Evaporation:						
Consumer Products	0	0	0%	0	0	0%
Architectural Coatings	0	0	0%	0	0	0%
Others	0	0	0%	0	0	0%
Misc. Processes	0.3	0.2	-~~52~~55%	27.8	29.~~8~~1	~~7~~5%
RECLAIM Sources	6.8	5.5	-19%	0	0	0%
Total Stationary Sources	**10**	**9**	**-12%**	**44**	**~~43~~42**	**~~-3~~4%**
MOBILE SOURCES						
On-Road Vehicles	1.9	1.7	-9%	10.9	11.~~1~~0	~~2~~1%
Off-Road Vehicles	3.7	3.~~7~~8	~~0~~4%	5.5	5.~~5~~8	~~0~~6%
Total Mobile Sources	**6**	**~~5~~6**	**~~-3~~1%**	**16**	**17**	**~~1~~3%**
TOTAL	**17**	**~~14~~15**	**-~~16~~15%**	**62**	**59**	**-5%**

[1] Values may not sum due to rounding

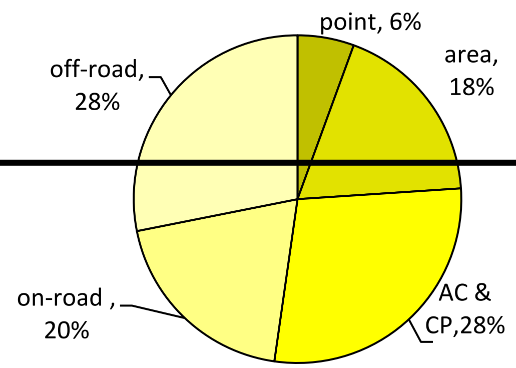
TABLE 3-2

SUMMARY OF EMISSIONS BY MAJOR SOURCE CATEGORY: 2018 BASE YEAR SUMMER PLANNING (TONS PER DAY[1])

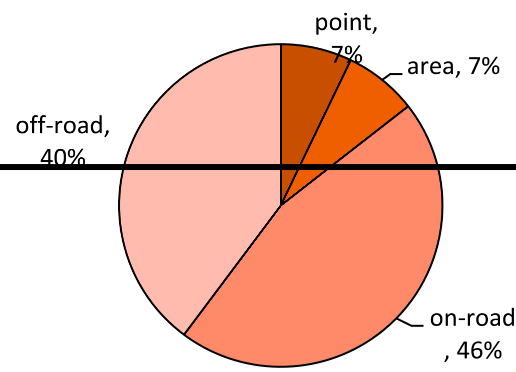
Source Category	Summer Planning					
	VOC	NOx	CO	SOx	PM2.5	NH3
Fuel Combustion	5	~~18~~20	~~79~~81	~~2~~6	5	8
Waste Disposal	17	2	1	0	0	6
Cleaning and Surface Coatings	38	0	0	0	2	0
Petroleum Production and Marketing	21	0	3	~~0~~1	1	0
Industrial Processes	11	0	1	0	5	9
Solvent Evaporation:						
Consumer Products	107	0	0	0	0	0
Architectural Coatings	11	0	0	0	0	0
Others	~~3~~2	0	0	0	0	1
Misc. Processes[2]	6	~~12~~11	~~20~~19	0	~~30~~29	36
RECLAIM Sources	0	18	0	6	0	0
Total Stationary Sources	218	~~50~~52	~~103~~104	9	~~43~~42	61
On-Road Vehicles	~~82~~81	~~159~~156	~~754~~747	2	11	16
Off-Road Vehicles	~~117~~107	~~138~~143	~~989~~807	4	~~5~~6	0
Total Mobile Sources	~~199~~188	~~297~~299	~~1743~~1553	~~5~~6	17	16
TOTAL	~~417~~406	~~347~~351	~~1846~~1658	~~14~~15	59	77

[1] Values may not sum due to rounding

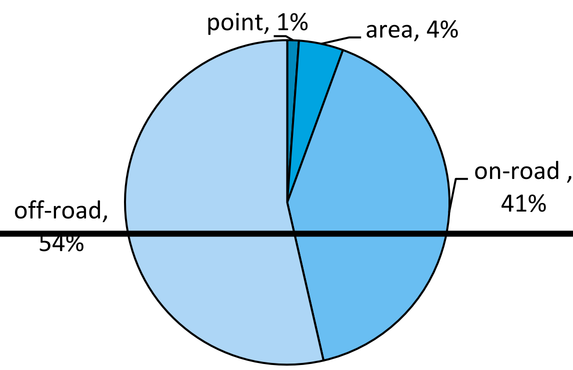
[2] Includes entrained road dust



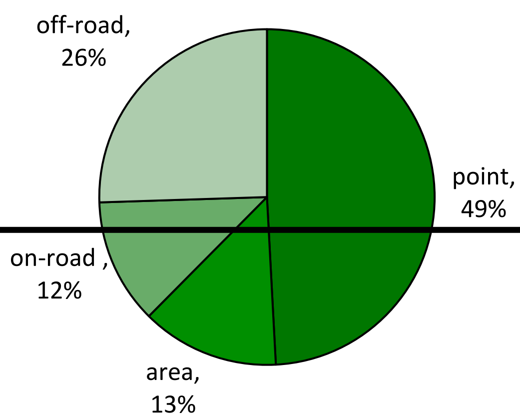
VOC Emissions: 417 tons/day



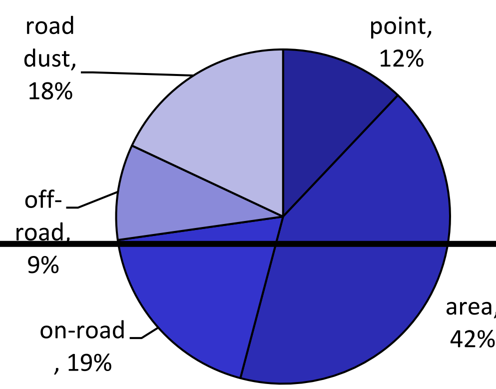
NOx Emissions: 347 tons/day



CO Emissions: 1846 tons/day



SOx Emissions: 14 tons/day



Directly Emitted PM2.5 Emissions: 59 tons/day

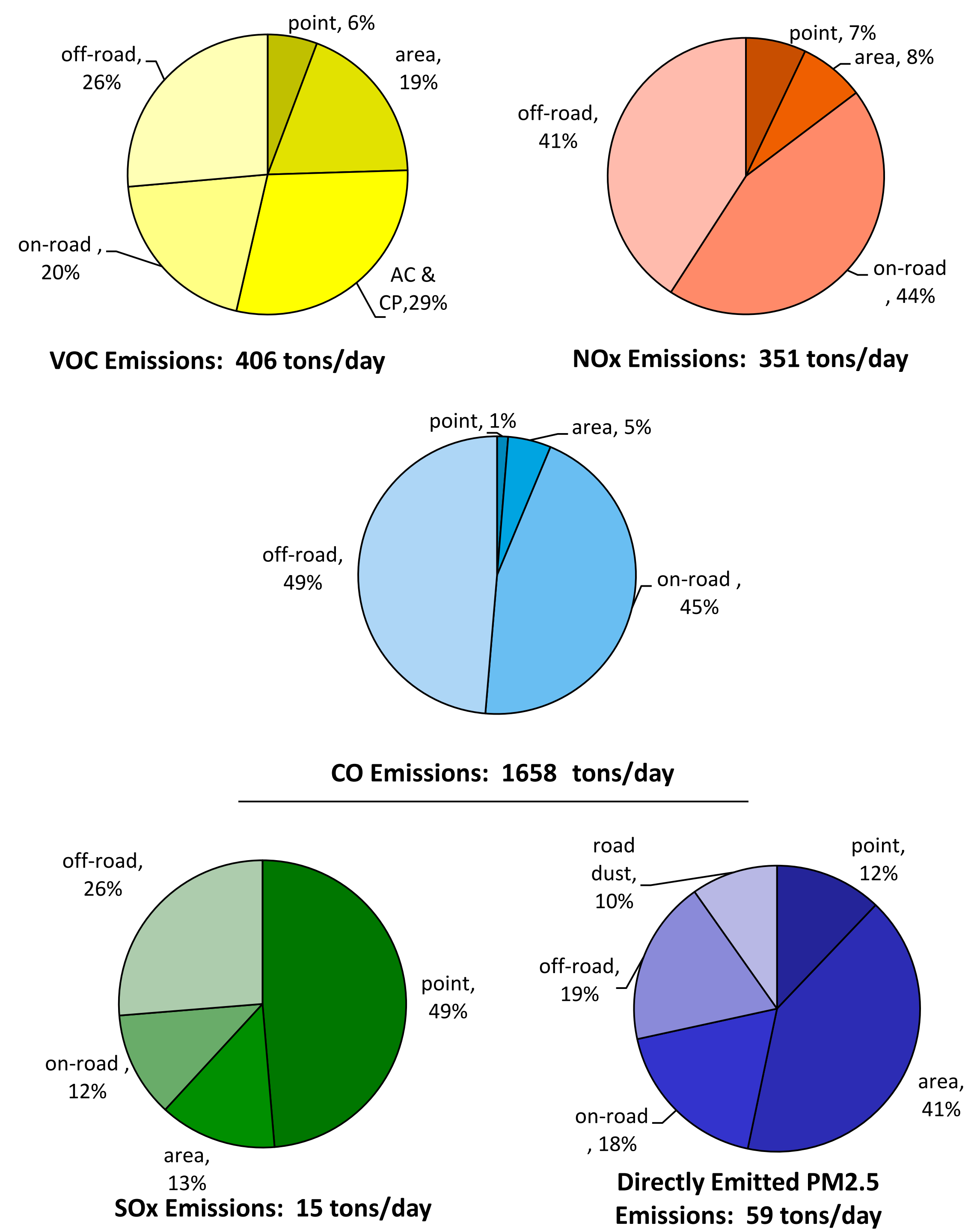
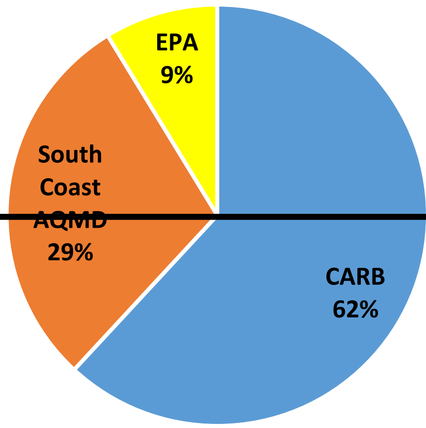


FIGURE 3-3

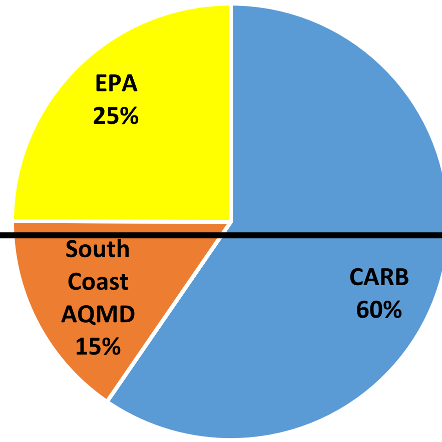
RELATIVE CONTRIBUTION BY SOURCE CATEGORY TO 2018 EMISSIONS INVENTORY

(*AC = ARCHITECTURAL COATINGS AND RELATED SOLVENT, CP = CONSUMER PRODUCTS*)

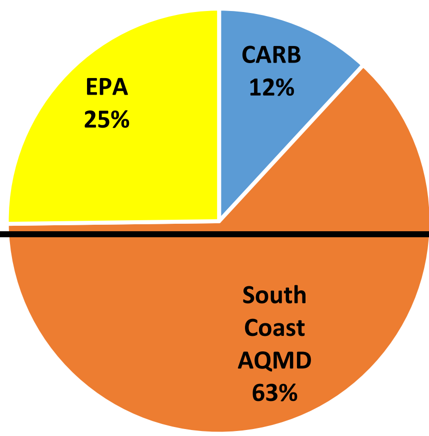
(*SUMMER PLANNING, VALUES ARE ROUNDED TO NEAREST INTEGER AND MAY NOT SUM DUE TO ROUNDING*)



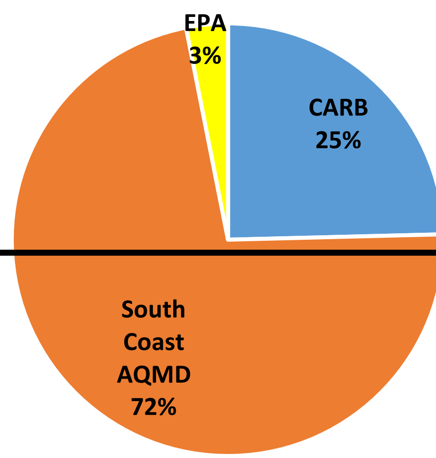
VOC Emissions: 417 tons/day



NOx Emissions: 347 tons/day



SOx Emissions: 14 tons/day



Directly Emitted PM2.5 Emissions: 59 tons/day

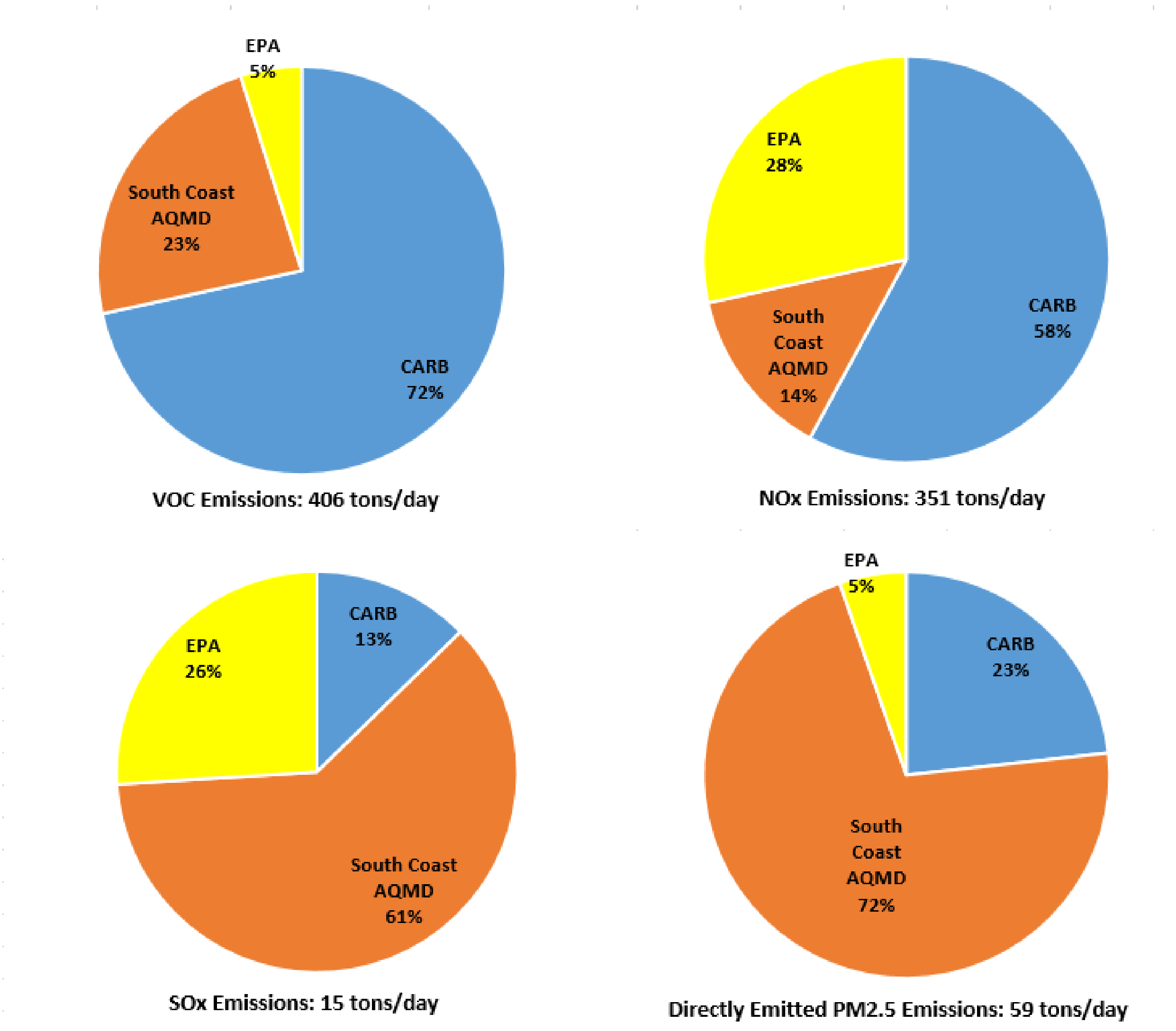


FIGURE 3-4

2018 EMISSION INVENTORY AGENCY PRIMARY RESPONSIBILITY

(*SUMMER PLANNING, VALUES ARE ROUNDED TO NEAREST INTEGER AND MAY NOT SUM DUE TO ROUNDING*)

Future Emissions

Inventory Development

Inventories were developed for 2018, the base year for attainment demonstration, 2037, the attainment year for the 2015 NAAQS 8-hour ozone standard of 70 ppb, and milestone years to demonstrate Reasonable Further Progress (RFP). Detailed emissions inventories for RFP years are provided in Appendix III.

Future-year emissions in 2037 were derived using: (1) emissions from the 2018 base year, (2) expected controls after implementation of the South Coast AQMD rules adopted by October 2020 and rule 1109.1 and CARB regulations adopted by December ~~2020~~2021, and (3) activity growth in various source categories between the base and future years.

One of the major changes to stationary source emission projections between the 2016 AQMP and 2022 AQMP is the treatment of point source NOx and SOx emissions under the RECLAIM program, which mainly include fuel combustion emissions from power plants, oil and gas production, petroleum refining, and manufacturing and industrial and service sectors. In the 2016 AQMP, RECLAIM source emissions were projected using allocation caps prescribed by the South Coast AQMD's Rule 2002. The 2016 AQMP inventory reflects the 2015 amendment which reduced the NOx allocation cap by 12 tons per day by 2022. Following the Governing Board's direction, NOx emissions from RECLAIM are subject to additional 5 tons per day reductions by 2025 under the 2016 AQMP CMB-05 (Further NOx Reductions from RECLAIM Assessment). The Board also directed the RECLAIM program to be converted to a traditional command-and-control regulatory structure. 2025 and 2026 will be the first years with no RECLAIM programs for NOx and SOx, respectively. In the 2022 AQMP, stationary source emission projections for attainment year 2037 are all subject to conventional control and growth, as there will be no RECLAIM universe in the emission inventory reporting. However, to be transparent and consistent with the 2016 AQMP, emission projections under the previous RECLAIM program are provided here separately as "former-RECLAIM" emissions. The South Coast AQMD adopted Rule 1109.1 in November 2021 to reduce NOx emissions from petroleum refineries and related operations in the Basin, which are the main drivers of former-RECLAIM NOx emission reductions in post-RECLAIM years. Former-RECLAIM SOx emission projections for 2037 were not subject to any additional controls.

Future growth projections were based on demographic growth forecasts for various socioeconomic categories (e.g., population, housing, employment by industry) developed by SCAG for their 2020 RTP/SCS. Industry growth factors for 2018 and 2037 were also provided by SCAG. Table 3-3 summarizes key socioeconomic parameters used in the 2022 AQMP emissions inventory development. Appendix III provides further detail on growth surrogates for different source sectors.

TABLE 3-3

BASELINE DEMOGRAPHIC FORECASTS IN THE DRAFT FINAL 2022 AQMP

Category	2018	2037	2037 % Growth from 2018
Population (Millions)	16.7	18.6	12%
Housing Units (Millions)	5.3	6.2	17%
Total Employment (Millions)	7.7	8.6	11%
Daily VMT (Millions)	388	406	5%

Current forecasts indicate that this region will experience population growth of 12 percent between 2018 and 2037, with a 5 percent increase in vehicle miles traveled (VMT). Housing units show the largest change of the socioeconomic indicators with a projected 17 percent increase from 2018 to 2037.

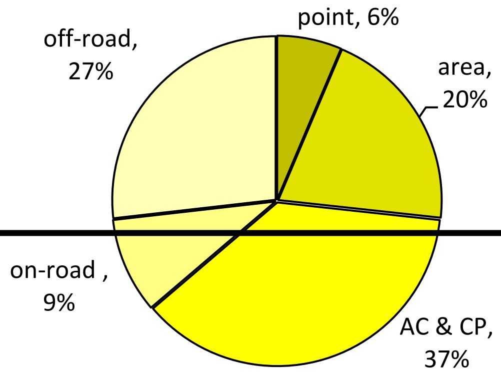
Summary of Future Baseline Emissions

To illustrate trends in future baseline summer planning inventories, emissions data by source category and pollutant for 2037 are presented in Table 3-~~4A and Table 3-4B for 2037~~4. Baseline inventories are projected future emissions that reflect already adopted regulations and programs but do not incorporate additional controls proposed in the 2022 AQMP. The 2018 base year emission inventory, which captures actual 2018 emissions, is used as the basis for future projections.

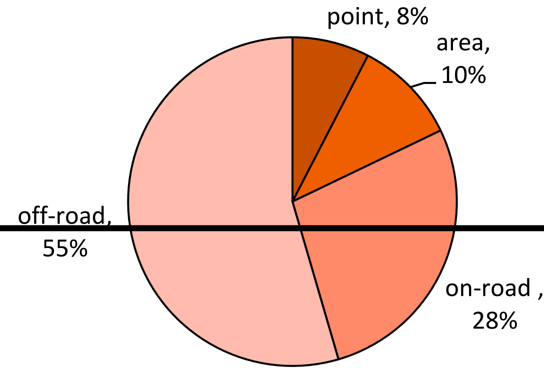
Without any additional control measures, VOC and NOx emissions are expected to decrease due to existing South Coast AQMD and CARB regulations and programs, such as controls for on- and off-road equipment, new vehicle standards, and Rule 1109.1 for refinery emissions. SOx and NH3 baseline emissions increase by ~~9~~4 percent and 10 percent, respectively, between 2018 and 2037. These emission increases are driven by increases in population and economic activity that outpace emission reductions from introducing cleaner equipment and vehicles. The increase in NH3 emissions is primarily driven by increased on-road NH3 emissions from adoption of NOx control from heavy-duty vehicles. Figure 3-5 shows relative contributions to the 2037 baseline inventory by source category. A comparison of Figures 3-3 and 3-5 indicates that area sources, including the consumer products category, continue to be the major contributor to VOC emissions. ~~Contributions from the on-road source category~~Contribution of mobile sources decline from ~~20~~46 percent of Basin total VOC emissions in 2018 to ~~only 9~~27 percent in 2037~~, while the total~~; both off-road and on-road sources show approximately 10 percent decline in their contribution ~~from the off-road category remain almost unchanged~~to VOC emissions in 2037. Mobile sources continue to be a major contributor to total NOx emissions. On-road contributions decrease from ~~46~~44 percent to ~~28~~20 percent in 2037, while contributions from off-road sources increase from ~~40~~41 percent to ~~55~~58 percent. The off-road source category also accounts for a larger fraction of CO emissions in 2037 (~~73~~53 percent) compared to 2018 (~~54~~49 percent), indicating that off-road mobile sources, including aircraft, OGV, and locomotives, account for a larger fraction of the entire inventory.

For directly emitted PM2.5, mobile sources account for 22 percent of total emissions in the 2037 inventory, a 7 percent decrease from the total mobile source contribution in 2018. This does not account for entrained dust emissions from paved and unpaved road, which shows a modest increase from 18 percent in the 2018 inventory to 20 percent in the 2037 inventory. Area sources excluding paved/unpaved road dust sources are projected to remain the predominant source of directly emitted PM2.5, contributing ~~42~~41 percent of emissions in 2018 and ~~46~~45 percent in 2037. Stationary sources are projected to remain the predominant source of SOx, with point sources contributing more than half of total SOx emissions in the Basin in 2037. However, OGVs are significant source of SOx emissions in the Basin, and growing OGV activity in future years is expected to increase SOx emissions at a faster rate than growth in point source emissions. The highest-ranking source categories in the 2018 and 2037 inventories are discussed in a later section.

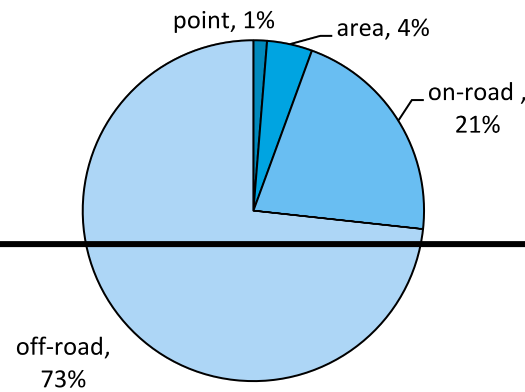
Figure 3-6 shows the fraction of the 2037 inventory by responsible agency for VOC, NOx, SOx, and directly emitted PM2.5 emissions. In 2037, slightly larger fractions of NOx and VOC emissions will fall under the South Coast AQMD control (~~33~~30 percent for VOC and ~~19~~20 percent for NOx) due to different relative rates of emission reductions among sources controlled by the three agencies. However, the majority of VOC and NOx emissions will remain primarily under CARB and U.S. EPA jurisdiction. NOx sources under federal control, such as OGVs (~~28~~31 tons per day), locomotives (~~15~~16 tons per day), aircraft (28 tons per day), out-of-state and international heavy-duty trucks (~~11~~5 tons per day), military portion of commercial harbor craft (1 ton~~s~~ per day), and pre-empted off-road equipment (~~9~~4 tons per day) contribute ~~42~~46 percent of total NOx emissions in the Basin in 2037, compared to ~~25~~28 percent in 2018, indicating growing disparity between regulations on federal sources and sources under State and local control. VOC emissions from consumer products, which are regulated by CARB, are projected to reach 132 tons per day in 2037, representing ~~34~~39 percent of total VOC emissions in the Basin. This increase in emissions, which mostly originate from the use of personal care, hygiene, and cleaning products, indicates population growth in the region. The fraction of SOx emissions that falls under the South Coast AQMD regulatory authority will remain largely unchanged from the 2018 base year inventory. Area sources, including entrained road dust, are projected to remain the largest contributor to PM2.5 emissions.



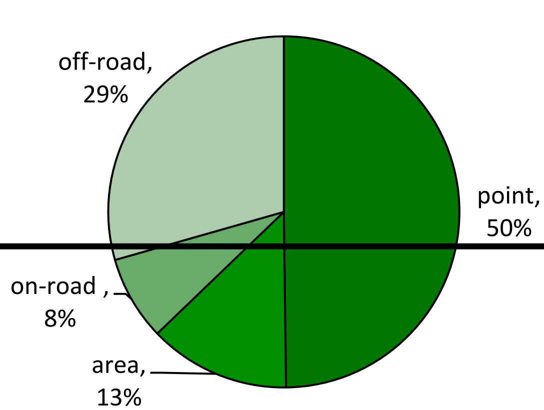
VOC Emissions: 389 tons/day



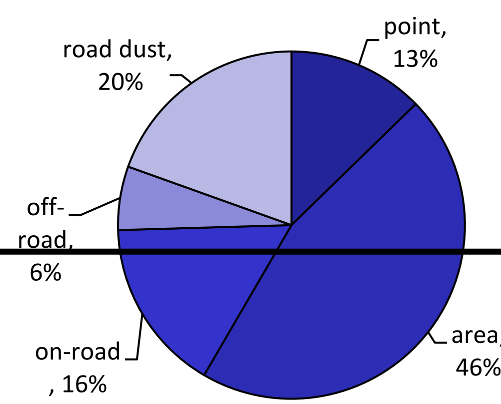
NOx Emissions: 220 tons/day



CO Emissions: 1700 tons/day



SOx Emissions: 16 tons/day



Directly Emitted PM2.5 Emissions: 59 tons/day

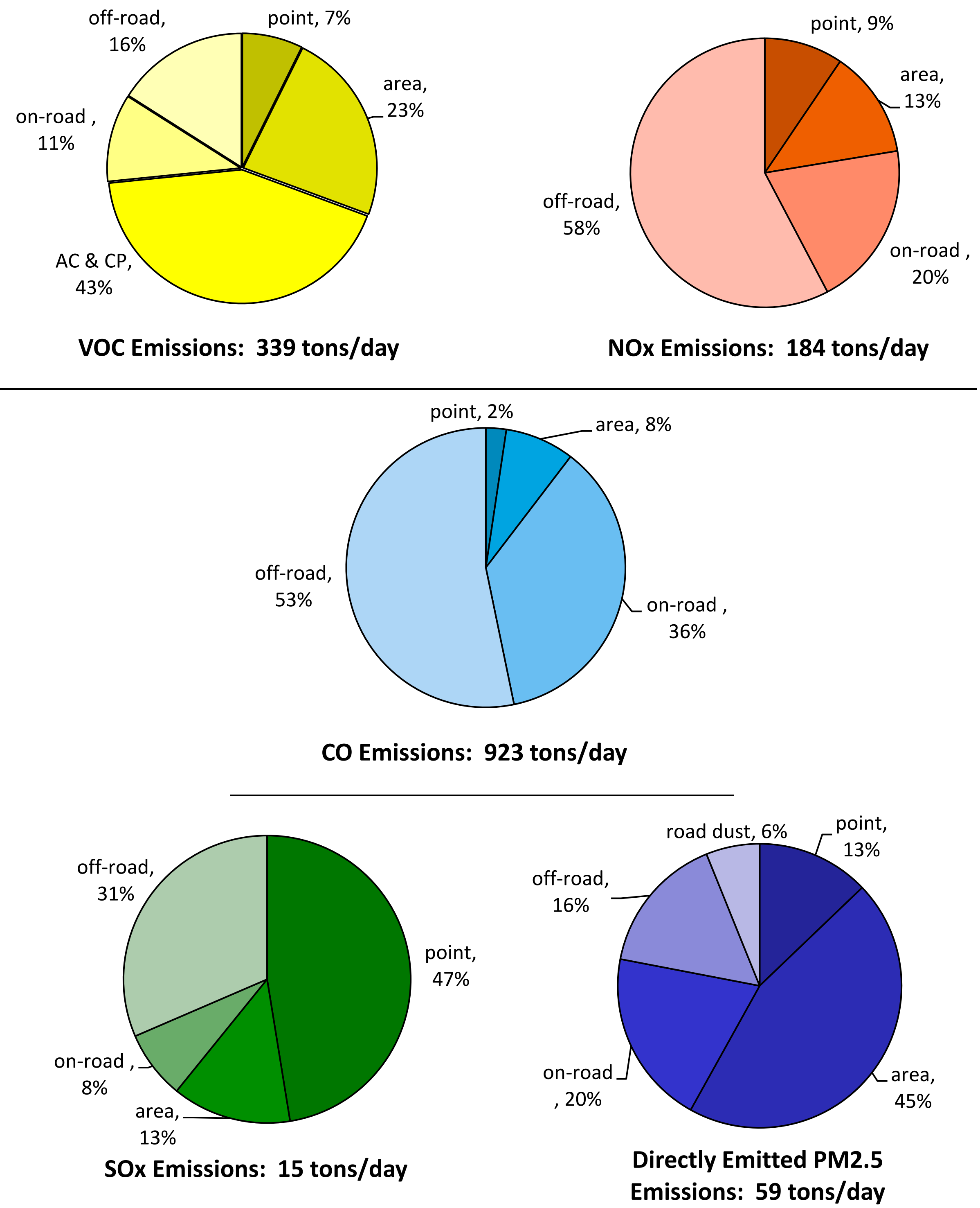
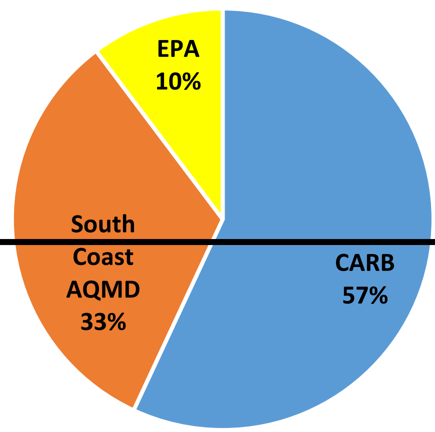


FIGURE 3-5

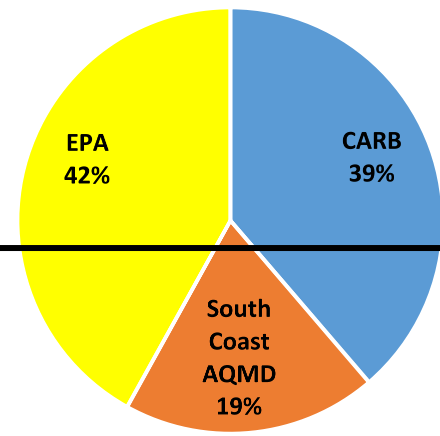
RELATIVE CONTRIBUTION BY SOURCE CATEGORY TO 2037 EMISSIONS INVENTORY

(*AC = ARCHITECTURAL COATINGS AND RELATED SOLVENT, CP = CONSUMER PRODUCTS*)

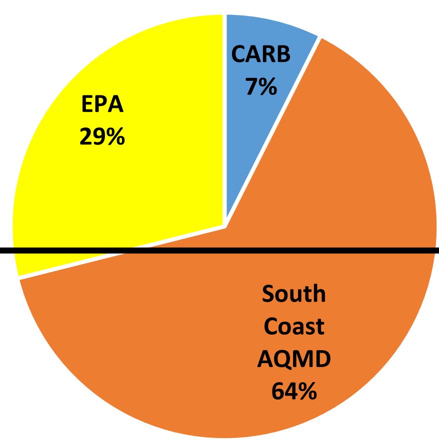
(*SUMMER PLANNING, VALUES ARE ROUNDED TO NEAREST INTEGER AND MAY NOT SUM DUE TO ROUNDING*)



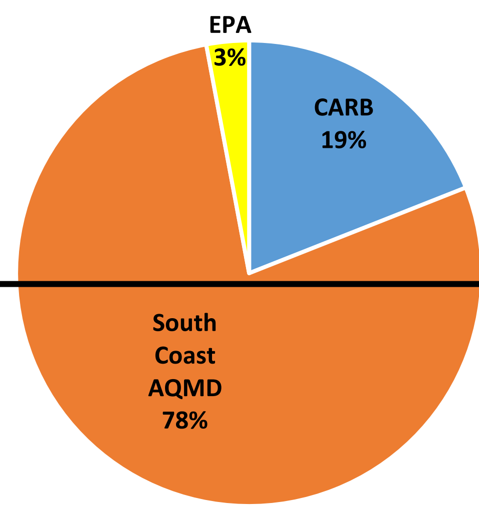
VOC Emissions: 389 tons/day



NOx Emissions: 220 tons/day



SOx Emissions: 16 tons/day



Directly Emitted PM2.5 Emissions: 59 tons/day

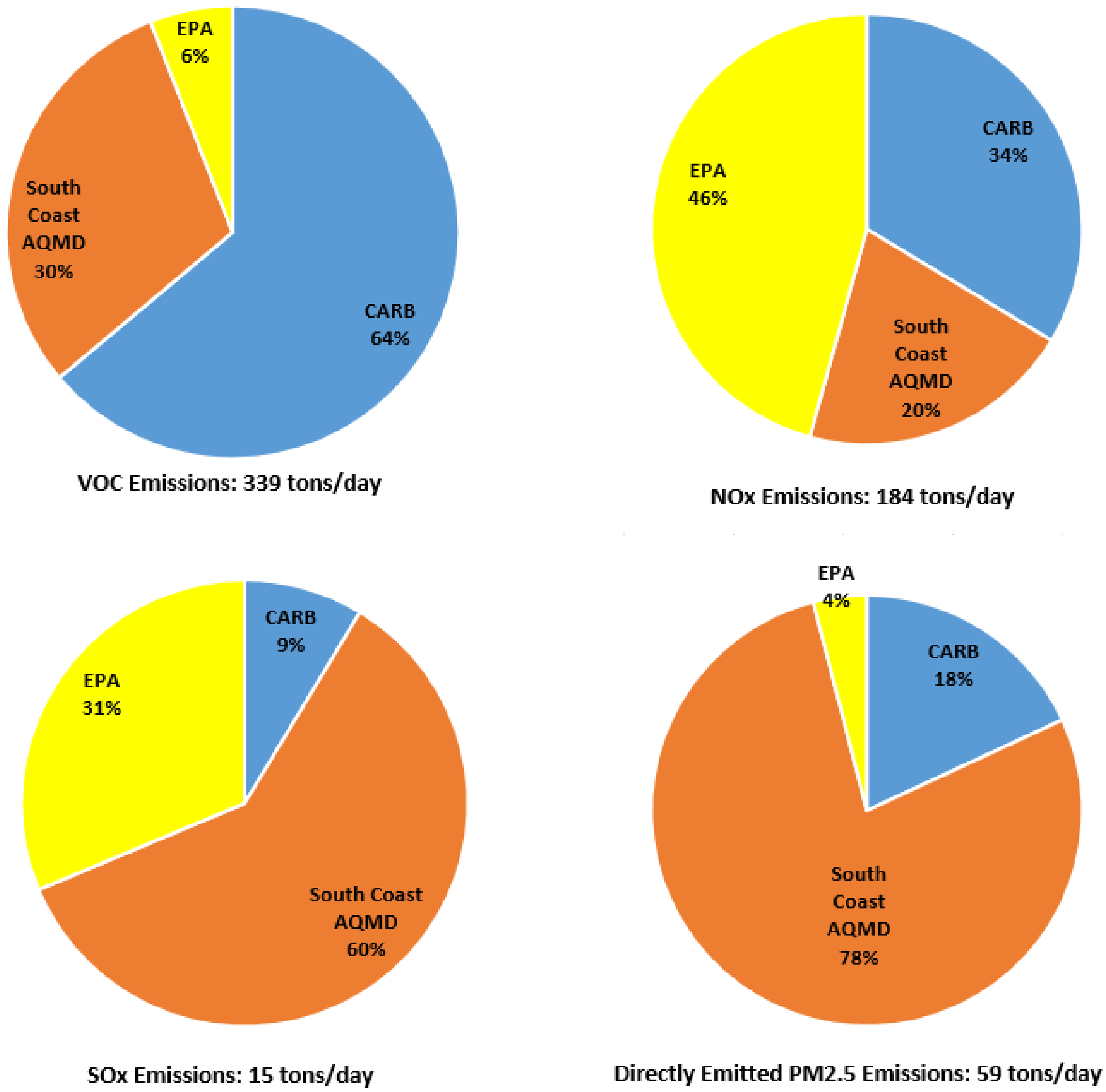


FIGURE 3-6

2037 EMISSIONS INVENTORY AGENCY RESPONSIBILITY

(*SUMMER PLANNING, VALUES ARE ROUNDED TO NEAREST INTEGER AND MAY NOT SUM DUE TO ROUNDING*)

TABLE 3-~~4A~~4

SUMMARY OF EMISSIONS BY MAJOR SOURCE CATEGORY: 2037 BASELINE SUMMER PLANNING (TONS PER DAY[1])

Source Category	Summer Planning					
	VOC	NOx	CO	SOx	PM25	NH3
Fuel Combustion	~~5~~6	~~26~~28	~~71~~72	~~7~~6	5	7
Waste Disposal	18	2	1	0	0	7
Cleaning and Surface Coatings	41	0	0	0	2	0
Petroleum Production and Marketing	20	1	3	2	1	0
Industrial Processes	11	1	1	1	6	9
Solvent Evaporation:						
Consumer Products	132	0	0	0	0	0
Architectural Coatings	12	0	0	0	0	0
Others	3	0	0	0	0	1
Misc. Processes[2]	5	10	~~20~~19	0	32	37
Total Stationary Sources	**~~248~~249**	**~~39~~41**	**~~95~~96**	**~~10~~9**	**46**	**61**
On-Road Vehicles	~~37~~36	~~61~~37	~~360~~336	1	~~10~~9	23
Off-Road Vehicles	~~104~~54	~~120~~106	~~1246~~492	5	~~3~~4	0
Total Mobile Sources	**~~141~~90**	**~~180~~143**	**~~1605~~827**	**6**	**13**	**24**
TOTAL	**~~389~~339**	**~~220~~184**	**~~1700~~923**	**~~16~~15**	**59**	**85**

[1] Values are rounded to nearest integer and may not sum due to rounding

[2] Includes entrained road dust

~~TABLE 3-4B~~

~~SUMMARY OF EMISSIONS BY MAJOR SOURCE CATEGORY: 2037 BASELINE WITH INDEPENDENT TRACKING OF FORMER-RECLAIM SOURCES SUMMER PLANNING (TONS PER DAY[1])~~

~~Source Category~~	~~Summer Planning~~					
	~~VOC~~	~~NOx~~	~~CO~~	~~SOx~~	~~PM2.5~~	~~NH3~~
~~Fuel Combustion~~	~~5~~	~~17~~	~~71~~	~~3~~	~~5~~	~~7~~
~~Waste Disposal~~	~~18~~	~~2~~	~~1~~	~~0~~	~~0~~	~~7~~
~~Cleaning and Surface Coatings~~	~~41~~	~~0~~	~~0~~	~~0~~	~~2~~	~~0~~
~~Petroleum Production and Marketing~~	~~20~~	~~0~~	~~3~~	~~0~~	~~1~~	~~0~~
~~Industrial Processes~~	~~11~~	~~0~~	~~1~~	~~0~~	~~6~~	~~9~~
~~Solvent Evaporation:~~						
~~Consumer Products~~	~~132~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~Architectural Coatings~~	~~12~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~Others~~	~~3~~	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~
~~Misc. Processes[2]~~	~~5~~	~~10~~	~~20~~	~~0~~	~~32~~	~~37~~
~~Former-RECLAIM Sources[3]~~	~~0~~	~~10~~	~~0~~	~~6~~	~~0~~	~~0~~
~~Total Stationary Sources~~	**~~248~~**	**~~39~~**	**~~95~~**	**~~10~~**	**~~46~~**	**~~61~~**
~~On-Road Vehicles~~	~~37~~	~~61~~	~~360~~	~~1~~	~~10~~	~~23~~
~~Off-Road Vehicles~~	~~104~~	~~120~~	~~1246~~	~~5~~	~~3~~	~~0~~
~~Total Mobile Sources~~	**~~141~~**	**~~180~~**	**~~1605~~**	**~~6~~**	**~~13~~**	**~~24~~**
~~TOTAL~~	**~~389~~**	**~~220~~**	**~~1700~~**	**~~16~~**	**~~59~~**	**~~85~~**

~~[1] Values are rounded to nearest integer and may not sum due to rounding~~
~~[2] Includes entrained road dust~~
~~[3] Accounting for the previous RECLAIM sources~~

Impact of Growth

The ~~draft~~Draft Final 2022 AQMP forecasts the 2037 emissions inventories ‘‘with growth’’ through a detailed consultation process with SCAG. The region is projected to see a 12 percent growth in population, 17 percent growth in housing units, 11 percent growth in employment, and 5 percent growth in vehicle miles traveled (VMT) between 2018 and 2037. To illustrate the impact of demographic growth on emissions, “no growth” emissions were estimated by removing the growth factors from 2037 baseline emissions. Table 3-5 presents a comparison of projected 2037 emissions with and without growth. The growth impacts to 2037 VOC, NOx, CO, SOx and directly emitted PM2.5 emissions are ~~46, 35, 183~~40, 25, 82, 1, and 5 tons per day, respectively.

While economic growth is beneficial for the region, it presents a challenge to air quality improvement efforts as projected growth could offset the progress made in reducing VOC, NOx, SOx, and PM2.5 emissions through adopted regulations from the South Coast AQMD and CARB. On September 27, 2019, the U.S. EPA and National Highway Traffic Safety Administration (NHTSA) published the “Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program.”[20] The Part One Rule revokes California’s authority to set its own greenhouse gas emissions standards and set zero emission vehicle mandates in California. The SAFE Vehicle Rule Part One impacts some of the underlying assumptions in CARB’s EMFAC 2017 model, which was used to estimates emissions from on-road mobile in ~~draft~~Draft Final 2022 AQMP. SAFE rule is expected to bring marginal increase for tailpipe emissions of NOx, hydrocarbons, carbon monoxide and particulate matter over the basin as a result of allowing additional gasoline fueled vehicle in the future.[21]~~.~~ However, U.S. EPA rescinded its 2019 withdrawal, thus reinforcing the 2013 California's Advanced Clean Car (ACC) program waiver, which includes waiving preemption for California’s zero emission vehicle (ZEV) sales mandate and GHG emissions standard (87 FR 14332)[22]. Meeting the U.S. EPA’s current 2015 8-hour ozone standard of 70 ppb and other NAAQS will require continued emission reduction efforts with shared responsibility from all levels of government.

[20] 84 FR 51310, https://www.govinfo.gov/app/details/FR-2019-09-27/2019-20672.

[21] https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_draft.pdf.

[22] https://www.federalregister.gov/documents/2022/03/14/2022-05227/california-state-motor-vehicle-pollution-control-standards-advanced-clean-car-program.

TABLE 3-5

GROWTH IMPACT TO 2037 EMISSIONS[1] IN TONS PER DAY

With Growth	VOC	NOx	CO	SOx	PM2.5
Point	25	17	22	~~8~~7	8
Area	~~223~~224	~~23~~24	~~73~~74	2	27
Road Dust	0	0	0	0	12
On-Road	~~37~~36	~~61~~37	~~360~~336	1	~~10~~9
Off-Road	~~104~~54	~~120~~106	~~1246~~492	5	~~3~~4
Total	**~~389~~339**	**~~220~~184**	**~~1700~~923**	**~~16~~15**	**59**
No Growth	**VOC**	**NOx**	**CO**	**SOx**	**PM2.5**
Point	23	~~16~~17	21	~~8~~7	7
Area	~~194~~193	~~23~~24	~~82~~83	2	~~25~~24
Road Dust	0	0	0	0	11
On-Road	~~35~~34	~~46~~30	~~358~~320	1	9
Off-Road	~~91~~48	~~100~~88	~~1056~~417	4	3
Total	**~~343~~299**	**~~185~~159**	**~~1517~~841**	**~~15~~14**	**54**
Impact of Growth	**VOC**	**NOx**	**CO**	**SOx**	**PM2.5**
Point	2	0	1	0	~~0~~1
Area	~~30~~31	0	-9	0	~~2~~3
Road Dust	0	0	0	0	1
On-Road	~~1~~2	~~15~~7	~~2~~16	0	~~1~~0
Off-Road	~~14~~6	~~20~~18	~~189~~75	1	~~0~~1
~~Total~~Total[2]	**~~46~~40**	**~~35~~25**	**~~183~~82**	**1**	**5**

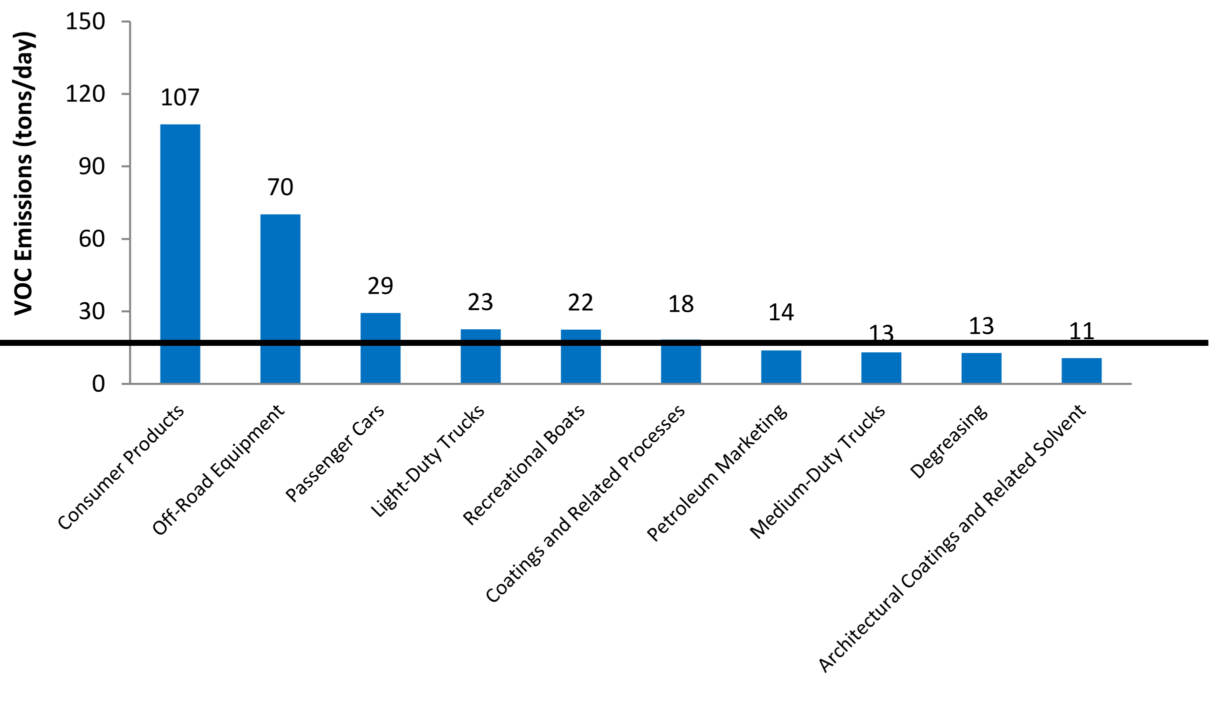
[1] Summary Planning Inventory

[2] Values are rounded to nearest integer and may not sum due to rounding

Top Ten Source Categories in 2018 and 2037

The top ten source contributors to 2018 and 2037 summer planning emissions inventories for VOC, NOx, SOx and directly emitted PM2.5 for years 2018 and 2037 are shown in Figures 3-7 to 3-14 and briefly discussed in this section. While the RECLAIM program will not exist in 2037, emissions from former-RECLAIM facilities are tracked separately and indicated where applicable to provide a clear comparison between 2018 and 2037.

Figures 3-7 to 3-8 provide the top ten source categories for VOC emissions in 2018 and 2037. These top ten categories account for approximately ~~77~~74 and ~~73~~72 percent of the total VOC inventories in 2018 and 2037, respectively. Consumer products and off-road equipment are the two highest-emitting categories in both years. Two of the top four categories are on-road mobile sources in the 2018 inventory, but no on-road sources rank in the top four categories in 2037. Additionally, light-duty trucks and medium-duty trucks are among top ten source categories in 2018 but drop out of the top ten in 2037. Decreasing contributions from on-road mobile sources reflect the effect of more stringent on-road standards in the future. ~~Motorcycles and ships~~Ships and commercial boats (combination of ocean-going vessels and commercial harbor ~~crafts) are~~craft) is projected to enter the top ten categories in 2037 ~~in a tie for ninth place~~but does not appear in 2018 top 10 VOC emissions bar chart. Recreational boats are still among the top ten source categories in 2037 but drop from fifth place in 2018 to ~~eighth~~ninth place in 2037.



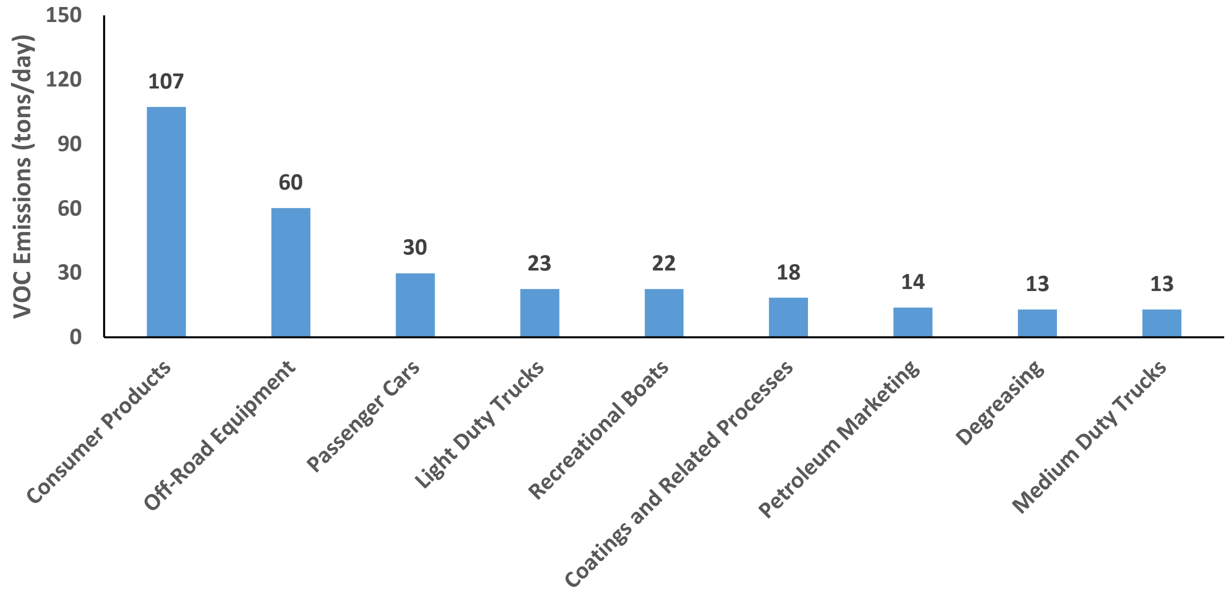
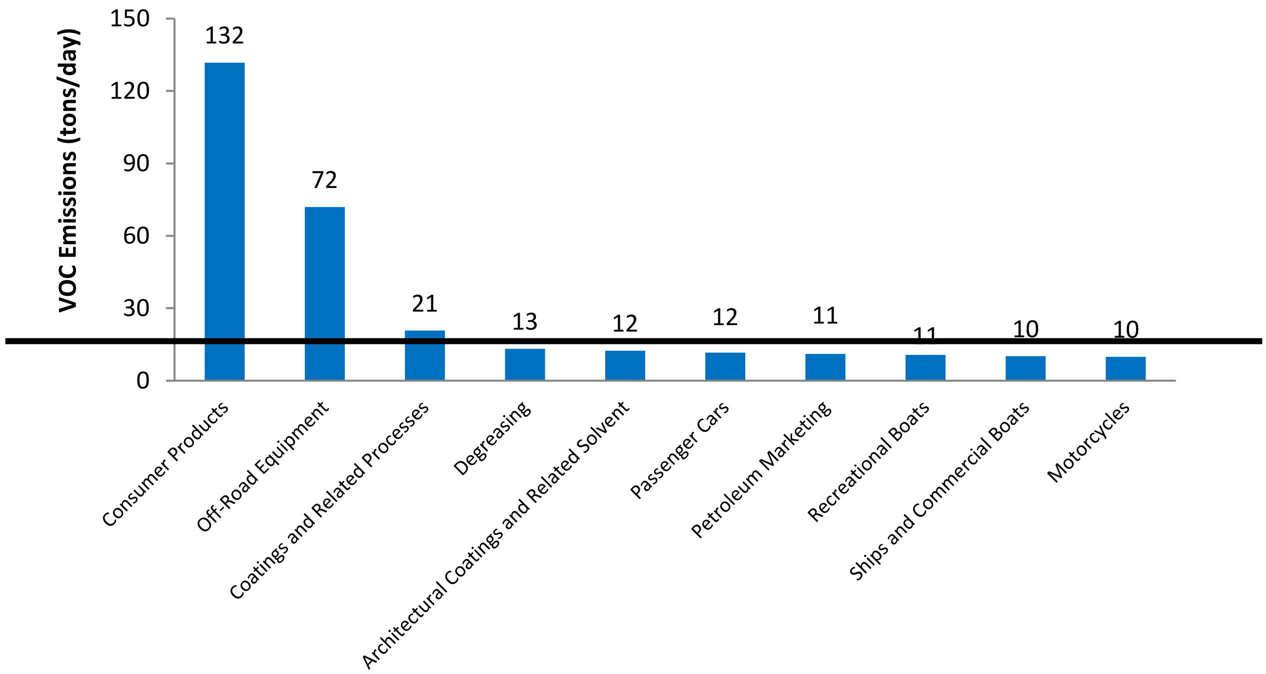


FIGURE 3-7
TOP TEN EMITTER CATEGORIES FOR VOC IN 2018
(*SUMMER PLANNING*)



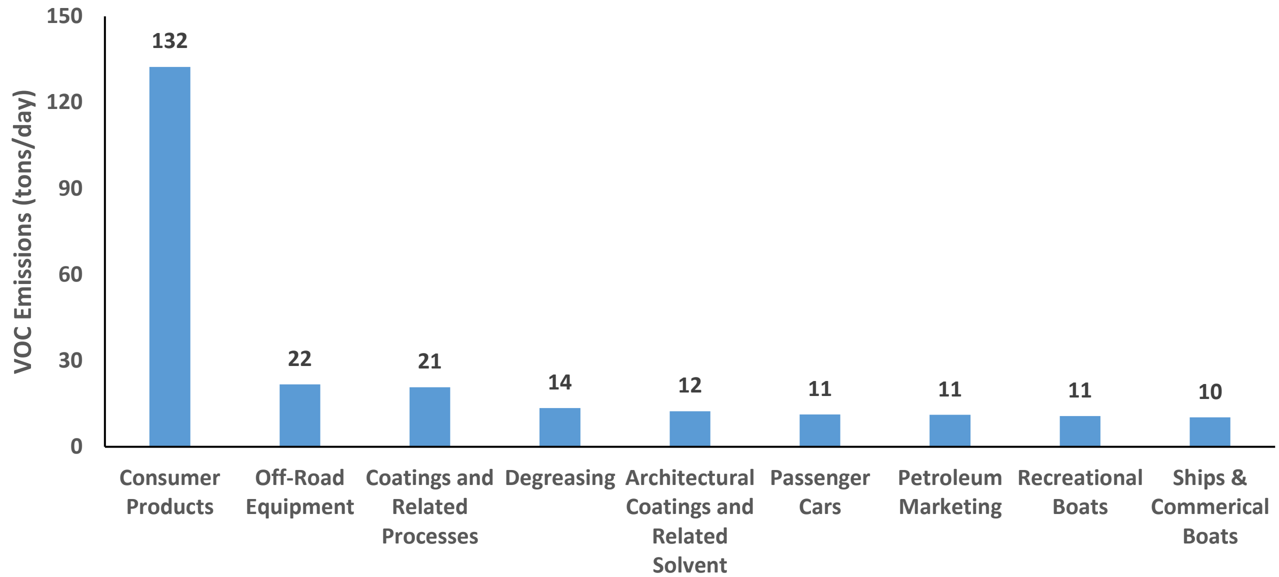
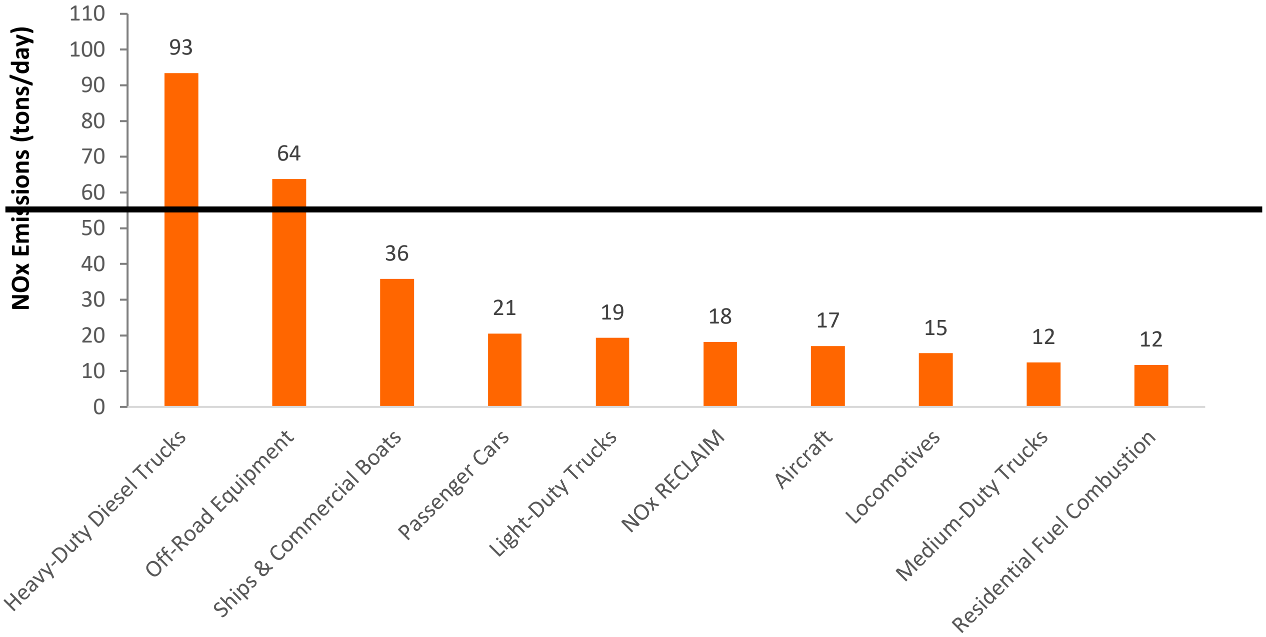


FIGURE 3-8
TOP TEN EMITTER CATEGORIES FOR VOC IN 2037
(*SUMMER PLANNING*)

Figures 3-9 to 3-10 show the top ten categories for NOx emissions in base year 2018 and future attainment year 2037 with former-RECLAIM sources depicted in hatched areas. The top ten categories account for 89 percent of the total NOx inventory in 2018 and ~~89~~79 percent and ~~90~~87 percent in 2037 when including and excluding former-RECLAIM sources in the source categories, respectively. Mobile source categories remain the predominant contributor to NOx emissions. Heavy-duty diesel trucks, off-road equipment, and ships and commercial boats are the top ~~three~~ emitters in both 2018 and 2037 (with or without former-RECLAIM sources). Aircraft emission raise from the ninth place in 2018 (17 tons per day) to the second place in 2037 (28 tons per day). NOx RECLAIM is the only non-mobile category which appears in the top ten list in 2018. As emissions from mobile source categories decrease due to the on-going implementation of regulations and programs, non-mobile sources appeared in the top 10 list in 2037, which are residential fuel combustion, service and commercial (1.4 tons per day former-RECLAIM/~~9.9~~10 tons per day total), and manufacturing and Industrial (1.~~6~~7 tons per day former-RECLAIM/6.2 tons per day total) sources. Additionally, passenger cars drop from fifth place in 2018 to ~~eight~~ninth place in 2037.



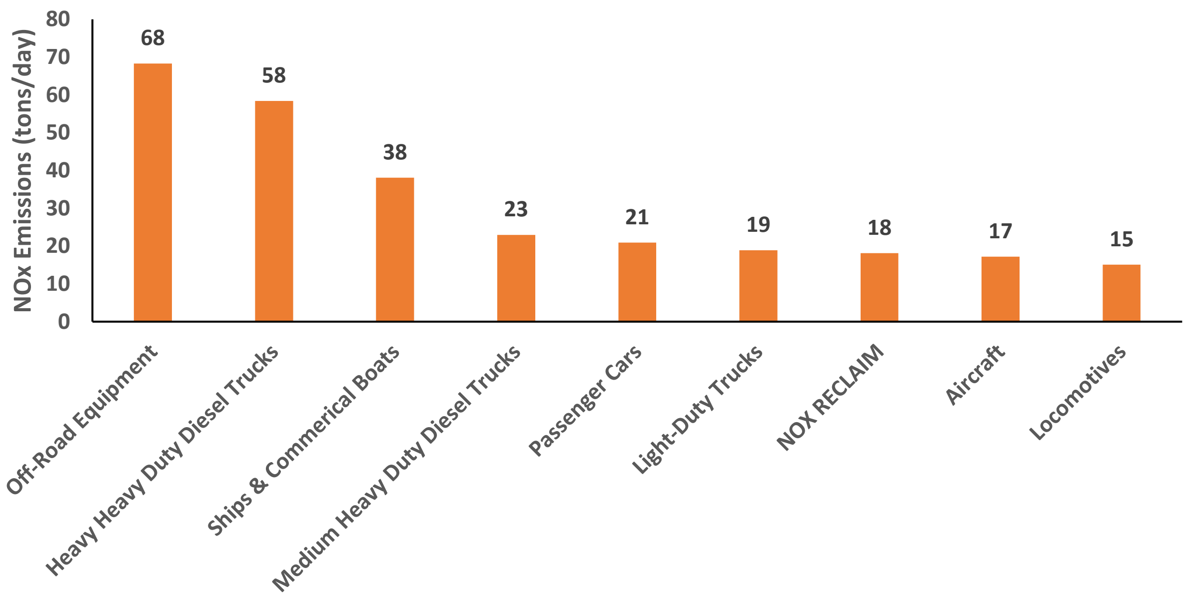
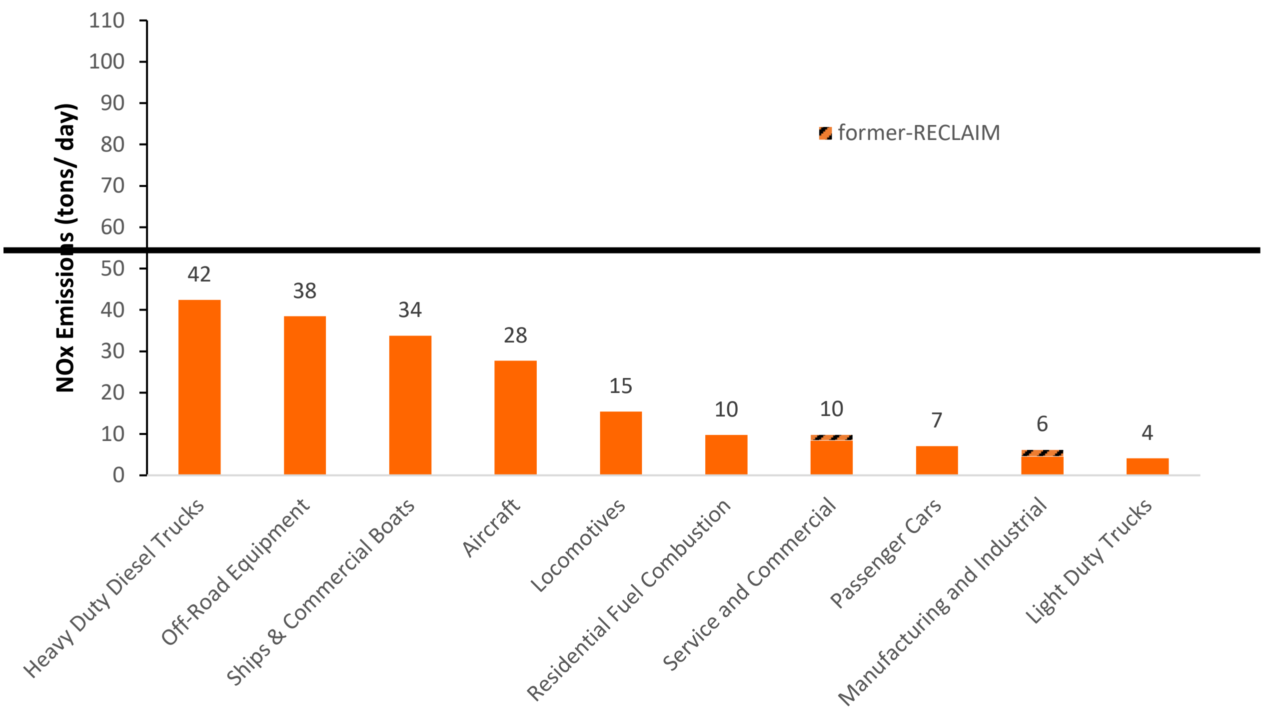


FIGURE 3-9
TOP TEN EMITTER CATEGORIES FOR NOx IN 2018

(*SUMMER PLANNING*)



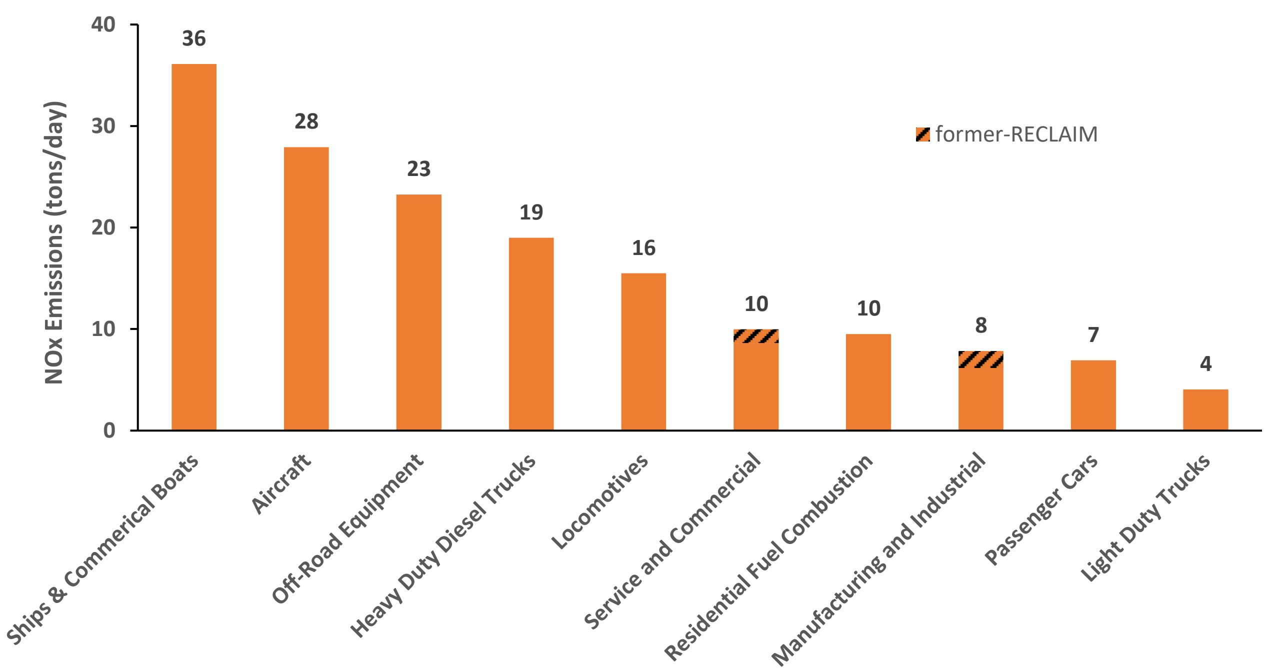
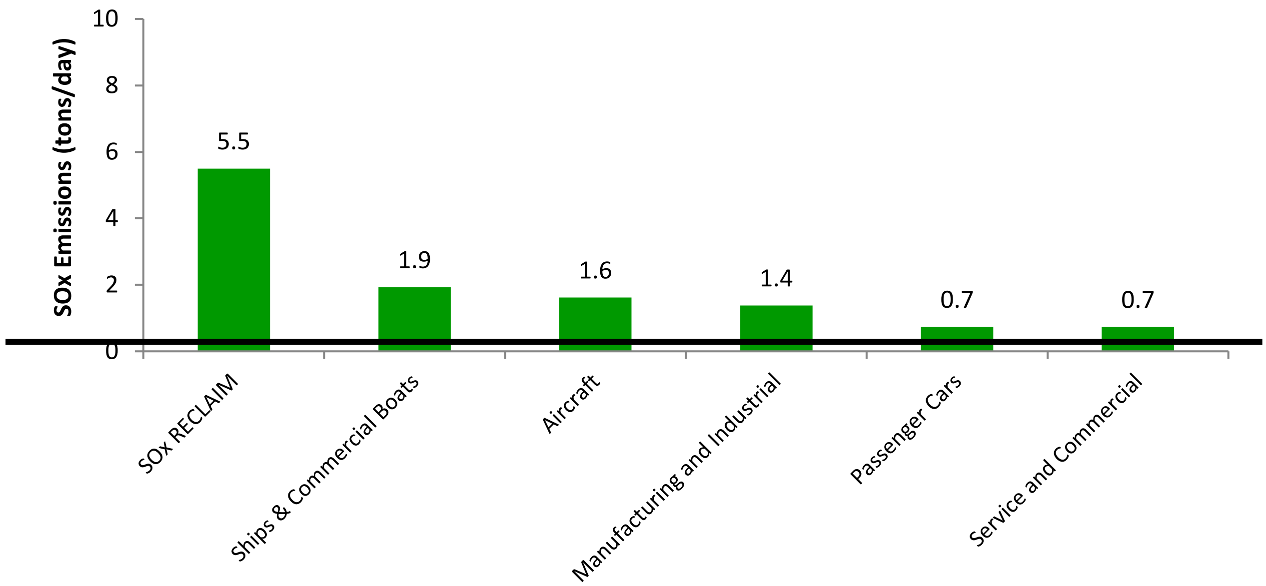


FIGURE 3-10

TOP TEN EMITTER CATEGORIES FOR NOx IN 2037

(*SUMMER PLANNING, FORMER-RECLAIM PORTION OF EACH SOURCE CATEGORY IS SHOWN WITH HATCHED AREAS*)

Figures 3-11 to 3-12 show the top source categories for SOx emissions in 2018 and 2037 with former-RECLAIM sources depicted in hatched areas. As SOx emission levels are relatively low in the basin, only categories that emit more than 0.5 tons per day of SOx are ranked and listed. This includes six categories in 2018, including SOx RECLAIM, which remain the high emitting categories in 2037 with SOx-RECLAIM sources distributed across several categories (fuel combustion in petroleum refining sector, manufacturing and industrial, and petroleum refining). The top six categories represent approximately 85 percent of total SOx inventory in 2018. The top seven categories represent ~~81~~84 percent of total SOx inventory in 2037, with former-RECLAIM sources contributing ~~34~~37 percent. Ships and commercial boats, and aircrafts remain ~~in second and third places of~~the top ~~seven~~four contributors to SOx emissions in the Basin; the top contributor in 2037 is petroleum refining (combustion) which is 100 percent attributed to former-RECLAIM. Among top seven emitter categories in 2037, ~~95~~84 percent of petroleum refining and ~~22~~36 percent of manufacturing and industrial emissions are from former-RECLAIM sources.



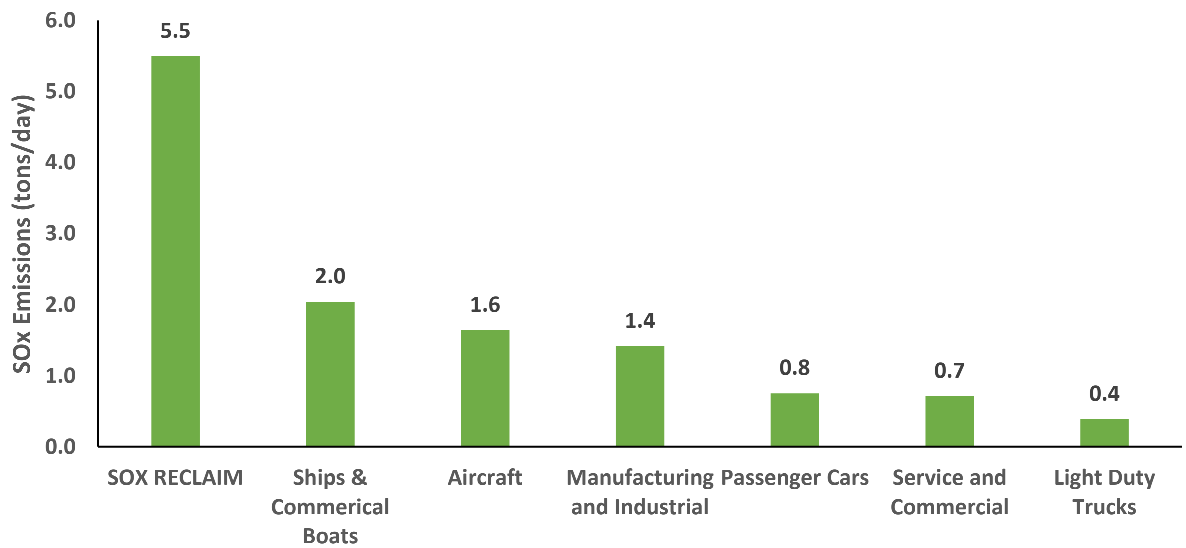


FIGURE 3-11

TOP EMITTER CATEGORIES FOR SOx 0.5 TONS PER DAY AND OVER IN 2018

(*SUMMER PLANNING*)

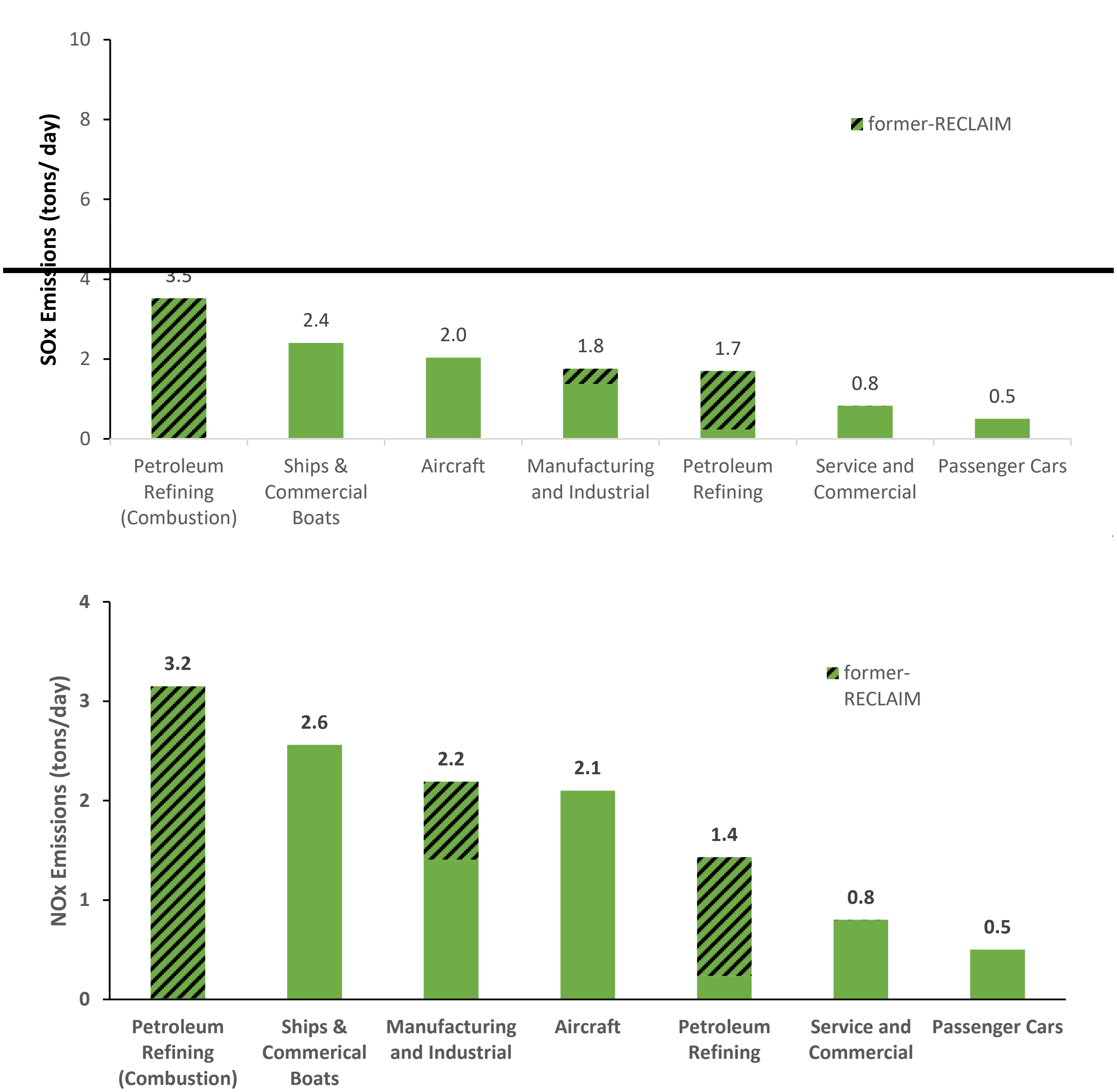


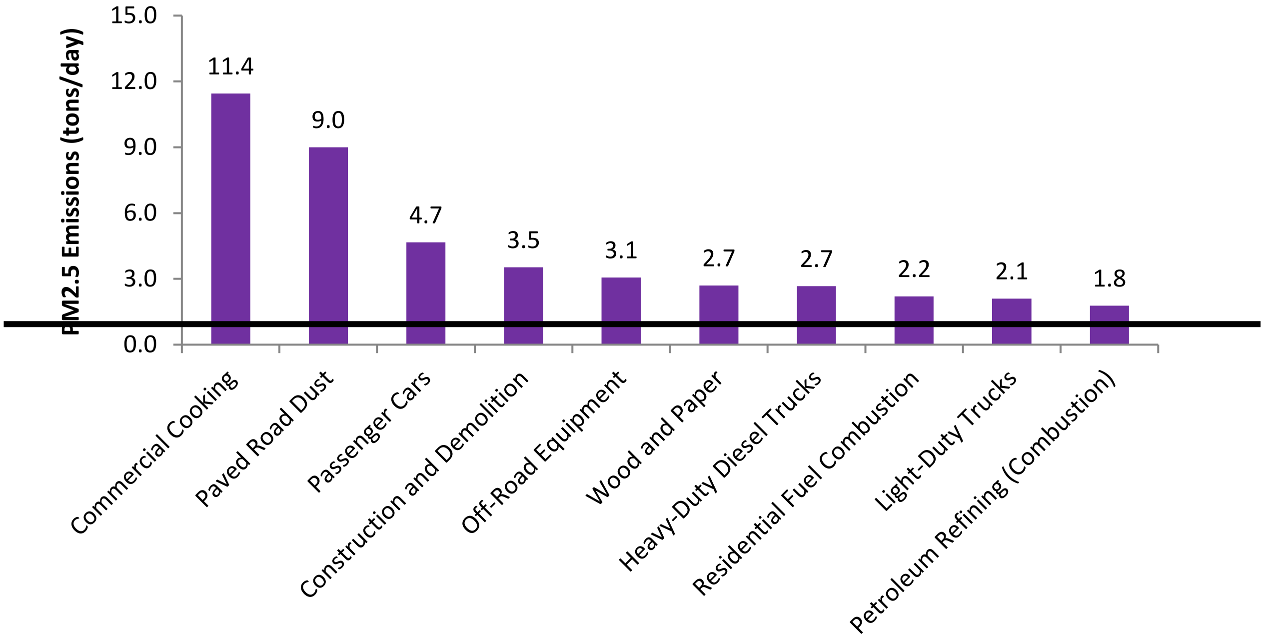
FIGURE 3-12

TOP EMITTER CATEGORIES FOR SOx 0.5 TONS PER DAY AND OVER IN 2037

(*SUMMER PLANNING, FORMER-RECLAIM PORTION OF EACH SOURCE CATEGORY IS SHOWN WITH HATCHED AREAS*)

Figures 3-13 to 3-14 show the top ten source categories for annual average directly emitted PM2.5 in 2018 and 2037. The top ~~ten~~ 10 categories represent ~~73~~72 percent of the total directly emitted PM2.5 inventory in 2018 and ~~74~~75 percent in 2037. Commercial cooking, paved road dust, residential fuel combustion, passenger cars, as well as wood and ~~construction and demolition~~paper source sectors are the top ~~four~~five highest emitting categories in both 2018 and 2037. ~~Compared with the 2016 AQMP, residential fuel~~

~~combustion ranks lower among the top PM2.5 source categories in both base year and future inventories due to updated activity data and emission factors.~~



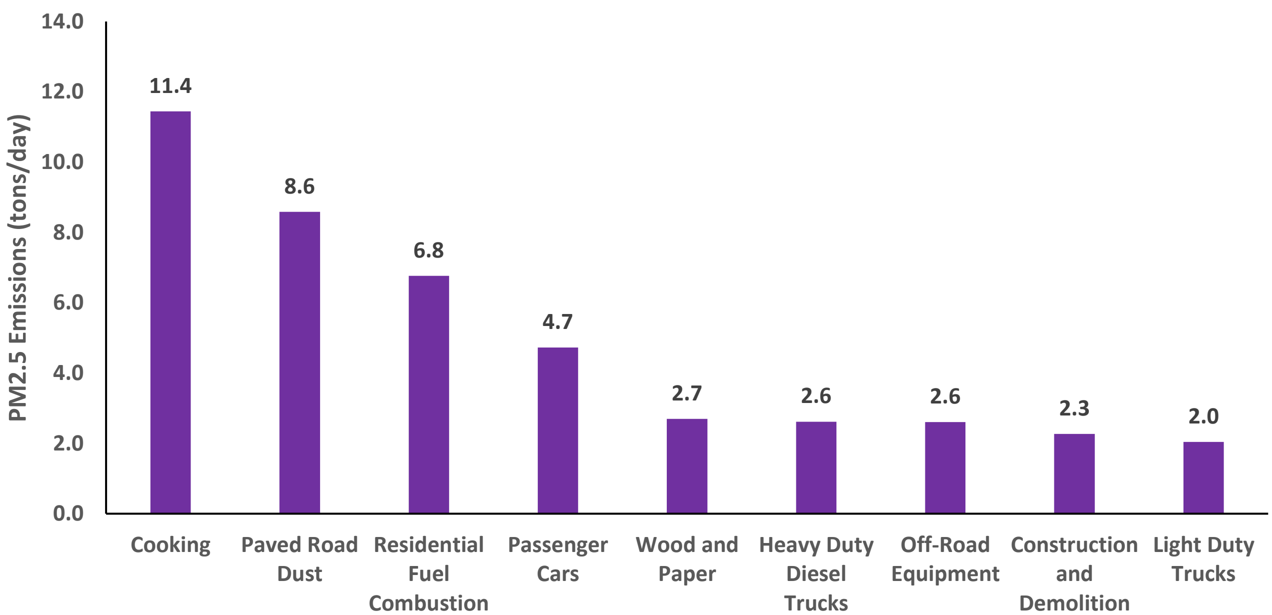
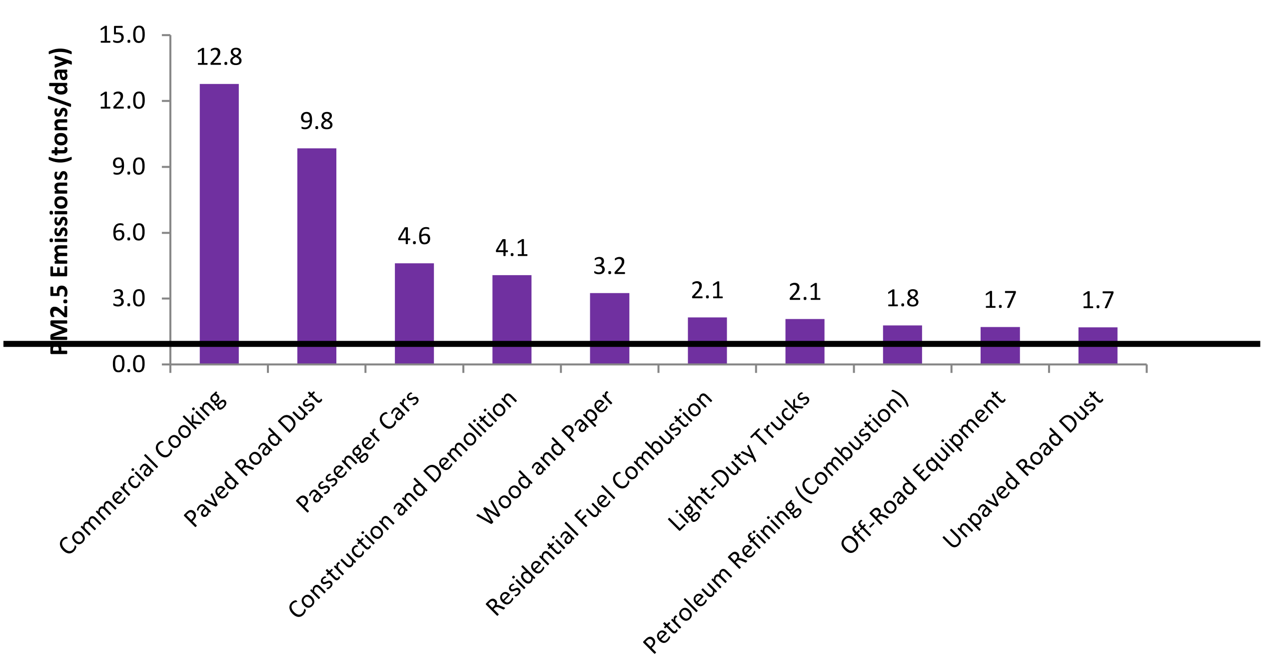


FIGURE 3-13

TOP TEN EMITTER CATEGORIES FOR DIRECTLY EMITTED PM2.5 IN 2018 ~~(SUMMER PLANNING)~~

(*ANNUAL AVERAGE*)



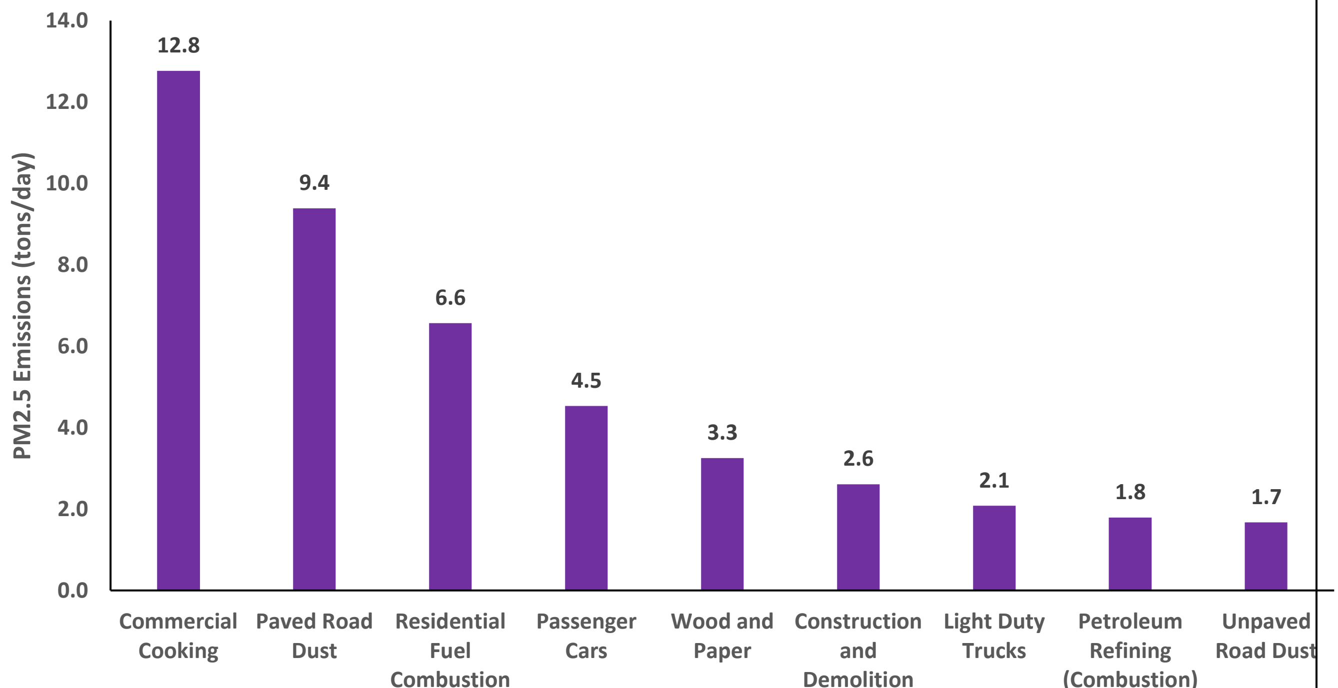
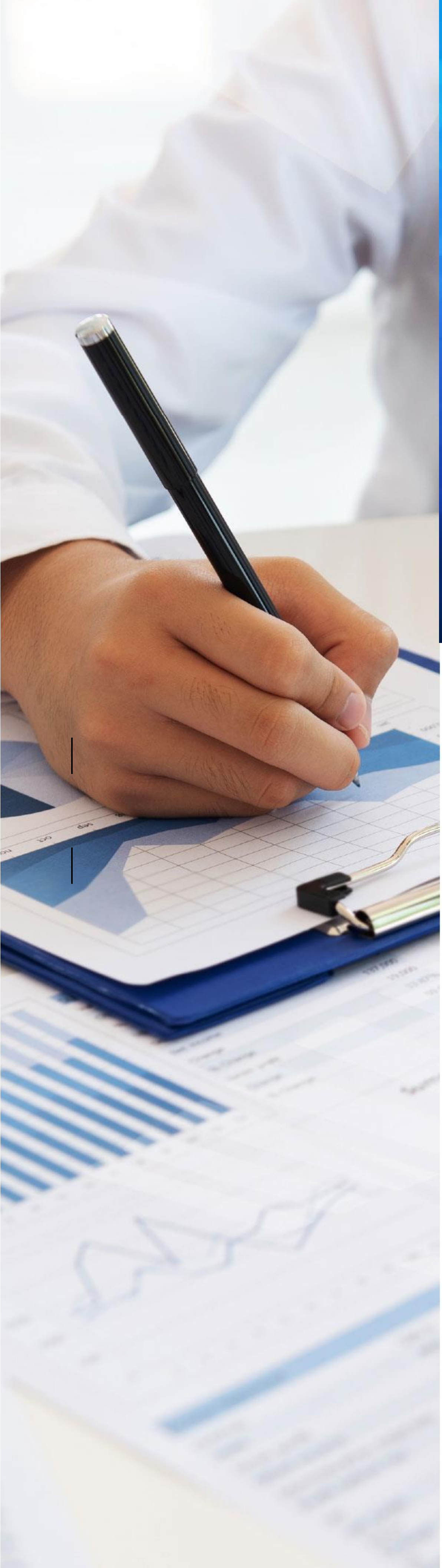


FIGURE 3-14

TOP TEN EMITTER CATEGORIES FOR DIRECTLY EMITTED PM2.5 IN 2037 ~~(*SUMMER PLANNING*~~ (*ANNUAL AVERAGE*)



Chapter 4

Control Strategy and Implementation

- **To attain the 2015 ozone standard, NOx emissions need to be reduced to ~~62.8~~60 tons per day by 2037. This represents a ~~71~~ 67 percent reduction in NOx emissions over baseline levels.**
- **NOx emissions from federally regulated sources alone will exceed the amount of NOx needed to attain by ~~50~~ 42 percent. Without substantial action by the federal government the region will be unable to attain the standard.**
- **The only viable pathway to achieve the required NOx reductions is through widespread adoption of zero emission technologies across all stationary and mobile sources.**
- **The needed transformation to zero emission technologies will require significant public and private investments and continued innovation and advancement on technologies.**
- **The control strategy includes innovative measures, such as residential and commercial building electrification, Facility-Based Mobile Source Measures, co-benefits from existing climate and energy efficiency programs, and incentives.**
- **Meeting the standard will require that the U.S. EPA acts to address sources within their authority such as ships, trains, and trucks.**
- **Implementation of the control strategy relies on additional regulations, accelerated deployment of available cleaner technologies, best management practices, and Clean Air Act section 182(e)(5) “black box” measures.**

In This Chapter

Introduction

The control strategy in the Draft Final 2022 Air Quality Management Plan (AQMP) provides the path to achieving emission reductions needed to meet the 2015 8-hour ozone NAAQS. Implementation of the 2022 AQMP will be based on a series of control measures and strategies that vary by source type (i.e., stationary or mobile) as well as by pollutant (i.e., NOx or VOC). This chapter outlines the proposed control strategy and the adoption and implementation schedule for the 2022 AQMP to achieve the 2015 8-hour ~~Ozone~~ozone standard in the Basin and the Coachella Valley.

To meet the 2015 ozone standard, NOx emissions must be reduced by ~~157~~124 tons per day, or about ~~71~~67 percent over baseline levels by 2037, and about ~~82~~83 percent below current levels. The preliminary baseline NOx emissions inventory is ~~220~~184 tons per day in 2037. This baseline reflects already adopted regulations and other controls currently in place. Meanwhile, the carrying capacity – the maximum amount of NOx in the atmosphere that results in attaining the standard – is approximately ~~63~~60 tons per day. The vast amount of NOx emission reductions needed to attain the standard poses a significant challenge. Traditional combustion controls and after controls will not be sufficient to achieve the level of NOx emission reduction needed for attainment. Instead, meeting the standard requires widespread adoption of zero emissions technologies where feasible, and the lowest emitting technologies where zero emission technologies are not feasible, across all emission sectors. Close collaboration with federal, State, and regional governments, businesses, and the public will be critical to tackling this challenge. Meeting the standard will also require that the federal government ~~acts~~act to address sources that are subject to federal regulation and beyond the regulatory authority of the South Coast AQMD and California Air Resources Board (CARB).

The Draft Final 2022 AQMP control strategy includes a variety of implementation approaches such as regulation, accelerated deployment of available cleaner technologies, best management practices, co-benefits from existing programs (e.g., climate, energy efficiency), incentives, and CAA section 182(e)(5) “black box” measures. Additional demonstration and commercialization projects will be crucial to help deploy and reduce costs for zero emission and low NOx technologies. A key element of AQMP implementation will be private and public funding from several sources to help further the development and deployment of these advanced technologies. Many of the same technologies will address both air quality and climate goals, such as increased energy efficiency and a transition to cleaner fuels. The total required emission reductions, technology readiness, cost-effectiveness, and economic impacts are critical considerations in developing a comprehensive and integrated control strategy.

Overall Strategy

The most significant air quality challenge in the Basin, and the primary driver for the control strategy, is the significant amount of NOx emission reductions required to meet the standard by the required attainment date ~~in~~, August 3 2038 – which requires the needed emission reductions to be in effect in 2037.

The challenge associated with the amount of emission reductions to reach attainment is depicted in Figure 4-1. The figure demonstrates the baseline reductions and strategy reductions required to reach attainment. The former is due to ongoing implementation of already adopted regulations and the latter represents reductions anticipated from the proposed control measures included in this chapter.

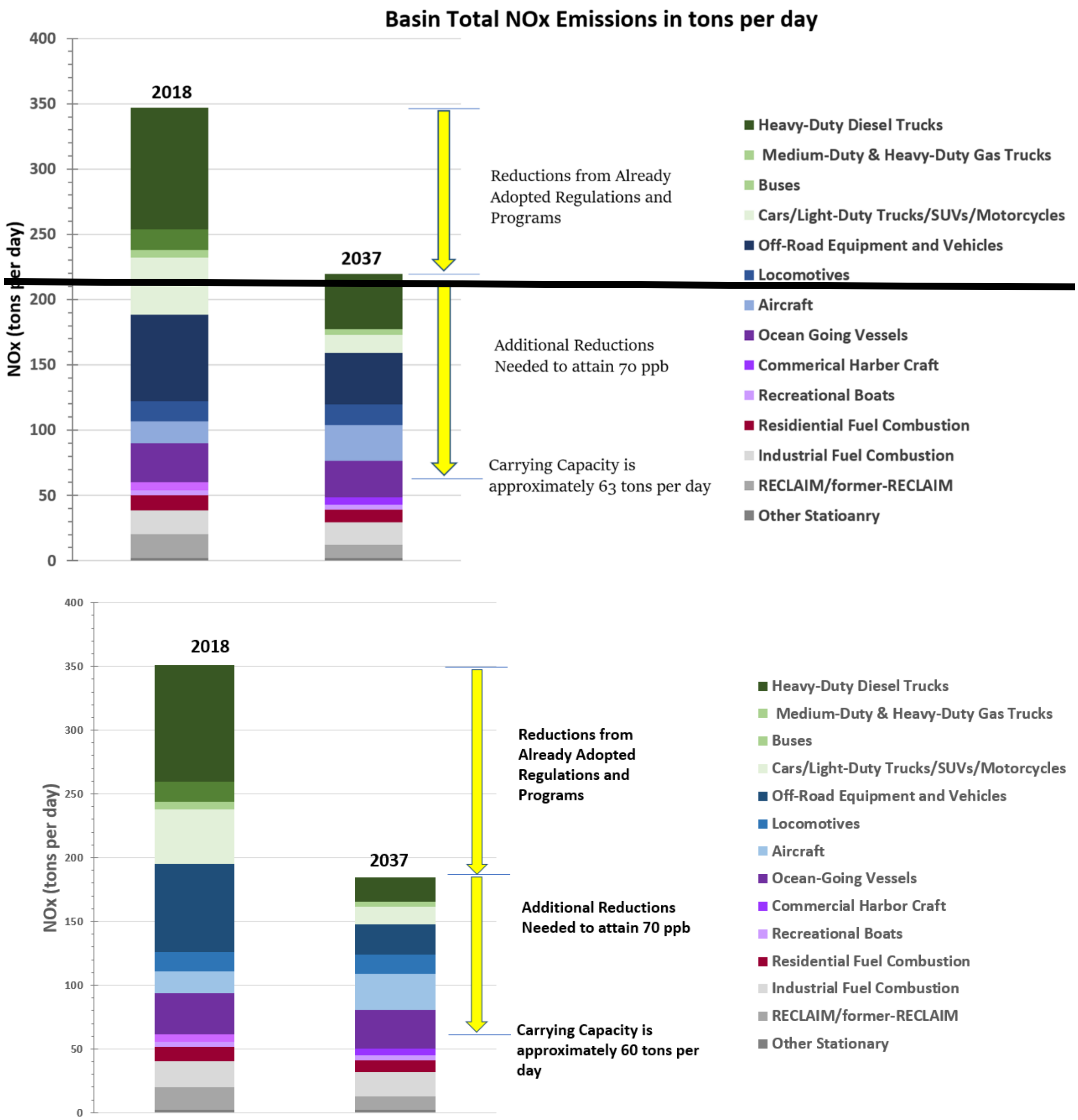


FIGURE 4-1

BASELINE NOX EMISSIONS INVENTORIES AND ADDITIONAL REDUCTIONS REQUIRED TO ATTAIN THE 70 PPB STANDARD

Control Strategy

South Coast AQMD staff have developed a comprehensive emission control strategy to achieve the necessary NOx emission reductions. The 2022 AQMP integrates a variety of control measures and implementation approaches in a cost-effective, feasible, and strategic fashion. Co-benefits from climate change programs and multi-pollutant management will likely produce concurrent benefits for ozone. Regional air quality modeling analysis indicates that significant NOx reductions with additional strategic, limited VOC reductions will result in the region attaining the 2015 ozone standard. The only viable pathway to achieve the standard requires a transformation to zero emissions technology where feasible across all sectors. ~~This includes relying on the development of new, zero emission and ultra-low NOx technologies where advanced control technologies are not yet available or feasible~~Air quality regulatory agencies have traditionally set policies and requirements that are performance-based. Such standards do not prescribe specific technologies or fuel usage provided the required level of emission control is achieved. This is a policy that the South Coast AQMD intends to continue.

The 2022 AQMP relies on the development of new, zero emission and on ultra low NOx technologies where advanced zero emission control technologies are not yet available or feasible. CAA section 182(e)(5) provides for reliance on the emission reductions from developing advanced technologies. These emission reductions are known as “black box” measures because the specific technologies or controls to achieve the emission reductions are not yet known. The rationale for allowing “black box” measures is that “extreme” ozone nonattainment areas have 20 years to attain the standard and, in that time, advanced technologies to achieve further emission reductions are presumed to become available. Control measures that rely on the development of new zero emission or low NOx technologies would utilize the flexibility provided by the Clean Air Act section 182(e)(5).

South Coast AQMD staff developed control measure concepts from a number of sources, including the AQMP Advisory Group, AQMP Working Groups, AQMP Control Measures Workshop, Reasonably Available Control Technology (RACT)/Reasonable Available Control Measures (RACM) Analysis (see Appendix VI), input from members of public and South Coast AQMD staff, and proposals from previous AQMPs. Six specialized working groups also supported the development of the 2022 AQMP:

1. Residential and Commercial Buildings Working Group;
2. Aircraft Working Group;
3. Ocean-Going Vessels Working Group;
4. Construction and Industrial Equipment Working Group;
5. Heavy-Duty Trucks Working Group; and
6. Zero Emissions Infrastructure Working Group.

Agendas and presentations for each working group meeting are available at the South Coast AQMD’s website.[1,2] As part of the 2022 AQMP control measure development, the South Coast AQMD and CARB

[1] Residential and Commercial Buildings Working Group, http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/2022-aqmp-residential-and-commercial-buildings-working-group.

[2] Mobile Source Working Groups, http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/2022-aqmp-mobile-source-working-groups.

staff conducted a joint AQMP Control Measures Workshop on November 10, 2021 to solicit new control concepts and innovative ideas from industry experts, professional consultants, government specialists, environmental and community representatives, and other stakeholders.

The South Coast AQMD, CARB, and Southern California Association of Governments (SCAG) play a role in developing and implementing measures to meet ozone standards. The overall control strategy in the Draft Final 2022 AQMP therefore consists of control measures developed by South Coast AQMD staff, measures developed by CARB as part of their ~~Draft~~ 2022 State SIP ~~strategy~~Strategy, and measures provided by SCAG as part of their Regional Transportation Strategy and Transportation Control Measures.

For each control measure, the estimated emission reductions and the cost-effectiveness are provided in the respective sections of the measures. These are initial estimates that will be refined during the implementation of the control measure. The control measures were developed accounting for technical and economic feasibility, as well as other factors, including ensuring that sources subject to different regulatory authorities achieved their fair share of emission reductions. Technological feasibility includes those technologies that may not be commercially available today, however, will be available upon implementation of the specific requirement that implements the control measure. Table 4-1 provides an overview of the criteria used in evaluating and selecting feasible control measures. The criteria are presented in alphabetical order.

TABLE 4-1

CRITERIA FOR EVALUATING 2022 AQMP CONTROL MEASURES

Criteria	Description
Cost-Effectiveness	The cost of a control measure per reduction of emissions of a particular pollutant. The cost includes purchasing, installing, operating, and maintaining the control technology.
Emission Reduction Potential	The total amount of emissions that a control measure can reduce.
Enforceability	The ability to ensure compliance with a control measure.
Legal Authority	Ability of the South Coast AQMD or other adopting agency to legally implement the measure.
Public Acceptability	The likelihood that the public will approve or cooperate in the implementation of a control measure.
Rate of Emission Reduction	The time it will take for a control measure to reduce a certain amount of air pollution.
Technological Feasibility	The likelihood that the technology for a control measure is or will be available.

Incentives and Funding

Incentives and funding will continue to be a critical component in implementing the control strategies. Substantial funding will be needed for research, technology demonstration, infrastructure, and early deployment of the new technologies. In addition, regulations alone will not be sufficient to achieve the magnitude of emission reduction needed. Incentive funds will be required to accelerate the deployment of advanced zero emission and cleaner technologies and associated fueling infrastructure. Incentive funding can be used to help promote deployment of technologies for both stationary and mobile sources. For stationary sources, incentive funds can help promote the transformation to zero emission technologies for small commercial and residential combustion sources such as water heaters and furnaces. For mobile sources, incentive funds can facilitate the replacement of older, high-emitting vehicles and equipment with the cleanest vehicles and equipment commercially available. A key consideration in deployment of incentives will be to ensure that environmental justice (EJ) areas are able to access advanced technologies and also benefit from the transition to zero emission technologies. The South Coast AQMD will therefore seek to prioritize incentive funding in EJ areas and seek opportunities to expand funding to benefit the most disadvantaged communities.

Close coordination with other agencies at federal, State and local levels will be necessary to achieve widespread adoption of clean technologies. It will be important to partner with entities beyond those typically involved with air quality planning. For example, fueling infrastructure must be significantly expanded to accelerate widespread adoption of zero emission vehicles and equipment and ultra-low emission technology where zero emission is not feasible. Getting to the needed deployment of infrastructure will require cooperation and coordination at the State (e.g., California Energy Commission and Public Utilities Commission) and local level with assistance from federal agencies, where available.

Federal Partnership

Federal partnerships will also be critical to meet the standard considering the significant additional emission reductions that will be necessary from sources for which the South Coast AQMD has limited regulatory authority. For example, aircraft and ocean-going vessels (OGVs) that are primarily regulated at the federal and international level, are ~~each~~ projected to emit ~~approximately 27~~28 and 31 tons per day, respectively, in 2037. Other such emission categories include locomotives, international and out-of-state trucks and pre-empted off-road equipment. The total emissions subject to federal and international authority are estimated to be ~~92~~84 tons per day in 2037 – about ~~29~~24 tons per day greater than the maximum amount of NOx that can still result in meeting the standard (see Figure 4-2). Given this, even if emissions from all sources subject to CARB and South Coast AQMD control were zero emissions, the region would fail to meet the 2015 ozone standard. The 2015 8-hour ozone standard will not be met absent significant action by the federal government to reduce emissions from sources subject to federal regulatory authority.

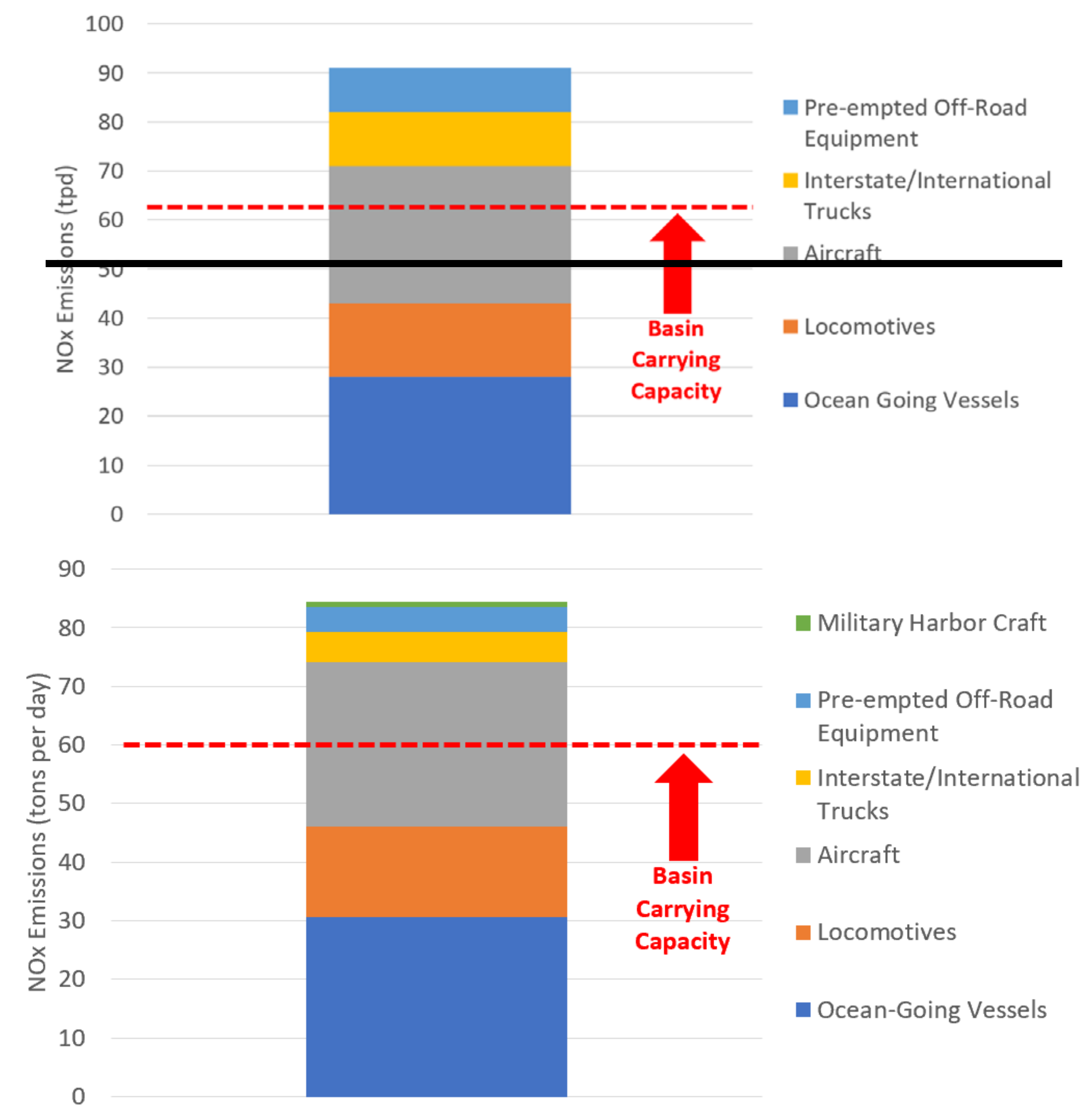


FIGURE 4-2
NOX EMISSIONS IN 2037 FROM SOURCES UNDER FEDERAL AND INTERNATIONAL AUTHORITIES IN RELATION TO THE CARRYING CAPACITY FOR THE 2015 8-HOUR OZONE NAAQS

The South Coast AQMD's primary regulatory authority to control emissions is for stationary sources with only limited authority to control mobile sources. This presents a challenge since mobile sources – namely heavy-duty trucks, ships, airplanes, locomotives and construction equipment – account for ~~over~~about 80 percent of NOx emissions. Meanwhile, stationary sources – such as power plants, refineries, and factories – are responsible for the remaining ~~19~~21 percent in 2037. It is impossible to discuss the challenge of mobile sources without examining the contribution of federal emission sources. More concerning is the contribution of mobile sources under federal regulatory authority is growing. In 2018, these sources only accounted for ~~25~~28 percent of the NOx emissions, yet their contribution is expected to increase to ~~42~~46 percent by 2037. The growing contribution of federal emission sources reflects aggressive action by CARB and the South Coast AQMD, while only modest actions have been taken by the U.S. EPA.

Without clear action to address federal emission sources, the emission reduction burden is unfairly being shifted to stationary sources, most of which are already subject to the most stringent controls in the nation. Regardless, the control strategy includes additional reductions for stationary sources with greater emphasis on small commercial and residential sources as well as additional reductions on industrial sources. The South Coast AQMD will continue to use its available regulatory authority to further control mobile source emissions where federal or State actions do not meet regional needs and to ensure the effectiveness of State and federal measures.

Chapter Overview

The following sections discuss the control measures, SIP commitments, overall emission reductions, and implementation as outlined below:

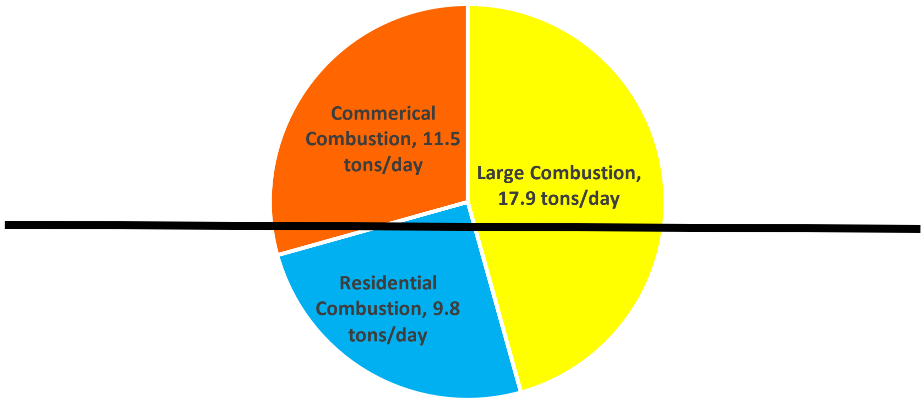
- The South Coast AQMD's Proposed Strategy to attain the 2015 8-hour ozone standard. Appendix IV-A provides detailed descriptions of South Coast AQMD stationary source and mobile source control measures;
- State and Federal Control Measures. Appendix IV-B provides detailed descriptions of the CARB Strategy;
- SCAG's Regional Transportation Strategy and Transportation Control Measures. Appendix IV-C provides detailed descriptions of the regional transportation strategy and control measures;
- Contingency Measures;
- SIP Emission ~~Reduction~~Reductions Commitment;
- Overall Emission Reductions; and
- Implementation of Proposed Control Strategy.

South Coast AQMD Proposed 8-Hour Ozone Strategy

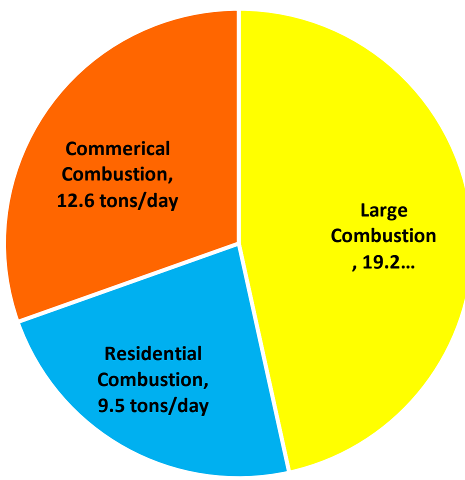
Meeting the 2015 8-hour ozone standard by its statutory deadline in 2037 will require both continuation and acceleration of existing ozone reduction strategies, as well as deployment of new strategies. Proposed measures to reduce ozone include stationary and mobile source NOx reduction strategies, supplemented by limited, strategic VOC emission reductions.

As discussed in a greater detail in Chapter 5, the carrying capacity – the maximum amount of NOx in the atmosphere that still allows for attainment of the standard – is approximately ~~63~~60 tons per day of NOx emissions. Relative to a 2037 baseline inventory of ~~220~~184 tons per day, NOx emissions must be reduced by approximately ~~71~~67 percent to attain the standard. Baseline NOx emissions for stationary point and area sources in the Basin are projected to be ~~39~~41 tons per day in 2037, which is approximately two-thirds of the carrying capacity. While stationary sources within the South Coast AQMD are already subject to some of the most stringent regulations in the country, additional reductions will still be needed in this sector to get down to the ~~63~~60 tons per day NOx carrying capacity.

The South Coast AQMD’s proposed ozone control measures are comprised of stationary and mobile source measures. Stationary source categories include: residential, commercial and large equipment. Each ~~of these groups~~group accounts for approximately one third of the entire stationary source inventory (see Figure 4-3). The control measures that cover stationary sources include traditional NOx controls, recognizing co-benefits from climate programs, incentives, limited, strategic VOC measures, and others. Stationary combustion sources can be replaced with new, lower or zero emission technologies, including low NOx or ultra-low NOx equipment and fuel cells for, but not limited to, combined heat and power (CHP). Electrification of equipment is another way to achieve substantial NOx emission reductions, especially when combined with renewable, non-combustion power generation. For residential and commercial water and space heating equipment, zero emission technologies are currently available as discussed in control measures R-CMB-01, R-CMB-02, C-CMB-01, and C-CMB-02.



Total NOx: 39.3 tons/day



Total NOx: 41.3 tons/day

FIGURE 4-3

STATIONARY SOURCE NOX EMISSIONS IN 2037

Substantial emission reductions will also be required from mobile sources to meet the standard. Mobile sources will account for ~~over~~about 80 percent of regional NOx emissions in 2037, or around ~~300~~240 percent of the carrying capacity. Therefore, mobile source controls must be a significant part of the control strategy.

South Coast AQMD's mobile source measures are categorized into ~~five~~four broad categories:

- **Emission Growth Management** addresses emission reductions from new or redevelopment projects by working with developers and local land use agencies on actions that mitigate emissions from affected projects;

- **Facility Based** mobile sources generate emissions from mobile source activity at locations such as the ports, railyards, or intermodal facilities;
- **On-road and Off-road Mobile Sources** focuses on, respectively, light, medium, and heavy-duty vehicles operating in the region, and equipment use in both construction and operational activities at industrial sites;
- **Incentives** fund a variety of sources to encourage early deployment of cleaner technologies; and
- ~~**Other** consider wildfire prevention and enhanced public outreach and education.~~

As shown in Figure 4-4, ~~the on-road heavy-duty truck category is~~ships and commercial boats are projected to be the single largest contributor to regional NOx emissions in 2037~~. Off~~, which comprise 20 percent of the total baseline emission in 2037. Aircraft, off-road equipment, ~~marine vessels, aircraft~~heavy-duty diesel trucks, and locomotives are also substantial sources of NOx emissions in the Basin. There are both currently available and emerging advanced technologies for trucks, locomotives, and cargo handling equipment with the potential to achieve zero emission and low NOx emission levels. These technologies include ultra-low NOx engines, hybrid-electric, battery-electric, fuel cell-electric, and hydrogen fuel cell on-road vehicle technologies. Next generation hybrids can also serve long-term needs while providing additional fuel diversity. These could include, for example, natural gas-electric hybrid technologies for on-road and other applications, particularly if coupled with improved after-treatment technologies. Alternative fuels such as natural gas have historically helped the region make progress toward attaining air quality standards and are generally cleaner than conventional fuels such as gasoline and diesel. Given the region's need to attain air quality standards in a time frame much shorter than 2037, alternative fuels will continue to play a major role in emission reductions especially for the near future to meet air quality standards with earlier attainment deadlines.

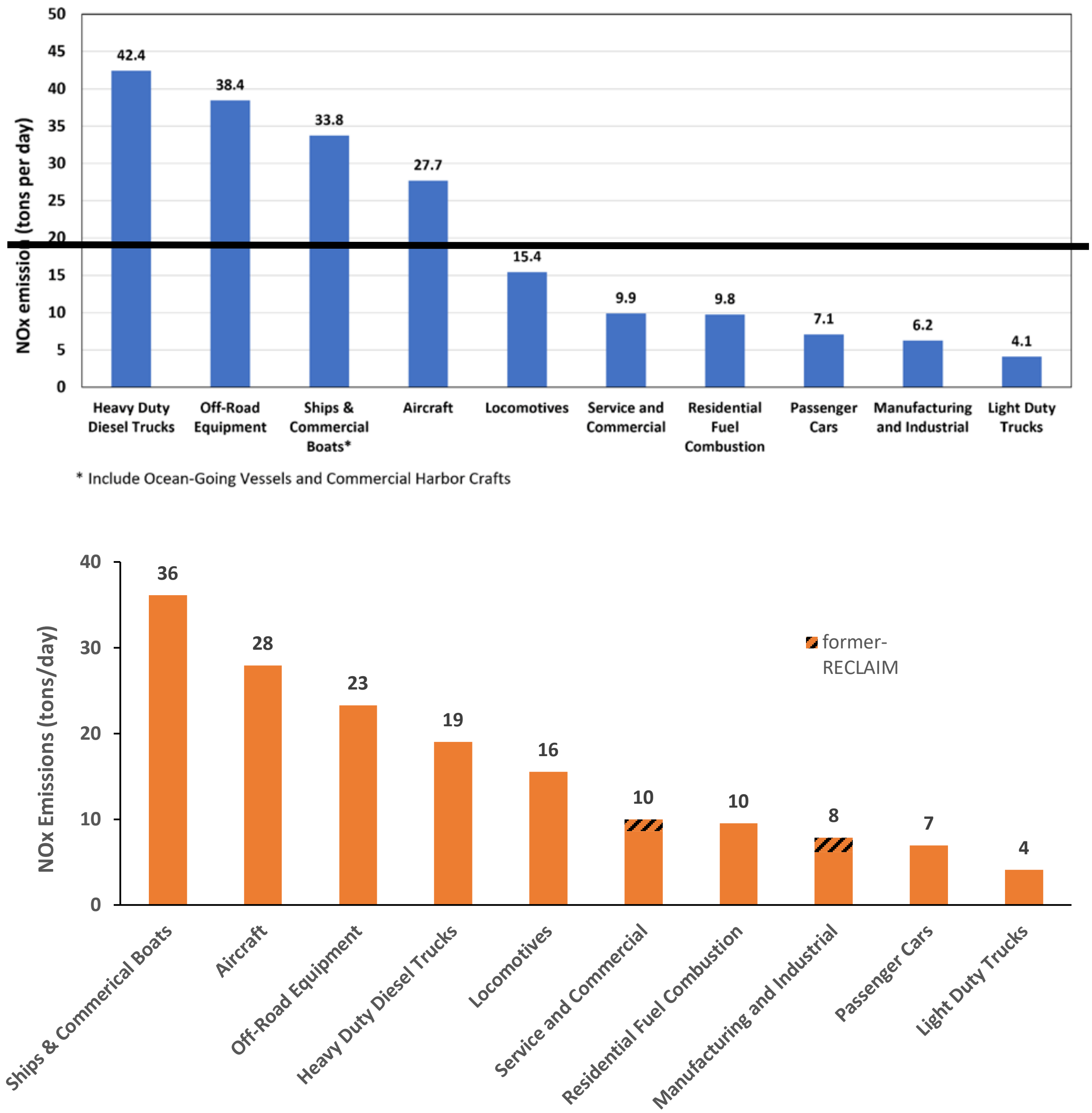


FIGURE 4-4

TOP 10 NOX EMISSIONS CATEGORIES AND CORRESPONDING NOX EMISSIONS (TONS PER DAY) IN 2037 IN THE SOUTH COAST AIR BASIN

(*SOURCE: 2022 AQMP SUMMER PLANNING INVENTORY*~~)~~*; FORMER-RECLAIM PORTION OF EACH SOURCE CATEGORY IS SHOWN WITH HATCHED AREAS*)

Given the substantial contribution of NOx emissions from heavy-duty trucks, more stringent federal engine standards will be crucial for attainment. While California has established State-based emission standards for heavy-duty trucks, these standards have limited reach over trucks that are registered out-of-state. The South Coast AQMD along with other air agencies petitioned the U.S. EPA to revise the federal heavy-duty truck standard in 2016.[3] The U.S. EPA estimates finalizing the proposed standards by the end of calendar year 2022, which would make the revised standards effective for model year 2027 and later vehicles. While the level of the final standard is currently unknown, preliminary analysis indicates that even the most stringent option proposed by the U.S. EPA will not provide the same level of emission reductions that would be achieved if the U.S. EPA adopted standards equivalent to the NOx standard (0.02 g/bhp-hr) in California's Omnibus rule. We therefore anticipate that additional action will be necessary to reduce emissions from heavy-duty trucks.

In addition to the defined control measures, emission reductions associated with further deployment of cleaner technologies will be necessary to meet the standard. As previously discussed, section 182(e)(5) of the CAA provides additional flexibilities for areas classified as "extreme" nonattainment for ozone, allowing reliance on the future deployment of advanced technologies that have not yet been developed or commercialized.

The 2016 AQMP relied heavily on these "black box" commitments in the attainment strategy for the 1997 and 2008 8-hour ozone standards. In the 2016 AQMP, the 2031 baseline NOx emissions were 214 tons per day and the carrying capacity was 96 tons per day, indicating that the "black box" accounted for over 80 percent of the required reductions. Compared to the magnitude of black box relied upon in the previous AQMP, only 3 tons per day of NOx reductions is assumed in the stationary source category in the 2022 AQMP. Additionally, the zero and low NOx emission technologies for stationary sources and some heavy-duty mobile sources needed for attaining the 2015 ozone standard are not fully evolved~~, so~~. As a result, reliance on section 182(e)(5) measures needs be maintained to provide flexibility and time for the development of new technology and improvement of existing technologies.

South Coast AQMD staff believes that a combination of strong regulatory actions and voluntary approaches using incentive funds for cleaner vehicles is the most effective means of achieving the needed emission reductions. In some cases, the incentive approach is the only way to address those sources currently without legal mandates to reduce emissions or beyond the reach of the South Coast AQMD authority. Other voluntary incentive programs, such as the Carl Moyer Program, provide a means to accelerate fleet turnover of outdated equipment to the cleanest commercially available equipment in a way that complements regulations. Incentive funds also play a key role in developing, demonstrating, and deploying new technologies, and significant additional investment will be needed to develop and deploy the advanced technologies needed to attain the standard at scale.

Voluntary agreements can also provide an avenue for emission reductions. For example, the South Coast AQMD reached agreements with the five major commercial airports in the Basin to reduce emissions from their operations. Each airport signed a Memorandum of Understanding (MOU) with the South Coast

[3] South Coast AQMD filed a petition asking U.S. EPA consider adoption of a standard at 0.02 g/bhp-hr, 90 percent lower than the current standard. In March 2022 the U.S. EPA proposed a suite of potential revised heavy-duty emission standards, ranging from 0.02 g/bhp-hr to 0.05 g/bhp-hr.

AQMD with enforceable commitments to implement a variety of measures to reduce emissions from ground support equipment, shuttle buses, and heavy-duty trucks.[4] This type of agreement is another way to achieve emission reductions outside of traditional regulatory approaches. Adopting a plan with sufficient measures to attain the ozone air quality standard is required under federal law. While the transition to cleaner technologies will be expensive, the public health benefits associated with meeting the standard will be substantial. There will also be significant co-benefits from related reductions in greenhouse gas (GHG) emissions, resulting in significant climate change benefits. By transitioning to cleaner transportation technologies, NOx emissions from transportation sources will be reduced, subsequently resulting in improved air quality, lower health risk across the region, and reductions in toxic risk and GHGs along goods-movement corridors. Failure to meet air quality standards would not only have negative public health consequences, but could also risk imposing adverse economic impacts on the region due to potential federal sanctions.

South Coast AQMD Proposed Stationary Source 8-Hour Ozone Measures

A control measure is a set of specific technologies and methods identified for potential implementation to reduce emissions to attain an air quality standard. The proposed stationary source ozone measures are designed to assist to attain the 2015 8-hour ozone standard primarily through NOx emission reductions with limited strategic VOC reductions. Co-benefits from GHG emissions reduction policies and other measures are included as well.

The NOx measures are further divided to three groups based on the scale of combustion equipment, which are Residential Combustion Sources (R-CMB), Commercial Combustion Sources (C-CMB), and Large Combustion Sources (L-CMB). Measures pursuing co-benefits from Energy and Climate Change Programs are grouped as ECC. VOC measures include Petroleum Operations and Fugitive VOC Emissions (FUG), Coatings and Solvents (CTS), Compliance Flexibility Programs (FLX), and Biogenic Sources (BIO). There are other measures such as Multiple Component Sources (MCS) and Public Outreach (FLX).

In the 2022 AQMP, the South Coast AQMD is proposing a total of ~~48~~49 control measures. Out of the ~~48~~49 proposed control measures, ~~30~~31 target reductions from stationary sources. South Coast AQMD's control measures focus on stationary sources as that is the area where South Coast has the strongest regulatory authority. The majority of these measures are anticipated to be developed in the next several years and implemented prior to 2037.

Table 4-2 provides a list of the South Coast AQMD proposed ozone measures for stationary sources along with anticipated emission reductions in 2032 and 2037. The following sections provide a brief description

[4] Due to the different emissions inventory versions used in the ~~draft~~ AQMP and the ~~draft~~ SIP strategy, the reductions indicated in this section do not match with the mobile source reductions reflected in the attainment demonstration. ~~In addition, HD I/M and SORE which were adopted in December 2021 were treated as baseline reductions in the draft SIP strategy, while they were considered as strategy reductions in the draft AQMP. The discrepancy will be resolved in the final version AQMP and SIP strategy.~~

of the proposed stationary source ozone measures. Detailed descriptions of the measures are provided in Appendix IV-A.

TABLE 4-2

SOUTH COAST AQMD PROPOSED STATIONARY SOURCE 8-HOUR OZONE MEASURES

Number	Title [Pollutant]	Emission Reductions ~~(tpd)~~ (tons per day) (2032/2037)
South Coast AQMD Stationary Source NOx Measures:		
Residential Combustion Source Measures:		
R-CMB-~~01~~01[a]	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Water Heating [NOx]	~~0.48~~ 0.46/ ~~1.29~~1.25
R-CMB-~~02~~02[a]	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Space Heating [NOx]	~~0.45~~ 0.44/ ~~1.20~~1.17
R-CMB-03	Emissions Reductions from Residential Cooking Devices [NOx]	~~0.30~~0.29 / ~~0.81~~0.79
R-CMB-04	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Other Combustion Sources [NOx]	~~1.17~~1.15 / ~~3.13~~3.09
	Total Residential Combustion Source Reductions	**~~2.4~~2.34 / ~~6.43~~6.30**
Commercial Combustion Source Measures:		
C-CMB-~~01~~01[a]	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Water Heating [NOx]	0.04 / 0.25
C-CMB-~~02~~02[a]	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Space Heating [NOx]	0.04 / 0.21
C-CMB-03	Emission Reductions from Commercial Cooking Devices [NOx]	0.21 / ~~0.62~~0.64
C-CMB-04	Emission Reductions from Small Internal Combustion Engines [NOx]	0 / ~~2.1~~2.25
C-CMB-05	NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted) [NOx]	0 / ~~4.24~~5.14
	Total Commercial Combustion Source Reductions	**0.29 / ~~7.42~~8.49**
Large Combustion Source Measures:		
L-CMB-01	NOx Reductions from RECLAIM Facilities [NOx]	0 / ~~0.28~~0.31
L-CMB-02	Reductions from Boilers and Process Heaters (Permitted) [NOx]	0 / ~~0.5~~0.45
L-CMB-03	NOx Emission Reductions from Permitted Non-Emergency Internal Combustion Engines [NOx]	0 / ~~0.31~~0.34
L-CMB-04	Emission Reductions from Emergency Standby Engines (Permitted) [NOx, VOCs]	0.0 / ~~2.0~~2.04
L-CMB-05	NOx Emission Reductions from Large Turbines [NOx]	0 / ~~0.06~~0.07
L-CMB-06	NOx Emission Reductions from Electricity Generating Facilities [NOx]	0.09 / ~~0.62~~0.91
L-CMB-07	Emission Reductions from Petroleum Refineries [NOx]	0 / ~~0.77~~0.89
L-CMB-08	NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works [NOx]	0 / 0.33
L-CMB-09	NOx Reductions from Incinerators [NOx]	0 / ~~0.89~~0.90
L-CMB-10	NOx Reductions from Miscellaneous Permitted Equipment [NOx]	0 / ~~1.16~~1.01
	Total Large Combustion Source Reductions	**0.09 / ~~6.92~~7.28**

TABLE 4-2 (CONTINUED)

SOUTH COAST AQMD PROPOSED STATIONARY SOURCE 8-HOUR OZONE MEASURES

Number	Title [Pollutant]	Emission Reductions ~~(tpd)~~ (tons per day) (2032/2037)
South Coast AQMD Co-Benefits from Energy and Climate Change Programs Measures:		
ECC-01	Co-Benefits from Existing and Future Greenhouse Gas Programs, Policies, and Incentives [NOx]	TBD / TBD[b]
ECC-02	Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures [NOx, VOCs]	TBD / TBD
ECC-03	Additional Enhancements in Reducing Existing Residential Building Energy Use [NOx, VOCs]	TBD / TBD
South Coast AQMD Stationary Source VOC Measures:		
FUG-01	Improved Leak Detection and Repair [VOCs]	0.6 / 0.6
FUG-02	Emission Reductions from Industrial Cooling Towers [VOCs]	TBD / TBD
CTS-01	Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants [VOCs]	0.5 / 0.5
FLX-02	Stationary Source VOC Incentives [VOCs]	TBD / TBD
BIO-01	Assessing Emissions from Urban Vegetation [VOCs]	TBD / TBD
L-CMB-04[c]	Emission Reductions from Emergency Standby Engines (Permitted) [NOx, VOCs]	0.0 / 0.1
	Total Stationary Source VOC Reductions	**1.1 / 1.2**
South Coast AQMD Stationary Source Other Measures:		
MCS-01	Application of All Feasible Measures [All Pollutants]	TBD / TBD
MCS-02	Wildfire Prevention [NOx, PM]	N/A / N/~~A~~A[d]
FLX-01	Improved Education and Public Outreach [All Pollutants]	N/A / N/A

a will be used to assist CARB's control measure, Zero-Emission Standard for Space and Water Heaters included in the 2022 State SIP

b TBD are reductions to be determined once the measure is further evaluated, the technical assessment is complete, and inventories and cost-effective control approaches are identified, and are not relied upon for attainment demonstration purposes.

c This is a NOx control measure with co-benefits of VOC reductions.[a]

d N/A are reductions that cannot be quantified due to the nature of the measure (e.g., outreach) or if the measure is designed to ensure reductions that have been assumed to occur will in fact occur.

~~b TBD are reductions to be determined once the measure is further evaluated, the technical assessment is complete, and inventories and cost-effective control approaches are identified, and are not relied upon for attainment demonstration purposes.~~

~~c This is a NOx control measure with co-benefits of VOC reductions.~~

South Coast AQMD Stationary Source NOx Measures

Residential Combustion Source Measures

There are four stationary source measures aiming to reduce NOx emissions from residential combustion equipment:

- R-CMB-01: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Water Heating
- R-CMB-02: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Space Heating
- R-CMB-03: Emissions Reductions from Residential Cooking Devices
- R-CMB-04: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Other Combustion Sources

R-CMB-01: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – RESIDENTIAL WATER HEATING: This control measure seeks to reduce NOx emissions from residential building water heating sources that are subject to Rule 1121 – Control of Oxides of Nitrogen (NOx) from Residential Type, Natural Gas-Fired Water Heaters. The measure proposes to: (1) develop a rule to require zero emission water heating units for installations in both new and existing residences; and (2) allow low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible (e.g., colder climate zones, or architecture design obstacles). This control measure would include incentive funds to facilitate the transition to zero emission technologies and promote further emission reductions earlier than required. A primary zero emission residential water heating technology is currently available with the all-electric heat pump water heater.

R-CMB-02: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – RESIDENTIAL SPACE HEATING: This control measure seeks to reduce NOx emissions from residential space heating sources regulated by Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces. The measure proposes to: (1) develop a rule to require zero emission space heating units for installations in both new and existing residences; and (2) allowing low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible. This control measure would also provide incentive funds to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required.

R-CMB-03: EMISSIONS REDUCTIONS FROM RESIDENTIAL COOKING DEVICES: This control measure seeks to reduce NOx emissions from residential cooking devices including stoves, ovens, griddles, broilers, and others in new and existing buildings. Replacing gas burners with electric cooking devices, induction cooktops, or low NOx gas burner technologies will reduce NOx emissions. NOx reductions will be pursued through a combination of regulatory approaches and incentive programs. Proposed method of control consists of two steps: step one includes a technology assessment of emissions testing of various cooking devices to establish emissions rates. Once emissions rates are defined, step two supports future rule development and incentive programs. The rule would apply to manufacturers, distributors, and installers establishing emission limits. The incentive programs would provide funds to encourage and promote adoption of zero and low NOx emission technologies.

R-CMB-04: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – RESIDENTIAL OTHER COMBUSTION SOURCES: This control measure seeks to reduce NOx emissions from residential combustion sources that are not water heating (See R-CMB-01), space heating (See R-CMB-02) and cooking equipment (See R-CMB-03). R-CMB-04 sources are miscellaneous, but primarily comprised of natural gas and liquified petroleum gas (LPG) fired swimming pool heaters, laundry dryers, and barbecue grills. The measure proposes to: (1) develop a rule to require zero emission technologies for some emission sources in both new and existing residences; and (2) allow low NOx technologies as an alternative for the rest of emission sources. Mitigation fees may be required for certain lower NOx technology applications which will be evaluated during the future rulemaking process. During the rulemaking, staff will assess the universe of equipment. Incentive funds will be considered to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required. Commercial Combustion Source Measures

There are five stationary source measures aiming to reduce NOx emissions from commercial combustion equipment:

- C-CMB-01: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Water Heating;
- C-CMB-02: Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Space Heating;
- C-CMB-03: Emission Reductions from Commercial Cooking Devices;
- C-CMB-04: Emission Reductions from Small Internal Combustion Engines; and
- C-CMB-05: NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted).

C-CMB-01: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – COMMERCIAL WATER HEATING: This control measure seeks to reduce NOx emissions from commercial building water heating sources that are subject to Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters. The measure proposes to: (1) develop a rule to require zero emission commercial water heating units for installations in both new and existing buildings; and (2) allow low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible. This control measure would also provide incentive funds to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required.

C-CMB-02: EMISSION REDUCTIONS FROM REPLACEMENT WITH ZERO EMISSION OR LOW NOX APPLIANCES – COMMERCIAL SPACE HEATING: This control measure seeks to reduce NOx emissions from commercial building space heating sources. (i.e., forced air furnaces) with a rated heat input capacity between 175,000 and 2,000,000 BTU per hour. Those sources are currently not subject to the South Coast AQMD NOx rules. The measure proposes to: (1) develop rules to require zero emission commercial space heating units for installations in both new and existing buildings; and (2) allow low NOx technologies as a transitional alternative when installing a zero emission unit is determined to be infeasible. This control measure would also provide incentive funds to facilitate adoption of zero emission technologies that would promote further emission reductions earlier than required. Heat pumps have been broadly applied in commercial applications as the primary zero emission technology.

C-CMB-03: EMISSION REDUCTIONS FROM COMMERCIAL COOKING DEVICES: This control measure seeks to reduce NOx emissions from commercial cooking devices including stoves, ovens, griddles, broilers, and others in new and existing buildings. Replacing gas burners with electric cooking devices, induction cooktops, or low NOx gas burner technologies will reduce NOx emissions. NOx reductions will be pursued through a combination of regulatory approaches and incentive programs. Proposed method of control consists of two steps: step one includes a technology assessment of emissions testing of various cooking devices to establish emissions rates. Once emissions rates are defined, step two supports future rule development and incentive programs. The rule will apply to manufacturers, distributors, and installers establishing emission limits. The incentive programs would provide funds to encourage and promote adoption of zero and low NOx emission technologies.

C-CMB-04: EMISSION REDUCTIONS FROM SMALL INTERNAL COMBUSTION ENGINES: This control measure seeks to reduce NOx emissions from non-permitted engines rated 50 brake horsepower or below. Such engines may be used in generators, pumps, or air compressors. Operators of these engines can include private residences or business and governmental entities. Because these small engines are not subject to South Coast AQMD regulations, approaches to reducing emissions will focus on education and outreach and incentive programs to encourage consumers to purchase zero emission technologies. Improved technologies and resulting cost reductions are anticipated to ease the transition towards zero emission alternative technologies.

C-CMB-05: NOX REDUCTIONS FROM SMALL MISCELLANEOUS COMMERCIAL COMBUSTION EQUIPMENT (NON-PERMITTED): This control measure seeks to reduce NOx emissions by replacing combustion with zero and low NOx emission technologies on miscellaneous unpermitted combustion equipment. Such equipment includes ovens, furnaces, dryers, and other fuel combustion equipment too small to require a permit. Zero emission technologies~~, including electrification~~ will be used where and when technically feasible and cost-effective. This control measure will develop rules to require zero and low NOx emission technologies at point-of-sale, establish incentive programs to facilitate adoption of cleaner technologies, and reassess permit and source specific exemption thresholds.

Large Combustion Source Measures

In the large combustion sources category, there are 10 proposed NOx control measures:

- L-CMB-01: NOx Reductions for RECLAIM Facilities
- L-CMB-02: Reductions from Boilers and Process Heaters (Permitted)
- L-CMB-03: NOx Emission Reductions from Permitted Non-Emergency Internal Combustion Engines
- L-CMB-04: Emission Reductions from Emergency Standby Engines (Permitted)
- L-CMB-05: NOx Emission Reductions from Large Turbines
- L-CMB-06: NOx Emission Reductions from Electricity Generating Facilities
- L-CMB-07: Emission Reductions from Petroleum Refineries
- L-CMB-08: NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works
- L-CMB-09: NOx Reductions from Incinerators
- L-CMB-10: NOx Reductions from Miscellaneous Permitted Equipment

L-CMB-01: NOX REDUCTIONS FOR RECLAIM FACILITIES: This control measure reduces NOx emissions by transitioning NOx RECLAIM facilities to a command-and-control regulatory structure requiring BARCT level controls. Source categories covered by this control measure include metal melting and heating furnaces, food ovens, and nitric acid tanks. The following rules would implement this control measure: Proposed Rule 1147.2 – NOx Reductions from Metal Melting and Heating Furnaces (PR 1147.2); Proposed Amended Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens (PAR 1153.1); and Proposed

Rule 1159.1 – Control of NOx Emissions from Nitric Acid Tanks (PR 1159.1). Staff is proposing to evaluate a variety of different NOx control technologies depending on the type of NOx source.

L-CMB-02: REDUCTIONS FROM BOILERS AND PROCESS HEATERS (PERMITTED): This control measure reduces NOx emissions by replacing or retrofitting boilers and process heaters used in industrial, institutional, and commercial operations with zero and low NOx emission technologies. It would apply to units with a rated heat input greater than or equal to 2 million BTU per hour. Boilers and process heaters used in industrial, institutional, and commercial operations with a rated heat input greater than or equal to 2 million BTU per hour are currently regulated under Rules 1146 and 1146.1. This control measure will establish rules to set standards for new equipment, replacements, or retrofits of boilers and process heaters.

L-CMB-03: NOX EMISSION REDUCTIONS FROM PERMITTED NON-EMERGENCY INTERNAL COMBUSTION ENGINES: This control measure targets emission reductions from permitted non-emergency internal combustion engines rated over 50 bhp regulated by Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines. It proposes to transition, older, higher-emitting engines in the RECLAIM program to newer technology that can meet the NOx emission limits set forth in Rule 1110.2. Low NOx and zero emission technologies may be available in the future and will be evaluated to determine feasibility of implementation.

L-CMB-04: EMISSION REDUCTIONS FROM EMERGENCY STANDBY ENGINES (PERMITTED): This control measure seeks reductions of NOx emissions from emergency standby engines rated over 50 brake horsepower. Over 12,000 internal combustion engines are permitted for emergency standby power in the South Coast AQMD, however due to the essential nature, limited operations of these engines, and high replacement costs, multiple approaches are proposed to reduce emissions from this source category. The approaches involve an education and outreach program to encourage the transition to zero- emission technologies. Regulatory strategies include replacing older, higher emitting engines with cleaner engines or with alternative technologies, requiring the use of lower emission fuels, and a future prohibition of the use of Internal Combustion Engines for emergency backup power. As alternative technologies mature and new technologies emerge, the South Coast AQMD will undertake rulemaking to maximize emission reductions utilizing zero emission equipment where cost-effective and feasible and low NOx emission equipment in all other applications.

L-CMB-05: NOX EMISSION REDUCTIONS FROM LARGE TURBINES: This control measure aims to reduce NOx from turbines in the South Coast AQMD subject to Rule 1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Rule 1134). Fuel cells and electrification are ways to shift away from combustion sources generating NOx emissions wherever feasible. As older higher emitting turbines reach the end of their equipment life it is expected that some facilities will opt to replace turbines with fuel cells or electrify facility operations.

L-CMB-06: NOX EMISSION REDUCTIONS FROM ELECTRICITY GENERATING FACILITIES: This control measure reduces NOx emissions from electric generating units regulated by Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities (Rule 1135). This measure proposes to develop a rule to implement low NOx and zero emission technologies at electricity generating facilities. The target of this approach is to replace boiler units with lower-emitting turbines, implement zero emission technologies such as fuel cells or electrification for 10 percent of gas-fired sources and other lower NOx emission technologies for the rest of gas-fired sources, and require stricter emission requirements from diesel internal combustion engines.

L-CMB-07: EMISSION REDUCTIONS FROM PETROLEUM REFINERIES: The goal of this measure is to assess and identify potential actions to further reduce NOx emissions by 20 percent for large refinery heaters and boilers with a maximum rated heat input of 40 MMBtu/hour. This would be accomplished by developing a rule requiring a lower NOx concentration limit of 2 ppm. South Coast AQMD staff identified three potential technological approaches to further reduce emissions for the large heaters and boilers category. The three approaches include next-generation ultra-low NOx burners, advanced SCR, and transition to zero emission technology.

L-CMB-08: NOX EMISSION REDUCTIONS FROM COMBUSTION EQUIPMENT AT LANDFILLS AND PUBLICLY OWNED TREATMENT WORKS: This control measure aims to reduce NOx emissions through a regulatory approach. The source categories for this control measure are biogas fueled combustion equipment – specifically boilers, turbines, and engines – regulated by Rule 1150.3 – Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills (Rule 1150.3) and Rule 1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities (Rule 1179.1).

L-CMB-09: NOX REDUCTIONS FROM INCINERATORS: This control measure seeks emission reductions of NOx by replacing or retrofitting incinerators and other combustion equipment associated with incinerators with zero and low NOx emission technologies. Incinerators are used to burn waste material at high temperatures until reduced to ash. This control measure will achieve reductions by developing a rule, and implementation of low NOx burner systems or ultra-low NOx burner systems.

L-CMB-10: NOX REDUCTIONS FROM MISCELLANEOUS PERMITTED EQUIPMENT: The goal of this measure is to assess and identify potential actions to further reduce NOx emissions associated with miscellaneous permitted equipment located in the South Coast AQMD jurisdiction. South Coast AQMD staff will convene a stakeholder working group to discuss and identify actions or approaches to further reduce NOx emissions from these sources. Miscellaneous permitted equipment is regulated under Rule 1147 – NOx Reductions from Miscellaneous Sources with NOx emission limits depending on equipment category.

South Coast AQMD Co-Benefits from Energy and Climate Change Programs Measures

There are three energy and climate change programs co-benefit measures as listed below:

- ECC-01: Co-Benefits from Existing and Future Greenhouse Gas Programs, Policies, and Incentives;
- ECC-02: Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures; and
- ECC-03: Additional Enhancements in Reducing Existing Residential Building Energy Use.

ECC-01: CO-BENEFITS FROM EXISTING AND FUTURE GREENHOUSE GAS PROGRAMS, POLICIES, AND INCENTIVES: This control measure seeks to quantify and take credit for the criteria pollutant co-benefits associated with programs to reduce GHG emissions. The processes that emit criteria pollutants and their precursors also typically emit GHGs. Mandates and programs that reduce GHG emissions will therefore also reduce criteria pollutant emissions. Significant efforts are currently being planned and implemented to reduce GHG emissions under State programs such as California Governor Executive Order B-55-18 and

SB 100 (California Renewables Portfolio Standard Program: Emissions of Greenhouse Gases), which established reduction goals for 2030, 2045, and 2050.

ECC-02: CO-BENEFITS FROM EXISTING AND FUTURE RESIDENTIAL AND COMMERCIAL BUILDING ENERGY EFFICIENCY MEASURES: This control measure seeks to quantify and take credit for criteria pollutant co-benefits resulting from the implementation of energy efficiency mandates such as California's Title 24 program. In addition, there are multiple programs that provide incentives, rebates, and loans for residential and commercial building efficiency projects. Improvements in weatherization and other efficiency measures provide emission reductions through reduced energy use for heating, cooling, lighting, cooking, and other needs. South Coast AQMD staff will work with agencies, utilities, and other stakeholders to implement innovative measures that provide energy savings along with emission reductions.

ECC-03: ADDITIONAL ENHANCEMENTS IN REDUCING EXISTING RESIDENTIAL BUILDING ENERGY USE: This control measure seeks to provide incentive funding to enhance the objectives of ECC-02. Incentives will be used to further promote programs reducing energy use associated with space heating, water heating, and other large residential energy sources, achieving emission reductions beyond the levels expected from program mandates. Residential incentive programs would be developed to facilitate weatherization, replace older appliances with highly efficient technologies and encourage renewable energy adoption. Incorporating efficient appliance technologies, improving weatherization, and encouraging renewables such as solar thermal and photovoltaics will reduce energy demand and provide additional emission reductions within the residential sector. The South Coast AQMD will collaborate with utilities, agencies, and organizations to help leverage funding and coordinate incentives with existing programs.

South Coast AQMD Stationary Source VOC Measures

This category seeks limited, strategic VOC controls that further contribute to controlling ozone levels in the Basin. There are five proposed VOC measures as listed below:

- FUG-01: Improved Leak Detection and Repair;
- FUG-02: Emission Reductions from Industrial Cooling Towers;
- CTS-01: Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants;
- FLX-02: Stationary Source VOC Incentives; and
- BIO-01: Assessing Emissions from Urban Vegetation.

FUG-01: IMPROVED LEAK DETECTION AND REPAIR: This proposed control measure seeks to reduce emissions of VOCs from fugitive leaks from process and storage equipment located at a variety of sources including, but not limited to, oil and gas production, petroleum refining, chemical products processing, storage and transfer, marine terminals, and other. Some of these facilities are subject to leak detection and repair (LDAR) requirements established by the South Coast AQMD and the U.S. EPA that include periodic VOC concentration measurements using an approved portable organic vapor analyzer (OVA) to identify leaks. This measure would implement the use of advanced leak detection technologies including optical gas imaging devices (OGI), open path detection devices, and gas sensors for earlier detection of VOC emissions from leaks.

FUG-02: EMISSION REDUCTIONS FROM INDUSTRIAL COOLING TOWERS: This proposed control measure seeks to reduce VOC emissions from industrial cooling towers through enhanced leak identification and repair requirements. Industrial cooling towers remove heat absorbed in the circulating cooling water systems at power plants, petroleum refineries, petrochemical plants, natural gas processing plants, and a wide variety of industrial operations. This control measure proposes to first assess the need for additional monitoring and practices to reduce industrial cooling tower VOC emissions. The assessment will include a review of the emissions inventory, costs for monitoring equipment, and the control requirements established by other governmental agencies. Findings from this assessment will be the basis of potential future rulemaking activities.

CTS-01: FURTHER EMISSION REDUCTIONS FROM COATINGS, SOLVENTS, ADHESIVES, AND LUBRICANTS: This proposed control measure seeks VOC emission reductions by focusing on select coating, adhesive, solvent and sealant categories by further limiting the allowable VOC content in formulations or incentivizing the use of super-compliant technologies. Categories to be considered include but are not limited to, metal part and product coatings, automotive refinishing coatings, adhesives, and sealants. Use of super-compliant zero and low VOC materials, such as powder coating, aqueous coatings, and some ultraviolet light, electron beam, and light emitting diode cured coatings, eliminate or substantially reduce emissions compared to similar products that are not zero or low VOC products. There are several product categories where these materials perform as well as traditional products and are widely available in the market. The proposal is anticipated to be accomplished with a multi-phase adoption and implementation schedule. Tightening regulatory exemptions that may be used as loopholes and enhanced enforcement can also lead to reduced emissions.

FLX-02: STATIONARY SOURCE VOC INCENTIVES: This control measure seeks to provide incentive funding to facilitate the adoption of clean, low VOC emission technologies from stationary sources. Facilities would be able to qualify for incentive funding if they use equipment or accept permit conditions which result in cost-effective emission reductions that are beyond existing requirements. The program would establish procedures for quantifying emission benefits from clean technology implementation and develop cost-effectiveness thresholds for funding eligibility. Mechanisms will be explored to incentivize businesses to choose the cleanest technologies as they replace equipment and upgrade facilities, and to provide incentives to encourage businesses to move into these technologies sooner. Potential incentive concepts include incentive funding, permitting and fee incentives and enhancements, New Source Review (NSR) incentives and enhancements, branding incentives, and recordkeeping and reporting incentives.

BIO-01: ASSESSING EMISSIONS FROM URBAN VEGETATION: This control measure seeks to improve the understanding of VOCs emitted by trees and vegetation (biogenic sources) and their contribution to PM and ozone formation. Certain VOCs emitted by biogenic sources are highly reactive and potent ozone precursors. A recent analysis of municipal tree inventories across the Basin demonstrated that many recently planted species are either high emitters (e.g., Quercus ilex, Quercus agrifolia, Platanus species) or are trees for which emission factors are unknown or highly uncertain (e.g., Koelreuteria bipinnata, Cercis canadensis, Pistacia chinensis, Podocarpus gracilor, Hymenosporum flavum). High resolution data combined with accurate emissions factor measurements of common tree species will be used to improve the biogenic VOC emissions inventory. Based on these findings, the South Coast AQMD will explore the need for tree planting programs that promote the planting of low VOC emitting tree species.

South Coast AQMD Stationary Source Other Measures

There are three proposed measures in this category as listed below:

- MCS-01: Application of All Feasible Measures;
- MCS-02: Wildfire Prevention; and
- FLX-01: Improved Education and Public Outreach.

MCS-01: APPLICATION OF ALL FEASIBLE MEASURES: This control measure is to address the State's requirement to take all feasible measures to reduce ozone. Existing rules and regulations for pollutants including VOC and NOx reflect current Best Available Retrofit Control Technology (BARCT). However, BARCT continually evolves as new technology becomes available that is feasible and cost-effective. South Coast AQMD staff will continue to review new emission limits or controls introduced through federal, State or local regulations to determine if South Coast AQMD regulations remain equivalent or more stringent than rules in other regions. If not, a rulemaking process will be initiated to perform a BARCT analysis and potential rule amendments if deemed feasible. In addition, the South Coast AQMD will consider adopting and implementing new retrofit technology control standards, based on research and development and other information, that are feasible and cost-effective.

MCS-02: WILDFIRE PREVENTION: This proposed control measure will seek to reduce the impacts of wildfires on PM and ozone levels from efforts to reduce wildfire fuel. Fuel reduction efforts include hand-thinning, mechanical thinning, and the use of chipping equipment (chipping) to mitigate excess fuels at properties located in the residential urban-wild-interface (UWI) areas of the San Bernardino National Forest (SBNF). To support efforts of wildfire prevention and aid compliance with Zone 0 defensible space requirements of California Assembly Bill 3074, incentive funding will be provided for a pilot project of approximately 1,400 acres. The South Coast AQMD will identify and coordinate implementation of the pilot project with established organizations and their contractors such as the Inland Empire Fire Safe Alliance, Mountain Rim Fire Safe Council, and Big Bear Fire Authority to provide fuel load reducing curbside chipping services to residents of these UWI areas.

FLX-01: IMPROVED EDUCATION AND PUBLIC OUTREACH: This control measure seeks to provide education, outreach, and incentives for consumers, business owners, and residences to contribute to clean air efforts. Examples include informing consumer choices such as the use of energy efficient products and appliances, new lighting technology, "super-compliant" coatings, and planting low VOC emitting trees. In addition, this measure intends to increase the effectiveness of energy conservation programs through public education and awareness as to the environmental and economic benefits of conservation. Educational and incentive tools to be used include social comparison applications such as comparing your personal environmental impacts with other individuals, social media, and public/private partnerships. These efforts will be complemented with currently available incentive programs.

South Coast AQMD Proposed Mobile Source 8-Hour Ozone Measures

While the bulk of the authority to regulate mobile sources rests with CARB and the federal government, the South Coast AQMD also has a role in achieving emission reductions from these sources. The proposed South Coast AQMD mobile source measures are based on a variety of control technologies that are commercially available and/or technologically feasible to implement prior to the attainment year of 2037.

The focus of these measures includes accelerated retrofits or replacement of existing vehicles or equipment, acceleration of vehicle turnover through voluntary vehicle retirement programs, and greater use of cleaner fuels in the near-term. The measures will encourage greater deployment of low NOx and zero emission vehicle and equipment technologies such as plug-in hybrids, battery-electric, and fuel cells to the maximum extent feasible as such technologies are commercialized and available everywhere else. In the longer-term, there is a need to significantly increase the penetration and deployment of low NOx and zero emission vehicles, greater use of cleaner fuels, and substantial emission reductions from federal and international sources such as locomotives, ocean-going vessels, and aircraft. While shifting to zero emission is necessary where feasible and available, low NOx and ultra-low NOx technology are inevitable for sectors where zero emission technologies are not available or mature commercially.

The South Coast AQMD proposes a total of 18 mobile source measures which are categorized in to five groups – emission growth management, facility-based mobile sources, on-road and off-road, incentives, and other (see Table 4-3). Three emission growth management measures (EGM-01 to EGM-03) are proposed to identify actions to help mitigate and potentially provide emission reductions due to new development and redevelopment projects, projects subject to general conformity requirements, and clean construction policy. Four facility-based mobile source measures (FBMSMs) (MOB-01 to MOB-04) seek to identify actions that will result in additional emission reductions at commercial marine ports, rail yards and intermodal facilities, warehouse distribution centers, and commercial airports. FBMSMs for marine ports and intermodal rail yards are currently undergoing an Indirect Source Rule development process. Six on-road and off-road mobile measures focus on on-road light/medium/heavy-duty vehicles, international shipping vessels, passenger locomotives and small off-road engines. Additionally, incentive-based measures such as MOB-11 will use established protocols such as Carl Moyer Program guideline and report to the Governing Board periodically. MOB-12, Pacific Rim Initiative for Maritime Emission Reductions seeks NOx emission reductions from partnership with local, State, federal and international entities. Three other measures (MOB-13 to MOB-15) focus on fugitive VOC emissions from tanker vessels, fleet vehicles mitigation options, and the development of a work plan to support and accelerate the deployment of zero emission infrastructure needed for the widespread adoption of zero emission vehicles and equipment that is described in more detail in Appendix IV-A.

TABLE 4-3

SOUTH COAST AQMD PROPOSED MOBILE SOURCE 8-HOUR OZONE MEASURES

Number	Title [Pollutant]	Emission Reductions ~~(tpd~~ (tons per day) (2032/2037)
Emission Growth Management Measures:		
EGM-01	Emission Reductions from New Development and Redevelopment [All Pollutants]	TBD / TBD
EGM-02	Emission Reductions from Projects Subject to General Conformity Requirements [All Pollutants]	TBD / TBD
EGM-03	Emission Reductions from Clean Construction Policy [All Pollutants]	TBD / TBD
Facility-Based Mobile Source Measures:		
MOB-01	Emission Reductions at Commercial Marine Ports [NOx, SOx, PM]	
MOB-02A	Emission Reductions at New Rail Yards and Intermodal Facilities [NOx, PM]	TBD / TBD
MOB-02B	Emission Reductions at Existing Rail Yards and Intermodal Facilities [NOx, PM]	TBD / TBD
MOB-03	Emission Reductions at Warehouse Distribution Centers [NOx]	TBD / TBD
MOB-04	Emission Reductions at Commercial Airports [All Pollutants]	TBD / TBD
On-Road and Off-Road Mobile Source Measures:		
MOB-05	Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles [~~VOCs,~~ NOx, ~~CO~~PM]	~~0.21~~0.20 / ~~0.14~~0.11 [NOx]
MOB-06	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	TBD / TBD
MOB-07	On-Road Mobile Source Emission Reduction Credit Generating Program [NOx, PM]	TBD / TBD
MOB-08	Small Off-Road Engine Equipment Exchange Program [VOCs, NOx, ~~PM~~CO]	TBD / TBD
MOB-09	Further Emission Reductions from Passenger Locomotives [NOx, PM]	TBD / TBD
MOB-10	Off-Road Mobile Source Emission Reduction Credit Generation Program [NOx, PM]	TBD / TBD
Incentive-Based Measures		
MOB-11	Emission Reductions from Incentive Programs [NOx, PM][5]	~~10.72 / 9.88~~7.11 / 6.69 [NOx]
MOB-12	Pacific Rim Initiative for Maritime Emission Reductions [NOx]	TBD / TBD
Other Measures		
MOB-13	Fugitive VOC Emissions from Tanker Vessels [VOCs]	TBD / TBD
MOB-14	Rule 2202 – On-Road Motor Vehicle Mitigation Options [VOCs, NOx, CO]	TBD / TBD
MOB-15	Zero Emission Infrastructure for Mobile Sources [All Pollutants]	TBD / TBD

[5] MOB-11 has concurrent PM2.5 reductions of 0.~~21~~23 and 0.~~17~~21 tons per day in 2032 and 2037, respectively.

Emission Growth Management Measures

There are three proposed control measures within this category:

- EGM-01: Emission Reductions from New Development and Redevelopment;
- EGM-02: Emission Reductions from Projects Subject to General Conformity Requirements; and
- EGM-03: Emission Reductions from Clean Construction Policy.

EGM-01: EMISSION REDUCTIONS FROM NEW DEVELOPMENT AND REDEVELOPMENT: The goal of this measure is to identify emission reduction opportunities and to mitigate and, where appropriate, reduce emissions from new development or redevelopment projects such as residential, commercial, and industrial projects that are otherwise not included in other FBMSMs identified in the 2022 AQMP. Based on Governing Board direction, South Coast AQMD staff has held three Working Group meetings for the development of EGM-01 and released an RFP in 2019 to profile the universe of off-road construction equipment available in the South Coast Air Basin and identify the incremental cost to upgrade existing off-road construction equipment to Tier 4 standards; no proposals were received on the RFP. South Coast AQMD staff will re-convene the Working Group to continue the information gathering process and work towards the development of a method of control for EGM-01. The amount emission reductions that can be achieved and their SIP creditability will be determined dependent on the final method of control to be implemented.

EGM-02: EMISSION REDUCTIONS FROM PROJECTS SUBJECT TO GENERAL CONFORMITY REQUIREMENTS: General conformity is a process intended to prevent the air quality impacts of a proposed federal project from causing or contributing to new violations of the air quality standards, exacerbating existing violations, or interfering with the purpose of the applicable implementation plan. The 2016 AQMP established a SIP set-aside account, with an initial balance of 2.0 tons per day of NOx and 0.5 tons per day of VOC each year from 2017 to 2030, and 0.5 tons per day of NOx and 0.2 tons per day of VOC in 2031, to accommodate projects with a positive conformity determination (i.e., emissions that exceed the de minimis threshold). This measure seeks to undertake a rulemaking process in order to accommodate general conformity determination using mechanisms other than the current set-aside account. Mitigation or offset mechanisms including those adopted by other air districts in California will be explored during the rulemaking process. Such mechanisms may include the imposition of fees to fund air quality improvement programs or a requirement to purchase surplus emission reduction credits.

EGM-03: EMISSION REDUCTIONS FROM CLEAN CONSTRUCTION POLICY: The purpose of this control measure is to identify potential approaches to mitigate and control emissions from construction activities in the South Coast Air Basin. This control measure will seek to develop a Clean Construction Policy (CCP) which can be utilized for reference and voluntary implementation by local municipalities and public agencies. The South Coast AQMD will work in collaboration with local municipalities and agencies, construction industry, and other affected stakeholders to develop such a policy and will consider existing control measures and best management practices that are currently being implemented by entities throughout California.

Facility-Based Mobile Source Measures

Facility-based mobile source measures are measures aimed at reducing the emissions from indirect sources – facilities that do not emit much air pollution directly, but instead attract mobile sources which contribute significant emissions. There are four proposed control measures within this category:

- MOB-01: Emission Reductions at Commercial Marine Ports;
- MOB-02A: Emission Reductions at New Rail Yards and Intermodal Facilities;
- MOB-02B: Emission Reductions at Existing Rail Yards and Intermodal Facilities;
- MOB-03: Emission Reductions at Warehouse Distribution Centers; and
- MOB-04: Emission Reductions at Commercial Airports.

MOB-01: EMISSION REDUCTIONS AT COMMERCIAL MARINE PORTS: This measure seeks to reduce NOx, VOC, and PM emissions related to on-road heavy-duty vehicles, ocean going vessels, cargo handling equipment, locomotives, and harbor craft that go to and from the Ports of Los Angeles and Long Beach (Ports). As a follow up to implementation of MOB-01 from the 2016 AQMP, the South Coast AQMD is working on an indirect source rule (Proposed Rule 2304) to address emissions from marine ports. Through a public rulemaking process, rule concepts will be proposed to address emissions from these sources. Rule development will continue to focus on deploying the cleanest technologies possible and supporting zero emissions fueling charging infrastructure as quickly as feasible. Incentive funding that supports the transition to cleaner technologies will also continue to be pursued to assist in implementing this measure.

MOB-02A: EMISSION REDUCTIONS AT NEW RAIL YARDS AND INTERMODAL FACILITIES: This measure seeks to reduce NOx and PM emissions related to on-road heavy-duty vehicles, off-road equipment, and locomotives at new rail yards and intermodal facilities. Through the public process, the South Coast AQMD will assess and identify potential actions that limit additional emissions created by the new operations. To implement this measure, staff will continue rule development for Proposed Rule 2306 for new railyards. Rule development will continue to focus on implementation of cleanest locomotives, switchers, on-road heavy-duty trucks, cargo-handling equipment, transportation refrigeration units available and requiring necessary infrastructure to support zero and low NOx emission technologies.

MOB-02B: EMISSION REDUCTIONS AT EXISTING RAIL YARDS AND INTERMODAL FACILITIES: The goal of this measure is to reduce NOx and PM emissions related to on-road heavy-duty vehicles, off-road equipment, and locomotives located at existing rail yards and intermodal facilities. Through a public rulemaking process, rule concepts will be proposed to address emissions from these sources. Rule development will focus on transitioning locomotives, switchers, on-road heavy-duty trucks, cargo-handling equipment, transportation refrigeration units to zero and low NOx emission technologies. The rule development will include necessary infrastructure measures to support the transition.

MOB-03: EMISSION REDUCTIONS AT WAREHOUSE DISTRIBUTION CENTERS: The goal of this measure to reduce NOx and PM emissions related to mobile sources and other equipment associated with warehouses. The strategy utilizes a menu-based point system in Rule 2305 (adopted in May 2021 to implement MOB-03 from the 2016 AQMP) where warehouses subject to the rule must annually earn points based on the amount of truck traffic at their facility. The menu includes actions that warehouse operators can take to reduce emissions, or to facilitate emission reductions from their operations. Required actions result in emission reductions when compared to conventional diesel technology, assist in implementation of other related measures, promote the demand for zero emission and low NOx technology, foster early action of compliance, and infrastructure installation to support new or emerging zero emission technologies. Implementation of this measure will include ensuring that applicable warehouses comply with Rule 2305, quantifying the air quality benefits of Rule 2305 as they occur and seeking to incorporate those benefits as SIP-creditable emission reductions, and evaluating the state of technology every three years to identify if Rule 2305 should potentially be amended to increase the air quality benefits.

MOB-04: EMISSION REDUCTIONS AT COMMERCIAL AIRPORTS: The Facility-Based Mobile Source Measure for Commercial Airports, which controls non-aircraft mobile sources at commercial airports, was adopted by the South Coast AQMD on December 6, 2019. The measure consists of MOUs between the South Coast AQMD and five commercial airports in the Basin to develop and implement air quality improvement plans. The MOUs were executed with Los Angeles International Airport, John Wayne Orange County Airport, Hollywood Burbank Airport, Ontario International Airport, and Long Beach Airport. Each MOU contains performance targets for cleaner ground support equipment, airport shuttle buses, and heavy-duty trucks. Based on the measures in the MOUs, the South Coast AQMD committed to achieve 0.52 and 0.37 ton per day NOx reductions in 2023 and 2031, respectively. This measure seeks to estimate emission reductions through 2037, beyond the term of the MOUs, based on continued implementation of the airports' Air Quality Improvement Plans/Measures. Opportunities for additional feasible emission reductions will be explored through the Airport MOU Working Group.

On-Road and Off-Road Mobile Source Measures

A total of six on-road and off-road mobile source measures are proposed within this category as listed below.

- MOB-05: Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles;
- MOB-06: Accelerated Retirement of Older On-Road Heavy-Duty Vehicles;
- MOB-07: On-Road Mobile Source Emission Reduction Credit Generating Program;
- MOB-08: Small Off-Road Engine Equipment Exchange Program;
- MOB-09: Further Emission Reductions from Passenger Locomotives; and
- MOB-10: Off-Road Mobile Source Emission Reduction Credit Generation Program.

MOB-05: ACCELERATED RETIREMENT OF OLDER LIGHT-DUTY AND MEDIUM-DUTY VEHICLES: The purpose of this control measure is to achieve emission reductions by accelerating retirement of older gasoline- and diesel-powered vehicles with up to 8,500 lbs. gross vehicle weight rating (GVWR). These vehicles include passenger cars, sports utility vehicles, vans, and light-duty pick-up trucks. The South Coast AQMD has been implementing the Replace Your Ride Program (RYR) since 2015 which provides a rebate to low- and moderate-income applicants for replacing their existing cars with newer, cleaner conventionally powered vehicles, plug-in hybrid electric vehicles or dedicated zero emission vehicles. This measure seeks to retire up to 2,000 light- and medium-duty vehicles annually through continued implementation of the Replace Your Ride Program with incentives up to $9,500 provided which includes $5,000 for residents in a Disadvantaged Community (DAC) zip code. For plug-in hybrid and battery electric vehicles, an additional incentive of up to $2,000 is also provided for the installation of electric vehicle charging equipment. As an alternative, the RYR program also offers a voucher of up to $7,500 for other clean modes of transportation, such as car-sharing, public transportation or e-bikes, in exchange for the retirement of an old vehicle.

MOB-06: ACCELERATED RETIREMENT OF OLDER ON-ROAD HEAVY-DUTY VEHICLES: This proposed control measure seeks additional emission reductions from existing heavy-duty vehicles with GVWR greater than 8,500 lbs through an accelerated vehicle replacement program with zero or low NOx emission vehicles. A new pilot program, the Trade Up Program for On-Road Heavy-Duty Vehicles, is proposed to achieve enforceable emission reductions by replacing old, high-polluting vehicles with a new, low-_NOx CNG powered vehicles through a three-way exchange approach. Under this pilot program, qualified participants can trade in their MY 2014 or newer heavy-duty diesel truck to a South Coast AQMD-approved dealership and receive an incentive toward the purchase of a new low NOx emission (0.02 g NOx) natural gas-powered truck. The dealer then sells the trade-in diesel truck to an owner or fleet with a MY 2009 or older truck that will be scrapped by an approved dismantler to ensure permanent and enforceable reductions. The objective of this pilot program is to accelerate the turnover of 2009 and older heavy-duty diesel trucks while also increasing the deployment of low NOx natural gas-powered heavy-duty trucks and maximizing emission reductions. If proven successful, this program can be further expanded to include other alternative-fuel vehicles including battery electric and fuel cell trucks.

MOB-07: ON-ROAD MOBILE SOURCE EMISSION REDUCTION CREDIT GENERATING PROGRAM: This proposed measure seeks to accelerate the early deployment of low NOx and zero emission on-road heavy-duty trucks through the generation of mobile source emission reduction credits (MSERCs) which can be used as an alternative means of compliance with certain South Coast AQMD regulations. These MSERCs will be used only by entities affected by the 2022 AQMP control measures MOB-01 through MOB-04, EGM-01, and EGM-03. The need for MOB-07 will be evaluated as these other control measures are implemented. South Coast AQMD staff will develop amendments to South Coast AQMD Rules 1612 and 1612.1 to reflect the latest advanced low NOx and zero emission technologies and quantification methodologies. MSERCs generated will be discounted to provide additional benefits to the environment and to help meet air quality standards.

MOB-08: SMALL OFF-ROAD ENGINE EQUIPMENT EXCHANGE PROGRAM: This measure seeks to reduce NOx emissions by promoting and expanding the accelerated turn-over of in-use small off-road engines and other engines, through expanded voluntary exchange programs. Examples of these types of engines include those used in larger diesel-powered lawn and garden equipment. Since 2003, the South Coast AQMD has sponsored lawn mower buyback programs for residential users of old lawn mowers. This program has resulted in over 57,000 high polluting gasoline-powered lawn mowers taken out of service from 2003 to the present. The South Coast AQMD also launched the Commercial Electric Lawn and Garden Equipment Incentive and Exchange Program (Commercial L&G Equipment Program) in 2018 to accelerate the replacement of old gasoline- or diesel-powered commercial lawn and garden equipment with zero emission, battery electric technology. This program provides a point-of-sale discount of up to 75 percent off the purchase price of a variety of new electric equipment. More recently, the South Coast AQMD has also started a new battery rebate program for commercial lawn and garden equipment that funds up to 75 percent of the rechargeable battery cost with a maximum limit of three batteries per equipment. Moving forward, the South Coast AQMD will increase the number of outreach and exchange events as well as continue to seek additional funding opportunities and resources to expand the scope and types of equipment and engines that can be funded by these programs.

MOB-09: FURTHER EMISSION REDUCTIONS FROM PASSENGER LOCOMOTIVES: This measure seeks to promote voluntary replacement or upgrade of existing passenger locomotives with Tier 4 or cleaner locomotives including zero emission locomotives. The South Coast AQMD continues to work collaboratively with technology providers and other stakeholders to explore the feasibility of zero and low NOx emission locomotive technologies such as battery electric or fuel cell engine-driven systems. For example, since 2018, the South Coast AQMD has been actively participating in the development and demonstration of zero emission battery-operated switcher locomotives in CARB-funded projects in the San Pedro Bay Ports. Through this measure, the South Coast AQMD will continue to promote accelerated replacement or upgrade of existing passenger trains with Tier 4 locomotives and support the development and adoption of zero or low NOx emission technologies.

MOB-10: OFF-ROAD MOBILE SOURCE EMISSION REDUCTION CREDIT GENERATION PROGRAM: This measure seeks to develop mechanisms to incentivize the early deployment of Tier 4, low NOx, and zero off-road equipment, where applicable, through the generation of mobile source emission reduction credits (MSERCs). These MSERCs will be used only by entities affected by the 2022 AQMP control measures MOB-01 through MOB-04, EGM-01, and EGM-03; and cannot be used to offset emissions from stationary sources. These MSERCs will be discounted to provide additional emission reductions to help meet air quality standards. South Coast AQMD staff will develop amendments to Rule 1620 to reflect the latest advanced low NOx and zero emission technologies and revise the quantification methodologies in Rule 1620.

Incentive-Based Measures

We are proposing two incentive-based mobile source measures:

- MOB-11: Emission Reductions from Incentive Programs; and
- MOB-12: Pacific Rim Initiative for Maritime Emission Reductions.

MOB-11: EMISSION REDUCTIONS FROM INCENTIVE PROGRAMS: This control measure seeks to quantify and take credit for the emission reductions achieved through the implementation of South Coast AQMD-administered incentive programs for SIP purposes. The South Coast AQMD has been implementing a variety of incentive programs including, but not limited to, Carl Moyer Memorial Air Quality Standards Attainment Program, Proposition 1B, Lower Emission School Bus, Community Air Protection Program, and Volkswagen Environmental Mitigation Trust. Examples of projects funded by these programs include heavy-duty vehicle/equipment replacements, installation of retrofit units, and engine repowers. The emission reductions from these incentive programs are calculated in two parts. First, the actual emission reductions associated with existing projects that will have remaining useful life in 2031, 2032 and 2037 are quantified. Second, potential reductions that are projected from the implementation of future projects are quantified. These reductions are estimated based on the projected level of funding for these incentive programs and average emission reductions from existing projects, discounted by control factors for future years. These incentive programs result in substantial emission reductions that are typically not eligible for credit in plans to attain ozone standards because they are not required by regulation. However, actual emission reductions that are realized and quantified may qualify for credit.

MOB-12: PACIFIC RIM INITIATIVE FOR MARITIME EMISSION REDUCTIONS: This measure seeks to reduce emissions from OGV through an incentive-based program to encourage the deployment of cleaner OGV to the Ports. This approach includes collaborating with international port authorities and shipping lines to establish common goals to reduce criteria pollutants from OGV. Incentives could be monetary (e.g., a per-visit payment for cleaner ships) or non-monetary (e.g., preferred berthing for cleaner ships). The cleanest commercially available OGV currently meet Tier III emission standards, however this class of vessels is not expected to be widely deployed for many years, in part due to the high cost of constructing new vessels and the difficulty in retrofitting existing vessels to Tier III standards. This measure would quicken the return on investment for these cleaner vessels by ensuring that shipping lines receive a benefit for every clean ship visit to a port with an incentive program. Clean ships could include Tier III vessels, retrofitted vessels that surpass Tier II standards, and eventually zero emissions shipping when it becomes available.

Other Measures

There are three proposed other mobile measures in this category:

- MOB-13: Fugitive VOC Emissions from Tanker Vessels;
- MOB-14: Rule 2202 – On-Road Motor Vehicle Mitigation Options; and
- MOB-15: Zero Emission Infrastructure for Mobile Sources.

MOB-13: FUGITIVE VOC EMISSIONS FROM TANKER VESSELS: The goal of this measure is to quantify fugitive VOC emissions from petroleum tanker vessels during venting events and from other leaks and to better control these VOC emissions through enhanced monitoring and reporting, and inspections as well as changes to vessel operating procedures. Ocean-going petroleum tankers and barges transport approximately 400 million barrels per year of crude oil, refined petroleum products and unfinished petroleum products through the Ports. While these tanker vessels are in transit and at anchorage, temperature variations from day to night and other operational factors can cause pressure fluctuations in the vessels' cargo storage tanks. Vessels that transport volatile products such as crude oil and gasoline are most susceptible to pressure increases and these vessels must vent to the atmosphere to control cargo tank pressure that may result in the release of several tons of VOCs in a 15-to-30-minute period. The South Coast AQMD will collaborate with industry representatives, P/V valve manufacturers, environmental/community organizations and other stakeholders to develop control strategies and best management practices to control these VOC emissions.

MOB-14: RULE 2202 – ON-ROAD MOTOR VEHICLE MITIGATION OPTIONS: This control measure proposes to reduce emissions by evaluating potential amendments to Rule 2202. Rule 2202 has been developed to reduce emissions associated with work commute trips. Specifically, larger employers in the region with more than 250 employees are required to mitigate employee commute trips into the worksite. Rule 2202 provides employers with a menu of options to select from to implement a combination of emission reduction strategies in order to meet the emission reduction target (ERT) for their worksite. During the Coronavirus Disease 2019 (COVID-19) pandemic in 2020 and 2021, many Rule 2202 regulated employers (where applicable) incorporated widespread telecommuting practices which can further reduce emissions by reducing commute trips into the worksite. While Rule 2202 currently provide credit for telecommuting, future rule amendments may include a larger focus on telecommuting strategies and provide additional incentives for regulated employers to adopt telecommuting policies. Other future rule amendments may include enhancements on current basic support and direct strategies, as well as streamlined compliance and reporting options. Options for gaining credit for emission reductions associated with Rule 2202 for the purposes of plans to meet ozone standards will also be explored.

MOB-15: ZERO EMISSION INFRASTRUCTURE FOR MOBILE SOURCES: This control measure proposes ~~to develop~~ a work plan to support and accelerate the deployment of zero emission infrastructure needed for the widespread adoption of zero emission vehicles and equipment. The work plan will, in conjunction with the California Energy Commission, the California Public Utilities Commission, and other partner agencies, assess the present and future zero emission infrastructure needs of the air basin and use information gathered to support market acceptance of zero emission vehicles and equipment. The work plan will further investigate the basin-wide costs of the infrastructure needed to support a widespread adoption of zero emission vehicles and equipment, including on-road, off-road and stationary applications. The work plan is anticipated to require coordination with all stakeholders and identify informational gaps and challenges in the planning and development of zero emission infrastructure. This plan will also aim to support the State's goals and requirements for zero emission vehicles and equipment. Information gathered can then be used to create or support policies and incentives that will ease this transition. AB 2127 estimated that the State will need 157,000 electric vehicle charging stations for medium and heavy-duty vehicles by 2030. AB 8 assessed the fueling needs for hydrogen fuel cell vehicles and found that 1,700 hydrogen stations will be needed to support 1.8 million FCEVs statewide by 2035. The proposed measure seeks to address these concerns and identify the unique challenges and opportunities for zero emission infrastructure development in the South Coast Air Basin, particularly as it relates to zero emission medium and heavy vehicle deployments.

State and Federal Control Measures

CARB Commitment for the South Coast

Overview of Commitment

CARB shares responsibility with South Coast and other local air districts to ~~develop and implement measures to attain~~meet federal air quality standards~~statewide. The measures that CARB will implement are contained in~~ . CARB's ~~Draft~~ measures to meet NAAQS are in the State Implementation Plan (SIP). SIPs contain enforceable commitments to achieve the level of emissions necessary to meet federal air quality standards. The 2022 State SIP Strategy.~~[6] The Draft 2022 State SIP Strategy lists potential~~ , adopted by CARB on September 22, 2022, contains new SIP measures and quantifies ~~proposed~~potential emissions reduction SIP commitments for the South Coast based on the measures identified and quantified to date. ~~Adoption of the~~ The 2022 State SIP Strategy ~~by~~and the accompanying measure schedule form the ~~CARB Board would create a commitment~~basis of the commitments for ~~new~~ emission reductions by the attainment deadlines for each region~~.~~ that will be proposed for CARB Board consideration alongside the respective nonattainment area's SIP. The ~~commitment consists~~commitments will consist of two components:

1. A commitment to bring an item to the CARB Board for defined new measures or take other specified actions within CARB's authority; and

~~[6] https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf.~~

2. A commitment to achieve aggregate emission reductions by specific dates.

As part of each SIP needing emission reductions from the State, the total aggregate emission reductions, and the obligation to make certain proposals to the CARB Board or take other actions within CARB's authority specified in the 2022 State SIP Strategy~~,~~ would become enforceable upon approval by ~~the~~ U.S. EPA~~. While the Draft 2022 State SIP Strategy will discuss a range of proposed measures and actions, those proposed measures and actions would still be subject to CARB's formal approval process and would not be final until the CARB Board formally takes action on this item~~.

Commitment to Act on ~~Proposed~~ Measures

~~CARB staff proposes to commit to engage in a public process and bring an item to the Board, or take other specified actions within CARB's authority, to address each of the proposed SIP measures shown in Tables 4-4 and 4-5. The detailed actions that CARB staff will ultimately propose to commit to in the Proposed 2022 State SIP Strategy are still being developed at this time. For each measure, CARB staff will initiate an investigation into the measure or take other specified actions designed to achieve the emission reduction estimates identified for each measure. This public process and CARB hearing will~~For each of the SIP measures shown in Tables 4-4 and 4-5, CARB commits to address each measure as described in this document. For each measure committed to, CARB staff would undertake the actions detailed for each measure. In the instance of measures that involve the development of a rule under CARB's regulatory authority, CARB would commit to bring a publicly noticed item before the CARB Board that is either a proposed rule, or is a recommendation that the CARB Board direct staff to not pursue a rule covering that subject matter at that time. This recommendation would be based on an explanation of why such a rule is unlikely to achieve the relevant emission reductions in the relevant timeframe, and would include a demonstration that the overall aggregate commitment will be achieved despite that rule not being pursued. This public process and CARB hearing would provide additional opportunity for public and stakeholder input, as well as ongoing technology review, and assessments of costs and environmental impacts.

The measures, as proposed by staff to the CARB Board or adopted by the CARB Board, may provide more or less than the initial emission reduction estimates. In addition, action by the CARB Board may include any action within its discretion.

Commitment to Achieve Emission Reductions

The following section describes the estimated emission reduction and potential commitment from the SIP measures identified and quantified to date for the South Coast. The aggregate commitment of emissions reductions from State sources to be proposed for CARB Board consideration will be found in CARB's staff report for the South Coast 2022 AQMP when it is brought to the CARB Board.

While the 2022 State SIP Strategy includes estimates of the emission reductions from each of the individual new measures, CARB's overall commitment is to achieve the total emission reductions necessary from State-regulated sources to attain the federal air quality standards, reflecting the combined reductions from the existing control strategy and new measures. Therefore, if a particular measure does not get its expected emission reductions, the State's overall commitment to achieving the total aggregate emission reductions still exists. If actual emission decreases occur that exceed the projections reflected in the current emission inventory and the 2022 State SIP Strategy, CARB will submit an updated emissions inventory to ~~the~~ U.S. EPA as part of a SIP revision. The SIP revision would outline the changes that have occurred and provide appropriate tracking to demonstrate that aggregate emission reductions sufficient for attainment are being achieved through enforceable emission reduction measures. CARB's emission reduction commitments may be achieved through a combination of actions including but not limited to the implementation of control measures; the expenditure of local, State or federal incentive funds; or through other enforceable measures. In some cases, actions by federal and international agencies will be needed. In others, programmatic approaches must be developed, and funding secured to achieve reductions through additional transition to cleaner technologies and systems in the relevant sectors. ~~If~~For such ~~measures are utilized~~situations, the Clean Air Act includes a provision for approval under section 182(e)(5) advanced technology provisions to allow this future flexibility for "extreme" areas such as the South Coast needing additional reductions to meet the ozone standard.

TABLE 4-4

~~PROPOSED~~ CARB MEASURES AND SCHEDULE

~~Proposed~~ Measure	Agency	Action	Implementation Begins
On-Road Heavy-Duty			
Advanced Clean Fleets Regulation	CARB_	2023	2024~~2023-2045~~
Zero Emissions Trucks Measure	CARB	2028~~TBD~~	2030~~TBD~~
On-Road Light-Duty			
On-Road Motorcycle New Emissions Standards	CARB	2022	2025~~2024-2035~~
Clean Miles Standard	CARB	2021	2023~~-2030~~
Off-Road Equipment			
Tier 5 Off-Road Vehicles and Equipment	CARB	~~2024/~~2025	~~2028/~~2029
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	CARB	2022	2024~~2023-2033~~
Transport Refrigeration Unit Regulation Part 2	CARB	2026~~TBD~~	2028~~TBD~~
Commercial Harbor Craft Amendments	CARB	2022	2023~~-2032~~
Cargo Handling Equipment Amendments	CARB	2025~~TBD~~	2026~~TBD~~
Off-Road Zero Emission Targeted Manufacturer Rule	CARB	2027~~2025~~	2031~~TBD~~
Clean Off-Road Fleet Recognition Program	CARB	2025	2027~~2026~~
Spark-Ignition Marine Engine Standards	CARB	2029~~2026/27~~	2031~~2029-2035~~
Other			
Consumer Products Standards	CARB	2027~~2025-2028~~	2028~~2031-2037~~
Zero Emission Standard for Space and Water Heaters	CARB	2025	~~2025-~~2030
Enhanced Regional Emission Analysis in State Implementation Plans[7]	CARB	2025~~TBD~~	2023~~TBD~~
Pesticides: 1,3-Dichloropropene Health Risk Mitigation	DPR[8]	2022	2024

[7] Proposed CARB finalization.

[8] California Department of Pesticide Regulation (DPR).

TABLE 4-4 (CONTINUED)

~~PROPOSED~~ CARB MEASURES AND SCHEDULE

~~Proposed~~ Measure	Agency	Action	Implementation Begins
Primarily-Federally and Internationally Regulated Sources – CARB Measures			
In-Use Locomotive Regulation	CARB	2023	~~TBD~~2024
Future Measures for Aviation ~~Emission~~Emissions Reductions	CARB	~~TBD~~2027	~~TBD~~2029
Future Measures for Ocean-Going Vessel ~~Emission~~Emissions Reductions	CARB	~~TBD~~2027	~~2025+~~TBD
Primarily-Federally and Internationally Regulated Sources – Federal Action Needed[9]			
On-Road Heavy-Duty Vehicle Low NOx Engine Standards	U.S. EPA	2022~~TBD~~	~~TBD~~2027
On-Road Heavy-Duty Vehicle Zero Emission Requirements	U.S. EPA	TBD	TBD
Off-Road Equipment Tier 5 Standard for Preempted Engines	U.S. EPA	TBD	TBD
Off-Road Equipment Zero Emission Standards Where Feasible	U.S. EPA	TBD	TBD
More Stringent Aviation Engine Standards	U.S. EPA/ICAO[10]	TBD	TBD
Cleaner Fuel and Visit Requirements for Aviation	U.S. EPA	TBD	TBD
Zero Emission On-Ground Operation Requirements at Airports	U.S. EPA	TBD	TBD
Airport Aviation Emissions Cap	U.S. EPA	TBD	TBD
More Stringent National Locomotive Emission Standards	U.S. EPA	TBD	TBD
Zero Emission Standards for ~~Switch~~ Locomotives	U.S. EPA	TBD	TBD
Address Unlimited Locomotives Remanufacturing ~~Loophole~~	U.S. EPA	TBD	TBD
More Stringent NOx and PM Standards for Ocean-Going Vessels	U.S. EPA/IMO[11]	TBD	TBD
Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels	U.S. EPA	TBD	TBD

[9] Request U.S. EPA approved under the provisions of section 182(e)(5) of the Clean Air Act.

[10] International Civil Aviation Organization (ICAO).

[11] International Maritime Organization (IMO).

TABLE 4-5

~~PROPOSED~~ CARB MEASURES AND SCHEDULE*

Measures	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Advanced Clean Fleets			★	■													
Zero--Emissions Trucks Measure					★			★		■							
On-Road Motorcycle New Emissions Standards		★			■												
Clean Miles Standard	★		■														
Tier 5 Off-Road Vehicles and Equipment					★★				■								
Amendments to the In-Use Off-Road Diesel Fueled Fleets– ~~Regulation~~		★		■													
Transport Refrigeration Unit Regulation ~~(TBD)~~Part 2						★		■									
Commercial Harbor Craft Amendments		★	■														
Cargo Handling Equipment Amendments ~~(TBD)~~					★	■											
Off-Road Zero--Emission Targeted Manufacturer Rule					★		★				■						
Clean Off-Road Fleet Recognition Program					★		■										
Spark-Ignition Marine Engine Standards							★		★		■						
Consumer Products Standards							★★	■									
Zero--Emission Standard for Space and Water Heaters					★					■							
			★														
P ★ ■																	
In-Use Locomotive Regulation			★	■													
Future Measures for Aviation Emission Reductions ~~(TBD)~~							★		■								
Future Measures for OGV Emission Reductions ~~(TBD)~~							★										

* Yellow star represents the year for which action is proposed; dark blue represents the ~~years of~~year implementation~~.~~ begins.

Statewide Emissions Reductions

The ~~proposed~~ measures in the 2022 State SIP Strategy will provide emission reduction benefits throughout the State. Some of these benefits will come from current programs while the remainder of the benefits will come from new measures. Although the existing control program will provide mobile source emission reductions necessary to meet the attainment needs of many areas of the State, the new measures in the 2022 State SIP Strategy will provide further reductions to enhance air quality progress and achieve the 2015 8-hour ozone standard.

Emission Reductions from Current Programs

Table 4-6 provides the remaining mobile source emissions under CARB and district current programs for the State ~~as a whole,~~ and the South Coast. Ongoing implementation of current control programs is projected to reduce mobile source NOx emissions ~~statewide~~ from today's levels by ~~407~~521 tons per day statewide, and 156 tons per day in the South Coast, in 2037. Achieving the benefits projected from the current control program will continue to require significant efforts for implementation and enforcement and thus represents an important element of the overall strategy.

TABLE 4-6

MOBILE SOURCE EMISSIONS UNDER CARB AND SOUTH COAST AQMD CURRENT CONTROL PROGRAMS~~[12]~~

Mobile Sources	NOx (~~tpd~~tons per day)			VOC (~~tpd~~tons per day)		
	2018	2037	Change	2018	2037	Change
Statewide[13]	~~1152.2~~1156.7	~~745.7~~635.3	-~~35~~45%	~~661.5~~638.3	~~448.1~~319.5	-~~32~~50%
South Coast~~–AQMD~~[14]	~~292.9~~299.0	~~154.8~~142.9	-~~47~~52%	~~197.1~~188.3	~~140~~90.0	-~~29~~52%

Although most of the 2016 State SIP Strategy measure commitments have been adopted, there ~~are three (Advanced Clean Cars II, Transport Refrigeration Unit,~~ is one (Zero Emission Forklift) that the CARB Board

~~12 The Draft SIP strategy and the Draft AQMP rely on different versions of emissions inventory and different base year, from which future emissions were projected from. Due the discrepancies in the emissions inventory, reductions anticipated from the proposed measures are not identical, but the final version SIP Strategy and AQMD will use a consistent emissions inventory and the discrepancies will be resolved. The Draft 2022 SIP Strategy reflects reductions from the HD I/M and SORE regulatory actions in December 2021 as baseline emissions, while the draft AQMP treat them as strategy reductions.~~

13 Source: 2022 CEPAM v1.01; represents the current baseline emissions out to 100 nautical miles with adopted CARB and South Coast AQMD measures.

14 Source: 2022 CEPAM v1.01; represents the current baseline emissions out to 100 nautical miles with adopted CARB and South Coast AQMD measures.

will be acting upon over the next year, and two that were recently adopted but are not yet accounted for in ~~2022.~~the baseline emissions inventory (Advanced Clean Cars II, Transport Refrigeration Unit Part 1). Table 4-7 below shows the timeline and anticipated emission reductions for these three measures.

TABLE 4-7

2016 STATE SIP STRATEGY MEASURES STILL TO BE ADOPTED[15]

Measure	Action	Implementation Begins	State-wide 2037 NOx (tpd*)	State-wide 2037 VOC (tpd*)	South Coast 2037 NOx (tpd*)	South Coast 2037 VOC (tpd*)
	2022	2026	~~12.1~~13.5	~~10.0~~10.8	~~4.4~~5.0	~~3.5~~3.8
	2022	2023-2024	1.3	1.0	0.5	0.4
	2023	2026	1.7	~~1.3~~0.3	0.9	~~0.7~~0.1
Total			**~~15.1~~16.5**	**~~12.3~~12.0**	**~~5.8~~6.4**	**~~4.6~~4.4**

*tons per day (tpd)

Emission Reductions from ~~Proposed~~ New Measures

The new measures contained in the 2022 State SIP Strategy commitment reflect a combination of State actions, and petitions and advocacy for federal and/or international action~~, as well as actions that outline an additional transition to cleaner technologies and systems~~.

Statewide ~~emission~~emissions reductions from the new measures identified and quantified to date in the ~~Draft~~ 2022- State SIP Strategy are estimated to be ~~174.2~~205.6 tons per day of NOx and ~~38.7~~40.9 tons per day of VOC in 2037. ~~Even when coupled with the emission reductions associated with ongoing implementation of the existing control program, additional reductions are needed to meet the standard, as described further in the following sections.~~

South Coast ~~Commitment~~

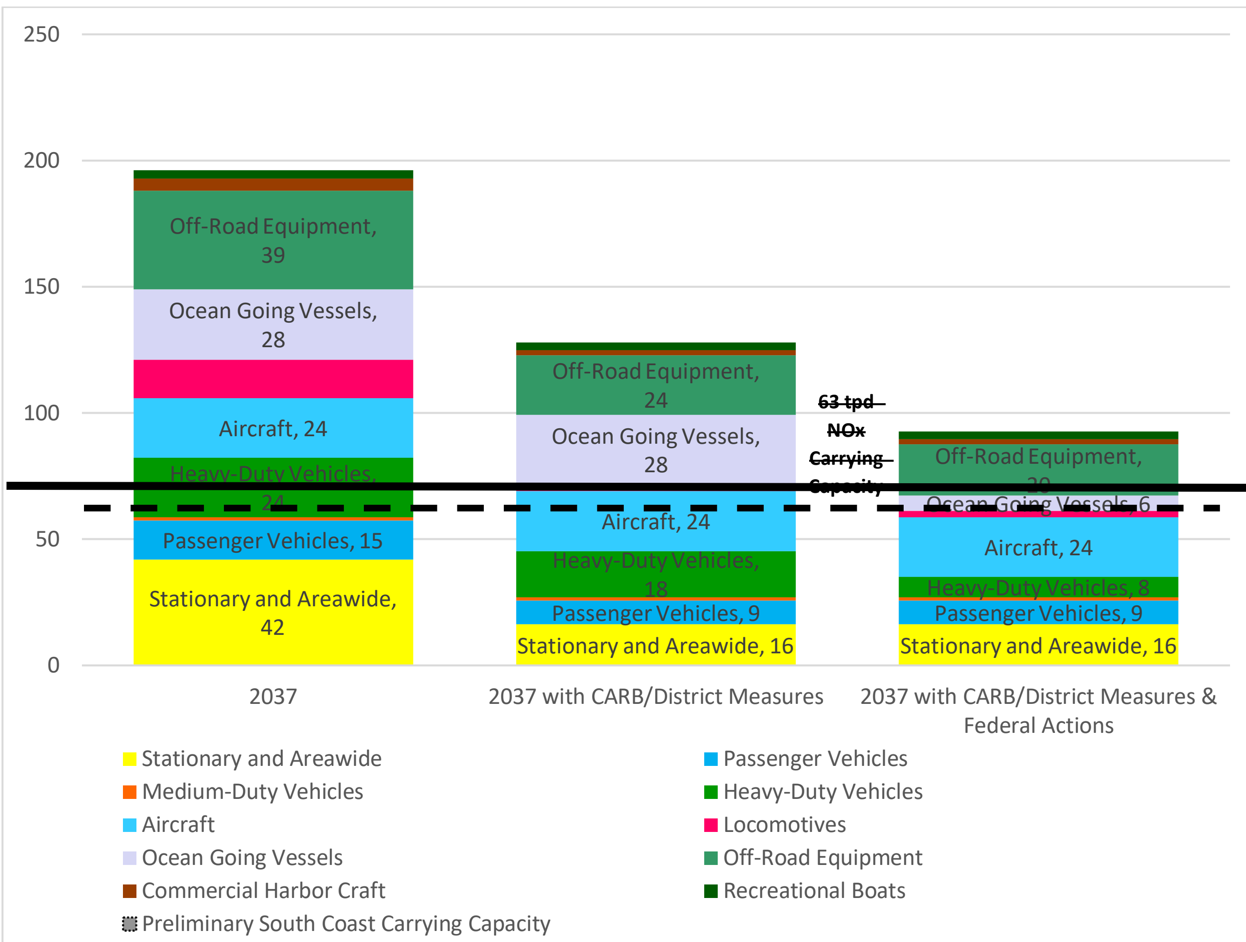
~~Preliminary air~~Air quality modeling indicates that total NOx emissions from all sources in the South Coast will need to decrease to approximately ~~63~~60 tons per day in 2037, representing ~~82~~an approximate 80 percent reduction from current levels. A significant fraction of the needed reductions will come from the existing control program~~, which is projected to reduce NOx emissions from all sources by approximately 55 percent by 2037, providing a significant down payment on the emission reductions needed.~~.

In addition, ~~while CARB action on the 2016 State SIP Strategy measure commitments has progressed through various implementation schedules over the last five years~~as described above, a few measure commitments included in the 2016 State SIP Strategy have not yet been acted upon or were very recently adopted and are thus not yet in the baseline emissions inventory, as outlined in Table 4-7 above. Action will be taken on ~~these~~the remaining measures in the coming year.

Collectively, ~~emission~~emissions reductions from CARB's current control program, reductions from the remaining 2016 State SIP Strategy measures~~ still to be adopted~~, and reductions estimated from the measures identified and quantified ~~to date for proposal in~~at the time of release of the 2022 State SIP

15 Numbers may not add up due to rounding.

Strategy were not enough to ~~meet~~show attainment of the 2015 8-hour ozone standard in the South Coast (Figure 4-5). Since the release of the ~~Draft~~ 2022 State SIP Strategy, ~~the~~CARB and South Coast AQMD ~~has been able to successfully model attainment of the 2015 8-hour ozone standard in 2037 when including~~ have identified the additional measures and reductions needed, such that this proposal now includes all measures and commitments needed from ~~additional~~ State sources to support attainment in the South Coast ~~AQMD measures~~. Tables 4-8 and ~~estimated~~4-9 summarize the reductions from the ~~aviation sector. CARB~~ identified and ~~the South Coast AQMD are continuing to work to identify and refine the additional~~quantified measures ~~and~~. The aggregate commitment of emissions reductions ~~to~~from State sources to be proposed for CARB Board consideration can be ~~pursued, and~~ found in CARB's staff report for the ~~forthcoming Proposed~~ 2022 ~~State SIP Strategy will include the additional measures and commitments needed from mobile sources to support the attainment demonstration in the South Coast. Table 4-8 summarizes the reductions from currently identified and quantified State measures~~AQMP.



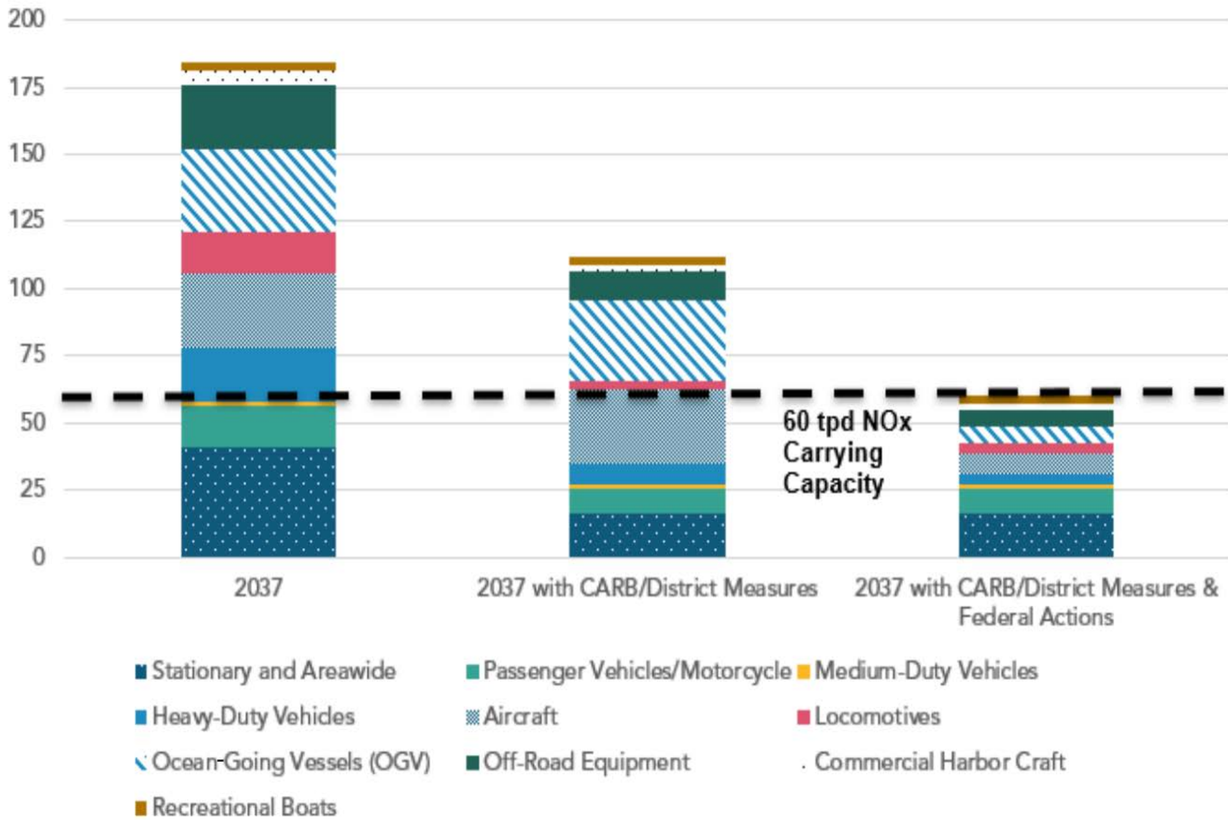


FIGURE 4-5
2037 SOUTH COAST NOX EMISSIONS WITH MEASURES AND FEDERAL ACTIONS[16]
(EMISSIONS OUT TO 100 NAUTICAL MILES)

[16] Source: ~~CARB draft emissions inventory and reduction estimates~~2022 CEPAM v1.01 out to 100 nautical miles; left column represents the current baseline emissions with adopted CARB and district measures; ~~middle~~center column includes ~~2022 State SIP Strategy~~ CARB measures quantified to date and ~~preliminary draft~~ South Coast AQMD Draft Final 2022 AQMP quantified control measures; right column further includes federal actions quantified to date. ~~Emissions inventories are still under development and will be finalized prior to release of the Proposed 2022 State SIP Strategy.~~

~~Due to the discrepancy in the emissions inventory version and treatment of HD I/M and SORE regulations adopted in December 2021, the emissions in the graph do not match with the draft AQMP inventory. This discrepancy will be resolved in the final AQMP.~~

TABLE 4-8

SOUTH COAST NOX EMISSION REDUCTIONS FROM CARB PROGRAMS

CARB Programs in South Coast	2037 NOx Emission Reductions (tons per day)[17]	~~Percent of Needed Reductions~~
Current Control Program	~~151.1~~166.4	~~55%~~
Potential CARB Emissions Reductions Commitments*	95.7	
2016 State SIP Strategy Measures (Not yet ~~adopted~~in baseline inventory)	~~5.8~~6.4	~~2%~~
New ~~Proposed~~ Measures	~~72.9~~89.3	~~26%~~
Total Reductions	**~~229.8~~262.1**	**~~83%~~**

* includes "Zero Emission Standard for Space and Water Heaters" which overlaps with South Coast AQMD's R-CMB-01, R-CMB-02, C-CMB-01 and C-CMB-02.

~~Table 4-9 shows the emission reductions of NOx and VOC in 2037 in the South Coast Air Basin expected from the 2022 State SIP strategy.~~

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17 Numbers may not add up due to rounding.

18 ~~Draft 2022 State SIP Strategy.~~

~~CARB draft emissions inventory;~~Current Control Program represents the current baseline emissions out to 100 nautical miles with adopted CARB and district measures~~. Emissions inventories are still under development and will be finalized prior to release of the Proposed 2022 State SIP Strategy.~~ (Source 2022 CEPAM v1.01).

TABLE 4-9

SOUTH COAST EXPECTED EMISSIONS REDUCTIONS FROM THE 2022 STATE SIP STRATEGY[19]

~~Proposed~~ Measure	2037 (tons per day)	
	NOx	VOC
On-Road Heavy-Duty		
Advanced Clean Fleets Regulation	~~5.3~~6.6	0.5
Zero Emissions Trucks Measure	~~NYQ[a]~~4.1	~~NYQ~~0.4
Total On-Road Heavy-Duty Reductions	~~5.3~~10.7	~~0.5~~0.9
On-Road Light-Duty		
On-Road Motorcycle New Emissions Standards	~~0.9~~0.8	2.1
Clean Miles Standard	<0.1	<0.1
Total On-Road Light-Duty Reductions	0.~~9~~8	2.1
Off-Road Equipment		
Tier 5 Off-Road Vehicles and Equipment	~~1.8~~2.7	NYQ
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	~~1.3~~1.0	0.1
Transport Refrigeration Unit Regulation Part 2	~~4.6~~5.0	~~NYQ~~0.7
Commercial Harbor Craft Amendments	2.6	0.2
Cargo Handling Equipment Amendments	~~1.2~~0.6	~~0.3~~0.4
Off-Road Zero Emission Targeted Manufacturer Rule	~~1.1~~NYQ	NYQ
Clean Off-Road Fleet Recognition Program	NYQ	NYQ
Spark-Ignition Marine Engine Standards	0.3	~~1.2~~0.7
Total Off-Road Equipment Reductions	~~12.9~~12.2	~~1.8~~2.0
Other		
Consumer Products Standards	~~NYQ~~-	8
Zero Emission Standard for Space and Water Heaters[20]	~~5.8~~3.2	0.~~8~~5
Enhanced Regional Emission Analysis in State Implementation Plans	NYQ	NYQ
Pesticides: 1,3-Dichloropropene Health Risk Mitigation	-	NYQ
Total Other Reductions	~~5.8[b]~~3.2	~~8.8~~8.5
Primarily-Federally and Internationally Regulated Sources – CARB Measures		
In-Use Locomotive Regulation	~~12.7~~10.9	~~0.3~~0.4
Future Measures for Aviation Emission Reductions	NYQ	NYQ
Future Measures for Ocean-Going Vessel Emissions Reductions	NYQ	NYQ
Total Primarily-Federally and Internationally Regulated Sources – CARB Measures Reductions	~~12.7~~10.9	~~0.3~~0.4
Primarily-Federally and Internationally Regulated Sources – Federal Action Needed[21]		
On-Road Heavy-Duty Vehicle Low-NOx Engine Standards	~~10.2~~3.8	~~NYQ~~<0.1
On-Road Heavy-Duty Vehicle Zero Emission Requirements	NYQ	NYQ
Off-Road Equipment Tier 5 Standard for Preempted Engines	~~2.0~~1.6	NYQ
Off-Road Equipment Zero Emission Standards Where Feasible	~~1.2~~2.2	NYQ
More Stringent Aviation Engine Standards	NYQ	NYQ

19 Numbers may not add up due to rounding.

20 Reductions may be achieved through CARB and/or complementary South Coast AQMD control measures for this sector.

21 Request U.S. EPA approval under the provisions of section 182(e)(5) of the Clean Air Act.

~~Proposed~~ Measure	2037 (tons per day)	
	NOx	VOC
Cleaner Fuel and Visit Requirements for Aviation	~~NYQ~~10.2	NYQ
Zero Emission On-Ground Operation Requirements at Airports	NYQ	NYQ
Airport Aviation Emissions Cap	9.2	NYQ
More Stringent National Locomotive Emission Standards	NYQ	NYQ
Zero Emission Standards for ~~Switch~~ Locomotives	NYQ	NYQ
Address Unlimited Locomotives Remanufacturing ~~Loophole~~	NYQ	NYQ
More Stringent NOx and PM Standards for Ocean-Going Vessels	0.8	NYQ
Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels	~~21.1~~23.7	NYQ
Total Primarily-Federally and Internationally Regulated -Federal Action Needed Reductions	~~35.3~~51.5	~~NYQ~~<0.1
Aggregate Emissions Reductions	**~~72.9~~89.3**	**~~13.5~~13.9**

[a] "NYQ" denotes emission reductions are Not Yet Quantified.

~~[b] The reductions are not reflected in the attainment demonstration to avoid double counting of reductions. However, CARB and South Coast AQMD collaborate closely to develop regulations and implementation of the measure.~~

CARB Measures

On-Road Heavy-Duty

Advanced Clean Fleets Regulation

This measure accelerates zero emission vehicle adoption in the medium- and heavy-duty sectors by setting zero emission requirements for fleets and 100 percent zero emission vehicle sales requirement in California for manufacturers of Class 2b through 8 vehicles. The Advanced Clean Fleets Regulation will focus on strategies to ensure that the cleanest vehicles are deployed by government, business, and other entities in California to meet their transportation needs. The requirements would be phased-in on varying schedules for different fleets including public, drayage trucks, and high priority private and federal fleets. Public fleets would be required to phase-in purchase requirement starting at 50 percent of new purchases in 2024 and 100 percent starting in 2027. All drayage trucks operating at seaports and intermodal railyards would be required to be zero emission by 2035. Drayage trucks will also have new registration and reporting requirements, starting in 2023. High priority private and federal fleets would be required to phase-in zero emission vehicles as a percentage of the total fleet. The fleet requirements are based on zero emission suitability and are phased-in by vehicle body type. The Advanced Clean Fleets Regulation would also include a requirement that 100 percent of Class 2b and above vehicle manufacturer sales in California are zero emissions starting in 2040.

Zero Emission Trucks Measure

This measure would increase the number of zero emission vehicles and require cleaner engines to achieve ~~emission~~emissions reductions from fleets that are not affected by the ~~proposed~~ Advanced Clean Fleets measure. This would include potential zero emissions zone concepts around warehouses and sensitive communities if CARB is given new authority to enact indirect source rules in combination with strategies to upgrade older trucks to newer and cleaner engines. This would be a transitional strategy to achieve zero emissions medium- and heavy-duty vehicles everywhere feasible by 2045.

On-Road Light-Duty

On-Road Motorcycles New Emissions Standards

This measure would reduce emissions from new, on-road motorcycles by adopting more stringent exhaust and evaporative emissions standards along with limited on-board diagnostics requirements and zero emissions sales thresholds with an associated credit program to help accelerate the development of zero emissions motorcycles. The new exhaust emissions standards include substantial harmonization with the more stringent European motorcycle emissions standards already in place. The new evaporative emissions standards are based on more aggressive CARB off-highway recreational vehicle emissions standards that exist today. This measure also proposes significant zero emission motorcycle sales thresholds beginning in 2028 and increasing gradually through 2035.

Clean Miles Standard

The Clean Miles Standard was adopted by CARB on May 20, 2021. The primary goals of this measure are to reduce GHG emissions from ride-hailing services offered by transportation network companies (TNCs) and promote electrification of the fleet by setting an electric vehicle mile target, while achieving criteria pollutant co-benefits. TNCs would be required to achieve zero grams CO2 emissions per passenger mile traveled and 90 percent electric vehicle miles traveled (VMT) by 2030.

Off-Road Equipment

Tier 5 Off-Road Vehicles and Equipment

This measure would reduce NOx and particulate matter (PM) emissions from new off-road compression-ignition (CI) engines by adopting more stringent exhaust standards for all power categories, including those that do not currently utilize exhaust aftertreatment such as diesel particulate filters and selective catalytic reduction. This measure would be more stringent than required by current U.S. EPA and European Stage V nonroad regulations and would require the use of best available control technologies.

For this measure, CARB staff would develop and propose standards for new off-road CI engines including the following: aftertreatment-based PM standards for engines less than 19 kilowatt (kW) (25 horsepower [hp]), aftertreatment-based NOx standards for engines greater than or equal to 19 kW (25 hp) and less than 56 kW (75 hp), and more stringent PM and NOx standards for engines greater than or equal to 56 kW (75 hp). Other possible elements include enhancing in-use compliance, proposing more representative useful life periods, and developing a low load test cycle. It is expected that this comprehensive off-road Tier 5 regulation would rely heavily on technologies manufacturers are developing to meet the recently approved low NOx standards and enhanced in-use requirements for on-road heavy-duty engines.

Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation

This measure would further reduce emissions from the in-use off-road diesel equipment sector by adopting more stringent requirements to the In-Use Off-Road Diesel-Fueled Fleets Regulation. These amendments would create additional requirements to the currently regulated fleets by targeting the oldest and dirtiest equipment that is allowed to operate indefinitely under the current regulation's structure.

The amendments would include an operational backstop to the current In-Use Off-Road Diesel-Fueled Fleets Regulation for most Tier 0, 1, and 2 engines between 2024 and 2032. This will allow ~~an eight~~ a 12 year phase out of these oldest engines. Along with the operational backstop, adding vehicle provisions in the current regulation will be extended to phase in a limitation on the adding of Tier 3 and Tier 4i vehicles to fleets. The amendments also include proposed new requirements for most fleets to use renewable diesel, proposed requirements for prime contractors and public works awarding bodies to increase the enforceability of the regulation, and optional flexibility provisions for fleet adoption of zero emission vehicles. Additional modifications could include clarification to implementation and sunset provisions that would have allowed small fleets to continue to operate vehicles that could not be retrofitted with a verified diesel emission control strategy indefinitely.

Transport Refrigeration Unit Regulation Part 2 (Non-Truck TRUs)

This measure is the second part of a two-part rulemaking to transition diesel-powered transport refrigeration units (TRUs) to zero emission technologies. This measure would require zero emission equipment for non-truck TRUs (trailer TRUs, domestic shipping container TRUs, railcar TRUs, TRU generator sets, and direct-drive refrigeration units).

Commercial Harbor Craft Amendments

This measure proposes that starting in 2023 and phasing in through 2031, most commercial harbor crafts (CHCs) (except for commercial fishing vessels and categories listed below) would be required to meet the cleanest possible standard (Tier 3 or 4) and retrofit with diesel particulate filters (DPFs) based on a compliance schedule. The current regulated CHC categories are ferries, excursion, crew and supply, tug/tow boats, barges, and dredges. The amendments would impose in-use requirements on the rest of vessel categories except for commercial fishing vessels, including workboats, pilot vessels, commercial passenger fishing, and all barges over 400 feet in length or otherwise meeting the definition of an ocean-going vessel. The amendments would also remove the current exemption for engines less than 50 hp.

The measure also proposes that, starting in 2025, all new excursion vessels be required to be plug-in hybrid vessels that ~~can derive~~are capable of deriving 30 percent or more of combined propulsion and auxiliary power from a zero emission tailpipe emission source. Starting in 2026, all new and in-use short run ferries would be required to be zero emission; and starting in 2030 and 2032, all commercial fishing vessels would need to meet a Tier 2 standard at minimum.

Cargo Handling Equipment Amendments

This measure would start transitioning Cargo Handling Equipment (CHE) to full zero emission in 2026, with over 90 percent penetration of ZE equipment by 2036. Based on the current state of zero emission CHE technological developments, the transition to zero emission would most likely be achieved largely through the electrification of CHE. This assumption about aggressive electrification is supported by the fact that currently some electric RTG cranes, electric forklifts, and electric yard tractors are already commercially available. Other technologies are in early production or demonstration phases.

Off-Road Zero Emission Targeted Manufacturer Rule

The Off-Road Zero Emission Targeted Manufacturer Rule would accelerate the development and production of zero emission off-road equipment and powertrains. Existing zero emission regulations and regulations currently under development target a variety of sectors (e.g., forklifts, cargo handling equipment, off road fleets, Small Off-Road Engines (SORE), etc.). However, as technology advancements occur, more sectors including wheel loaders, excavators, and bulldozers could be accelerated. Fully addressing control of emissions from new farm and construction equipment under 175 horsepower that are preempted, will require partnership on needed Federal zero emission standards for off-road equipment.

This measure would require manufacturers of off-road equipment and/or engines to produce for sale zero emission equipment and/or powertrains as a percentage of their annual statewide sales volume. Sales/production mandate levels would be developed based on the projected feasibility of zero emission technology to enter and grow in the various off-road equipment types currently operating in California. This measure is expected to increase the availability of zero emission options in the off-road sector and support other potential measures that promote and/or require the purchase and use of such options. A targeted manufacturer regulation will need to ~~consider~~take into account parameters such as the number of equipment and engine manufacturers producing off-road equipment for sale in California, along with sales volumes, to ensure that such an effort is cost-effective and technologically feasible.

Clean Off-Road Fleet Recognition Program

This measure would create a non-monetary incentive to encourage off-road fleets to go above and beyond existing regulatory fleet rule compliance and adopt advanced technology equipment with a strong emphasis on zero emission technology. The Clean Off-Road Fleet Recognition Program would provide a standardized methodology for contracting entities, policymakers, ~~State~~state and local government, and other interested parties to establish contracting criteria or require participation in the program to achieve their individual policy goals.

The Clean Off-Road Fleet Recognition Program framework would encourage entities with fleets to incorporate advanced technology and zero emission vehicles into their fleets, prior to or above and beyond regulatory mandates based on fleet size. The program would provide standardized criteria or a rating system for participation at various levels to reflect the penetration of advanced technology and zero emission vehicles into a fleet. Levels could be scaled over time as zero emission equipment becomes more readily available. CARB anticipates the next several years of technology advancements and demonstrations to drive the stringency of the rating system. Participation in the program would be voluntary for entities with fleets, however, designed in a manner that provides them motivation to go beyond business as usual. The program would offer value for entities with fleets to participate by potentially providing them increased access to jobs/contracts, public awareness, and marketing opportunities.

Spark-Ignition Marine Engine Standards

For this measure, CARB will develop and propose catalyst-based standards for outboard and personal watercraft engines less than or equal to 40 kW in power that will gradually reduce emission standards to approximately 70 percent below current levels. For outboard and personal watercraft engines under 40 kW, more stringent exhaust standards will be developed and proposed based on the incorporation of electronic fuel injection that will gradually reduce emission standards 40 percent below current levels. This measure would require a 5.0 g/kW-hr HC+NOx standard for outboard engines and personal watercraft engines at or above 40 kW in power and a 10.0 g/kW-hr HC+NOx standard for engines less than 40 kW.

In addition to requiring more stringent exhaust standards, CARB is considering actions consistent with Executive Order N-79-20 that would require a percentage of outboard and personal watercraft vessels to be propelled by zero emission technologies for certain applications. Outboard engines less than 19 kW, which are typically not operated aggressively or for extended periods, could potentially be phased-out and gradually replaced with zero emission technologies. Some personal watercraft applications could also potentially be replaced with zero emission technologies.

Other

Consumer Products ~~Regulation~~Standards

This measure will further reduce VOC and equivalent VOC emissions from consumer products to expedite attainment of national ambient air quality standards for ozone. As with previous rulemakings, emission reductions will be achieved by setting regulatory standards applicable to the content of consumer products. To meet emission reduction targets for the measure, CARB staff will evaluate categories with relatively high contributions to ozone formation, whether currently regulated or unregulated. Staff will consider the merits of proposing VOC content standards as well as reactivity limits. Staff developing proposed amendments to the Consumer Products Regulation will also consider investigating concepts for expanding manufacturer compliance options, market-based approaches, and reviewing existing exemptions. Staff will work with stakeholders to explore mechanisms that would encourage the development, distribution, and sale of cleaner, very low, or zero-emitting products. In undertaking these efforts staff will prioritize strategies that achieve the maximum feasible reductions in ozone forming, toxic air contaminant, and GHG emissions. This measure complements a parallel measure in CARB's Climate Change Scoping Plan Update, to be considered by the CARB Board in 2022, to phase down use of HFC-152a and other GHGs in consumer products.

Zero Emission Standard for Space and Water Heaters

For this measure, CARB would develop and propose zero GHG emission standards for space and water heaters sold in California; CARB could also work with air districts to further tighten district rules to drive zero emission technologies. This measure would not mandate retrofits in existing buildings, but some buildings would require retrofits to be able to use the new technology that this measure would require. Beginning in 2030, 100 percent of sales of new space and water heaters (for either new construction or replacement of burned-out equipment in existing buildings) would need to meet zero emission standards. It is expected that this regulation would rely heavily on heat pump technologies currently being sold to electrify new and existing homes.

Enhanced Regional Emissions Analysis in SIPs

The primary goal of this measure is to reduce criteria pollutant and GHG emissions that come from on-road mobile sources through reductions in VMT. In addition, lowering VMT will help alleviate traffic congestion, improve public health, reduce consumption of fossil fuels, and reduce infrastructure costs. CARB is exploring three options to reduce ~~reactive organic gases (ROG)~~VOC and NOx emissions through reductions in VMT. First, CARB will consider whether and how to change the process for developing Motor Vehicle Emissions Budget (MVEB) by evaluating the existing MVEB development process to meet NAAQS. In addition, CARB will assess and improve the Reasonably Available Control Measures (RACM) analysis in the SIP by providing a comprehensive list of Transportation Control Measures (TCMs) and emission quantification methodology. Finally, CARB will consider updating the guidelines for the California Motor Vehicle Registration Fee (MV Fees) Program and the Congestion Mitigation and Air Quality Improvement (CMAQ) Program to fund a broader range of transportation and air quality projects that advance new approaches and technologies in reducing air pollution.

1,3-Dichloropropene Health Risk Mitigation

Pesticides are regulated under both federal and state law. California Department of Pesticide Regulation (DPR) is the agency responsible for regulating the sale and use of pesticides in California. DPR can generally reduce exposures to pesticides through the development and implementation of necessary restrictions on pesticide sales and use and by encouraging integrated pest management. Considered a VOC, 1,3-Dichloropropene (1,3-D) is a fumigant used to control nematodes, insects, and disease organisms in soil.

DPR is developing a regulation to address both cancer and acute risk to non-occupational bystanders from the use of 1,3-D. The regulation will be developed in consultation with the County Agricultural Commissioners (CACs), the local air districts, CARB, the Office of Environmental Health Hazard Assessment (OEHHA), and the California Department of Food and Agriculture (CDFA). Once implemented, DPR's regulation would require applicators to use totally impermeable film (TIF) tarpaulins or other mitigation measures that provide a comparable degree of protection from exposure.

Primarily-Federally and Internationally Regulated Sources – CARB Measures

In addition to reducing emissions from the above sources, it is critical to achieve ~~emission~~emissions reductions from sources that are primarily regulated at the federal and international level. It is imperative that the federal government and other relevant regulatory entities act decisively to reduce emissions from these primarily-federally and internationally regulated sources of air pollution. CARB and the air districts in California have taken actions to not only petition federal agencies for action, but also to directly reduce emissions using programmatic mechanisms within our respective authorities. CARB continues to explore additional actions, many of which may require a waiver or authorization under the Clean Air Act, as described below.

In-Use Locomotive Regulation

This measure would use mechanisms available under CARB's regulatory authority to accelerate the adoption of advanced, cleaner technologies, and include zero emission technologies, for locomotive operations. The In-Use Locomotive Regulation would apply to all locomotives operating in the State of California with engines that have a total rated power of greater than 1,006 horsepower, excluding locomotive engines used in training of mechanics, equipment designed to operate both on roads and rails, and military locomotives. The measure reduces emissions by increasing use of cleaner diesel locomotives and zero emission locomotives through a spending account, in-use operational requirements, and by an idling limit. By July 1, 2024, a spending account would be established for each locomotive operator. Funds in the account would only be used toward Tier 4 or cleaner locomotives until 2030, and at any time toward zero emission locomotives, zero emission pilot or demonstration projects, or zero emission infrastructure.

For the in-use operational requirements, beginning January 1, 2030, only locomotives built after January 1, 2007 may operate in California. Each year after January 1, 2030, only locomotives less than 23 years old may operate in California. Additionally, under the in-use operational requirements, starting January 1, 2030, all switch, industrial, and passenger locomotives operating in California with an original engine build date 2030 or newer will be required to be zero emission. Starting January 1, 2035, all freight line haul locomotives operating in California with an original engine build date 2035 or newer must be zero emission. Locomotives equipped with automatic engine stop/start systems are to idle no more than 30 minutes unless an exemption applies. Also, locomotive operators would report locomotive engine emissions levels and activity on an annual basis.

Future Measures for Aviation Emissions Reductions

Future measures for aviation would reduce emissions from airport and aircraft related activities. The identified emission sources for the aviation sector are main aircraft engines, auxiliary power units (APU), and airport ground transportation. Emission reductions can be achieved by pursuing incentive and regulatory measures.

CARB would evaluate federal, ~~State~~state, and local authority in setting operational efficiency practices to achieve emission reductions. Operational practices include landing, takeoff, taxi, and running the APU, and contribute to on-ground and near-ground emissions. Near ground emissions are emissions between ground level up to 3,000 feet. Operational practices such as de-rated take-off and reduced power taxiing have the potential to achieve emission reductions.

CARB would similarly work with ~~the~~ U.S. EPA, Air Districts, airports, and industry stakeholders in a collaborative effort to develop regulations, voluntary measures, and incentive programs. CARB would evaluate the incentive amounts that would be required to encourage aircrafts to voluntarily use cleaner engines and fuels. Incentives to encourage the use of cleaner engines and fuels for aircraft in California would involve identification of funding sources and implementation mechanisms such as development of new programs.

Future Measures for Ocean-Going Vessel Emissions Reductions

Future measures for OGVs would reduce emissions from OGVs that are transiting, maneuvering, or anchoring in regulated California waters and while docking at berth in California seaports. Despite the reductions achieved by existing regulatory and incentive programs, additional measures are needed to achieve further ~~emission~~emissions reductions from OGVs to protect public health and meet federal air quality standards. Due to the international nature of OGVs, advocacy and coordination with federal and international oversight and regulatory organizations may be needed to achieve additional ~~emission~~emissions reductions.

Future measures for OGVs could achieve additional reductions through the use of operational changes and new technologies currently in development, including advances in exhaust capture and control, mobile shore power connections, cleaner fuels (such as liquified natural gas [LNG], hydrogen, methanol, ammonia, etc.), alternative power sources (including batteries and fuel cells), as well as potential vessel side technologies (such as water-in-fuel emulsion). In pursuing regulatory measures, CARB would work with ~~the~~ U.S. EPA, California Air Districts, seaports, and industry stakeholders in a collaborative effort to determine which measure would provide the most effective ~~emission~~emissions reductions, as well as CARB's ability to implement each potential measure. Advocacy at the federal and international levels may be necessary to achieving additional ~~emission~~emissions reductions from OGVs given the international nature of sea trade.

Incentive or regulatory measures could be pursued to achieve further ~~emission~~emissions reductions from OGVs, including using cleaner engines or cleaner fuels than those required by ~~the~~ U.S. EPA and the International Maritime Organization (IMO), reducing emissions while anchored within regulated California waters (RCW), sailing at slower speeds while in RCW, and requiring bulk and general cargo vessels to reduce emissions while at berth.

Additionally, CARB staff have committed to assessing the feasibility, benefits, and cost-effectiveness of control technologies for bulk/general cargo vessels and vessels at anchor (which are ~~currently~~ not subject to emissions control requirements in the 2020 At Berth Regulation) as part of the 2020 At Berth Regulation's Interim Evaluation. This evaluation will occur in 2021–2022, with a public report due by December 1, 2022.

~~Primarily-Federally and Internationally Regulated Sources –~~ Federal Actions Needed

For California to meet air quality standards, it is imperative that the federal government and other relevant regulatory entities act decisively to reduce emissions from these primarily-federally and internationally regulated sources of air pollution. Absent further action, by 2030, Statewide NOx emissions from primarily-federally regulated sources will be double the emissions from California-regulated mobile sources ~~by 2030~~. For the following measures, CARB would petition and/or advocate to ~~the~~ U.S. EPA and other federal and international entities for actions to control emissions as described below.

On-Road Heavy-Duty ~~Vehicle Low-NOx Engine Standards~~ Vehicles

~~Due to the preponderance of interstate trucking's contribution to emissions in California, timely federal action to implement a national low-~~On-Road Heavy-Duty Vehicle Low NOx ~~engine standard is critical to provide the emission reductions needed for attainment.~~ Engine Standards

In the 2016 State SIP Strategy, CARB ~~included~~outlined a ~~measure to~~ petition for a federal low-~~-~~ NOx standards that ~~would~~ apply to all new heavy-duty trucks sold nationwide starting in 2024 or later. This ~~would~~will ensure that all trucks traveling within California would eventually be equipped with an engine meeting the lower NOx standard. Federal action is critical to implement this emission standard, since ~~emission~~emissions reductions from a California-only CARB regulation would come mostly from Class 4-6 vehicles (as most Class 7 and 8 vehicles operating in California were originally purchased outside the State).

~~In June of 2016, the South Coast, San Joaquin Valley and Bay Area air districts and nine other State and local air control agencies formally petitioned the U.S. EPA to adopt 0.02 g/bhp-hr NOx standards for medium- and heavy-duty- truck engines nationally. The U.S. EPA responded to those petitions on December 20, 2016, stating that they will initiate the work necessary to issue a Notice of Proposed Rulemaking for a new on-road heavy-duty NOx program, with the intention of proposing standards that could begin in model year~~ Although~~2024, consistent with the lead-time requirements of the Clean Air Act. In November 2018, the U.S. EPA announced the national program, known as the Cleaner Trucks Initiative (CTI),[22] and an Advanced Notice of Proposed Rulemaking was released on January 21, 2020.[23] On August 5, 2021, the U.S. EPA announced an update to CTI called~~ the Clean Trucks Plan (CTP~~).[24] And finally, just recently on~~) proposal released in March ~~3,~~ 2022~~, the U.S. EPA published a Notice of Proposed Rulemaking[25] that includes two proposed~~ provides options ~~for levels at which the emissions standard could be set and implementation timelines, along with an additional alternative, on which they~~ that are ~~currently accepting public comment.~~ less stringent, U.S. EPA is moving forward with the federal CTP, and CARB ~~will~~would advocate to align the federal CTP with CARB's low-~~-~~ NOx ~~omnibus~~Omnibus regulations to the maximum degree possible, given the need for deep ~~emission~~emissions reductions and the benefits of consistency in this area given the multiple jurisdictions in which trucks are purchased and used.

On-Road Heavy-Duty Vehicle Zero Emission Requirements

In addition to the need for cleaner combustion engine standards, actions are also needed at the federal level to drive the introduction of zero emission heavy-duty vehicles into the on-road fleet nation-wide. CARB would petition and/or advocate to ~~the~~ U.S. EPA for federal zero emission on-road heavy-duty vehicle requirements, along with more stringent GHG standards for medium- and heavy-duty vehicles that would apply to new heavy-duty trucks sold nationwide~~.~~ to achieve the needed NOx emissions reductions for the South Coast in 2037. Additionally, CARB would advocate that ~~the~~ U.S. EPA enable ~~State~~state leadership

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~~[22] https://www.epa.gov/regulations-emissions-vehicles-and-engines/cleaner-trucks-initiative.~~

~~[23] *Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine Standards*, 85 Fed. Reg. 3306 (Jan. 21, 2020). https://www.govinfo.gov/content/pkg/FR-2020-01-21/pdf/2020-00542.pdf.~~

~~[24] https://www.epa.gov/regulations-emissions-vehicles-and-engines/clean-trucks-plan.~~

~~[25] https://www.epa.gov/system/files/documents/2022-03/hd2027stds-nprm-2022-03.pdf.~~

on zero emission trucks by prioritizing federal grants toward zero emission technology and their associated infrastructure.

Pre-empted Off-Road Equipment ~~Tier 5 Standard~~

More Stringent Emission Standards for Preempted Off-Road Engines~~–~~

Off-road equipment regulated at the federal level also contributes significant ozone precursor emissions in California. ~~Included in the Draft 2022 State SIP Strategy is a potential measure for Tier 5 standards on State-regulated off-road equipment.~~ CARB would ~~also~~ petition and/or advocate to ~~the~~ U.S. EPA to promulgate off-road equipment Tier 5 compression-ignition standards and new spark-ignition standards for preempted engines to achieve the needed NOx emissions reductions for the South Coast in 2037, akin to those that CARB is pursuing for equipment under State authority to prevent the availability of equipment meeting a less stringent standard.

Off-Road Equipment Zero Emission Standards Where Feasible

Given the availability of zero emission equipment in certain off-road sectors, zero emissions requirements are also feasible and needed, as discussed in various CARB measures in the Off-Road Equipment portion of the ~~Draft~~ 2022 State SIP Strategy. CARB would ~~also~~ petition and/or advocate to ~~the~~ U.S. EPA to require zero emission standards for off-road equipment where the technology is feasible to achieve the needed NOx emissions reductions for the South Coast in 2037. Zero emission technology is maturing and penetrating the off-road equipment categories, and federal zero emission standards for off-road equipment would provide a clear path for zero emission technology to continue maturing.

Aviation

More Stringent Aviation Engine Standards

In California, aircraft are projected to make up 9.5 percent of mobile source NOx emissions in 2035, increasing from 5.4 percent in 2020. While CARB continues to explore options available under its regulatory authority to control emissions from aviation, CARB would petition and/or advocate to ~~the~~ U.S. EPA~~/ICAO~~ for more stringent criteria and GHG standards for aircraft engines to achieve the needed NOx emissions reductions for the South Coast in 2037. With innovative research and advanced optimization of engine design, it has been demonstrated that NOx emissions can be further reduced beyond the CAEP/8 standards as seen under the FAA's Continuous Lower Energy, Emissions, and Noise Phase II (CLEEN II) Program.

Cleaner Fuel and Visit Requirements for Aviation

In addition to needing more stringent engine standards, there are other mechanisms by which regulatory entities could require ~~emission~~emissions reductions from aircraft in California. CARB would petition and/or advocate to ~~the~~ U.S. EPA to require aircraft to use cleaner fuels when ~~travelling~~traveling through California, and to require visits from cleaner aircraft to achieve the needed NOx emissions reductions for the South Coast in 2037. Using the aircraft engine certification data manufacturers report to International Civil Aviation Organization (ICAO), CARB staff has identified the Airbus 320-NEO and Airbus 319-100 Series as the cleanest options for NOx emissions among aircraft commonly visiting California, with NOx emissions 40 percent below the weighted-average aircraft visit.

Zero Emission On-Ground Operation Requirements at Airports

The on-ground operations at airports present additional opportunities for ~~emission~~emissions reductions for aviation. Typical aircrafts include an auxiliary power unit (APU) which is a small turbine engine that starts the aircraft main engines and powers the electrical systems on the aircraft when the main engines are off. Requirements for switching to the on-board rechargeable batteries as the power supply, it would reduce the usage of the gas turbine APU and hence emissions. Taxiing is another on-ground operation where emissions can be reduced through reduced power during taxiing, improved taxi-time, and the use of new technologies~~ such as Taxi-bot. Taxi-bot is utilized during pushback operations and allows immediate taxiing with the engines stopped eliminating bottlenecks in the gate area while also eliminating emissions from the main engines.~~. CARB would petition and/or ~~advocated~~advocate to~~ the~~ U.S. EPA to require zero emission on-ground operation at California airports to achieve the needed NOx emissions reductions for the South Coast in 2037.

Airport Aviation Emissions Cap

In addition to the three proposed aviation actions above, CARB would petition and/or advocate to appropriate agencies, including the U.S. EPA, for additional actions to control emissions from aviation, such as requiring an aviation emissions cap at each California airport to achieve the needed NOx emissions reductions for the South Coast in 2037. This emissions cap would set an emissions level for all aircraft activities related to the airports preventing emissions to increase with airport growth and reduce existing emissions by replacing airport activities with cleaner combustion and zero emission technologies. These additional reductions could potentially also be achieved through incentivized turnover of aircraft or upgrades to cleaner engines, or other available regulatory mechanisms.

Locomotives

More Stringent National Locomotive Emission Standards

Locomotives are another source primarily regulated at the federal level that contribute significant NOx emissions in California. In the 2016 State SIP Strategy, CARB ~~included~~outlined a ~~measure to~~ petition for ~~more stringent~~new national locomotive emission standards~~. The goal of a more stringent national locomotive emission standard is to reduce~~ for significant additional reductions in criteria and toxic pollutants, and GHG emissions from existing and future locomotives~~ in order to meet air quality and climate change goals.~~. On April 13, 2017, CARB petitioned ~~the~~ U.S. EPA~~[26]~~ to promulgate both Tier 5 national emission standards for newly manufactured locomotives, and more stringent national requirements for remanufactured locomotives~~, to reduce criteria and toxic pollutants, fuel consumption, and GHG emissions.~~. CARB is waiting for ~~the~~ U.S. EPA to act on ~~the~~this petition to promulgate ~~Tier 5 national emission~~these standards ~~for newly manufactured locomotives and more stringent national~~ and requirements~~ for remanufactured locomotives~~.

Zero Emission Standards for ~~Switch~~ Locomotives

~~Switchers~~Locomotive switchers, or switchers, move railcars and sections of trains in and around railyards ~~(but should not be confused with rubber-tired railcar movers, smaller off-road vehicles than move~~

~~[26] https://ww2.arb.ca.gov/resources/documents/petition-rulemaking-seeking-amendment-locomotive-emission-standards.~~

~~individual railcars in yards, but are not considered switchers). Switchers that~~and account for about 10 percent of freight diesel use~~ could be converted ~~. The 2017 petition to ~~electric.~~U.S. EPA included a proposed standard for zero emission technology for use in certain overburdened areas and communities near railyards, but zero emission technology is now feasible for additional locomotive applications and geographical areas. For this measure, CARB would petition and/or advocate to ~~the~~ U.S. EPA to promulgate national zero emission standards for ~~switchers~~locomotives to reduce criteria and toxic pollutants, fuel consumption, and GHG emissions to achieve the needed NOx emissions reductions for the South Coast in 2037.

Address **Unlimited** Locomotive Remanufacturing **~~Loophole~~**

Federal rules currently define remanufactured locomotives as "new" when they are remanufactured, and do not set limits on how often locomotives can be remanufactured. ~~The result is~~For this measure, CARB would petition and/or advocate to U.S. EPA to address the regulatory provisions that allows continued remanufacturing of old and polluting locomotives to the same pollution tier standards, and persistent pollution from these sources~~. For this measure, CARB would petition and/or advocate to the U.S. EPA to remove this regulatory loophole, in addition to the State-level rules discussed above~~ to achieve the needed NOx emissions reductions for the South Coast in 2037.

Ocean-Going Vessels

More Stringent NOx and PM Standards for Ocean-Going Vessels

Emissions from main engines and auxiliary engines of ~~ocean-going vessels~~OGVs during transit, anchorage, and maneuvering must be addressed in order to achieve NOx reductions needed to meet ~~California's near- and mid-term~~ air quality ~~goals~~standards in California. Currently, very few vessels with Tier 3 main engines visit California ports, even though the Tier 3 engine standard applied to new marine engines beginning in 2016. Tier 2 vessels emit three times higher NOx than Tier 3 vessels; thus, phasing out of older Tier 5 vessels is key to reducing criteria and toxics emissions from OGVs.

CARB would petition and/or advocate to ~~the~~ U.S. EPA and International Maritime Organization (IMO) for cleaner marine standards to achieve the needed NOx emissions reductions for the South Coast in 2037. While marine Tier 3 is considerably cleaner than Tier 2, the Tier 3 NOx standard is still 5 to 10 times higher than the standards for other diesel equipment sectors, and does not include a PM standard. CARB will work with ~~the~~ U.S. EPA, U.S. Coast Guard, and other partners to urge IMO to adopt more stringent Tier 4 marine standard and establish efficiency requirements for existing vessels.

Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels

In addition to more stringent engine standards, there are other mechanisms by which regulatory entities could require ~~emission~~emissions reductions from OGVs in California and along the California coast. ~~CARB would petition and/or advocate to the U.S. EPA to require vessels to use cleaner fuels and visits from cleaner OGVs.~~ To the maximum extent possible all Tier 0, Tier 1, and Tier 2 vessel visits should be replaced with visits made by Tier 3 or cleaner vessels ~~by 2031~~. Current Tier 3 vessel manufacturing data suggest that there may not be sufficient Tier 3 vessels to ~~meet the~~satisfy all vessel visits to the State, even if California were to receive a large majority of the worldwide Tier 3 vessels. However, these reductions may be achieved by incentivizing visits from Tier 2 vessels that have been retrofitted to reduce NOx emissions. ~~Current~~Some of the current retrofit technologies for marine engines include ~~water-in-fuel emulsion,~~ exhaust gas recirculation (EGR) and SCR~~. Both EGR and SCR~~, which both have ~~shown~~ potential to reduce emissions by up to 80 percent. ~~Water-in-fuel emulsion strategies have shown up to 40 percent reduction in NOx emissions and may provide significant and cost-effective reductions options (particularly at near-port and low load conditions where~~It is possible that Tier 3 and ~~other~~ retrofit ~~options~~strategies may not ~~operate at~~ achieve full potential~~). Biofuels~~ benefits when operating or maneuvering at lower loads in the vicinity of seaports in Regulated California Waters. Therefore, other strategies such as water-in-fuel emulsion, biofuels, renewable hydrogen and other hydrogen-derived fuels such as ammonia, methanol, batteries and fuel cells are being considered as potential or complementary fuel choices for vessels~~.~~ to achieve maximum emissions reductions. All options need to be considered to achieve the needed ~~emission reductions~~emissions reductions. CARB would petition and/or advocate to U.S. EPA to require vessels to use cleaner fuels and visits from cleaner OGVs to achieve the needed NOx emissions reductions for the South Coast in 2037.

SCAG's Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures

Measures from the Southern California Association of Governments' Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures (RTP/SCS and TCMs) also play a key role in the 2022 AQMP. This section summarizes SCAG's RTP/SCS and TCMs. More details of SCAG's RTP/SCS is included in Appendix IV-C, which is based on SCAG's Final 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy (2020 RTP/SCS, also known as Connect SoCal) and 2021 Federal Transportation Improvement Program (FTIP), as amended. The RTP/SCS and FTIP were developed in consultation with federal, State, and local transportation and air quality planning agencies and other stakeholders. The four County Transportation Commissions (CTCs) in the South Coast Air Basin, namely Los Angeles County Metropolitan Transportation Authority, Riverside County Transportation Commission, Orange County Transportation Authority, and the San Bernardino County Transportation Authority, were actively involved in the development of the regional transportation measures of this Appendix.

Introduction

As required by federal and State laws, SCAG is responsible for ensuring that the regional transportation plan, program, and projects are supportive of the goals and objectives of applicable AQMPs and State Implementation Plans (AQMPs/SIPs). SCAG is also required to develop demographic projections and regional transportation strategy and control measures for the South Coast AQMD's AQMP/SIP.

As the Metropolitan Planning Organization (MPO) for the six-county region comprising SCAG's jurisdiction, SCAG is obligated to develop an RTP/SCS every four years. The RTP/SCS is a long-range regional transportation plan that provides for the development and integrated management and operation of transportation systems and facilities that will function as an intermodal transportation network for the SCAG region. The RTP/SCS also outlines certain land use growth strategies that provide for more integrated land use and transportation planning and enhance transportation investments. The RTP/SCS is required by federal laws to demonstrate transportation conformity and also to achieve regional GHG reduction targets set by the California Air Resources Board (CARB) pursuant to SB 375. Pursuant to the California Health and Safety Code, the RTP/SCS constitutes the Regional Transportation Plan/Sustainable Communities and Transportation Control Measures of the South Coast AQMD's AQMPs.

In addition, SCAG develops the biennial FTIP. The FTIP is a list of multimodal capital improvement projects to be implemented over a six-year period. The FTIP implements the programs and projects in the RTP/SCS.

Regional Transportation Plan/Sustainable Communities Strategy and Transportation Control Measures

The SCAG region faces many critical challenges including demographics, transportation system preservation, transportation funding, goods movement, housing, air quality, climate change, and public health. Under the guidance of the goals and objectives adopted by SCAG's Regional Council, SCAG's governing board, the Connect SoCal was developed to provide a blueprint to integrate land use and transportation strategies to help achieve a coordinated and balanced regional transportation system. Connect SoCal represents the culmination of more than three years of work involving dozens of public agencies, 197 local jurisdictions in the SCAG region, hundreds of local, county, regional and State officials, the business community, environmental groups, as well as various nonprofit organizations. Connect SoCal was adopted by SCAG's governing board, the Regional Council, on May 7, 2020 for transportation conformity purposes only and on September 3, 2020 for all purposes.

To realize a sustainable and connected region, Connect SoCal includes a Core Vision that centers on maintaining and better managing the transportation network for moving people and goods, while expanding mobility choices by locating housing, jobs and transit closer together and increasing investment in transit and complete streets; five Key Connections that augment the Core Vision to address trends and emerging challenges while closing the gap between what can be accomplished through intensification of core planning strategies alone and what must be done to meet increasingly aggressive greenhouse gas reduction goals; as well as action-oriented transportation strategies and Sustainable Communities Strategy.

Core Vision

- Sustainable Development
- System Preservation and Resilience
- Demand and System Management
- Transit Backbone
- Complete Streets
- Goods Movement

Key Connections

- Smart Cities and Job Centers
- Housing Supportive Infrastructure
- Go Zones

- Accelerated Electrification
- Shared Mobility and Mobility as a Service

Transportation Strategies

- Preserve and Optimize Our Current System
  - Congestion Management
  - Congestion Pricing
  - Transportation Demand Management (TDM)
  - Transportation System Management (TSM)
- Completing Our Transportation System
  - Transit
  - Passenger Rail
  - Active Transportation
  - Transportation Safety
  - Highway and Arterial Network
  - Regional Express Lane Network
  - Goods Movement
  - Aviation
  - Technological Innovations and Emerging Technology

Sustainable Communities Strategy

- Focus Growth Near Destinations and Mobility Options
- Promote Diverse Housing Choices
- Leverage Technology Innovations
- Support Implementation of Sustainability Policies
- Promote a Green Region

Transportation Control Measures

Connect SoCal includes, as a subset of transportation strategies, SIP-committed transportation programs and projects that reduce vehicle use or change traffic flow or congestion conditions for the purposes of reducing emissions from transportation sources and improving air quality, better known as Transportation Control Measures or "TCMs." In the South Coast Air Basin, TCMs include the following three main categories of transportation improvement projects and programs that have funding programmed for right-of-way and/or construction in the first two years of the 2021 FTIP:

- Transit and non-motorized modes;
- High Occupancy Vehicle (HOV) Lanes and their pricing alternatives; and
- Information-based strategies (e.g., traffic signal synchronization).

Attachment A of Appendix IV-C is a list of transportation control measure projects that are from SCAG's 2021 FTIP and specifically identified and committed to in the Draft Final 2022 AQMP/SIP. Per the federal Clean Air Act, these committed TCMs are required to receive funding priority and be implemented in a timely manner. In the event that a committed TCM cannot be delivered or will be significantly delayed, there must be a substitution for the TCM. It is important to note that as the SCAG's FTIP is updated every two years, new committed TCMs are automatically added to the applicable SIP from the previous FTIP.

Plan Emissions Reduction Benefits

If the future vehicle fleet mix and emission factors are held constant as those in the Connect SoCal base year 2016, Connect SoCal is estimated to yield a reduction in NOx emissions by about 1.5 tons per day in 2025, 4.1 tons per day in 2035, and 6.8 tons per day in 2045 compared with their respective Baselines without Connect SoCal. However, if accounting for mandated future improvement in vehicle fleet mix and emission factors, the estimated NOx emission reduction from Connect SoCal is reduced by 60 to 73 percent, because the vehicles as a whole are becoming much cleaner, and reduction of every vehicle mile traveled from Connect SoCal yields less reduction in NOx emissions.

Plan Investment

The total expenditure for the various strategies in Connect SoCal is forecasted to be $638.9 billion for the entire six-county SCAG region. Connect SoCal has identified the same amount of total revenues from both existing and several new funding sources that are reasonably expected to be available.

Cost-Benefit Analysis

Implementation of Connect SoCal will secure a safe, efficient, sustainable, and prosperous future for the SCAG region. To demonstrate how effective Connect SoCal would be toward achieving our regional goals, SCAG conducted a Connect SoCal vs. Connect SoCal Baseline cost-benefit analysis utilizing the Cal-B/C Model to calculate regional network benefits – essentially comparing how the region would perform with and without implementation of the Connect SoCal.

Compared with the alternative without the Plan, Connect SoCal would result in significant benefits to our region, not only with respect to mobility and accessibility, but also in the areas of air quality, economic growth and job creation, sustainability, and environmental justice. Altogether, the transportation investments in Connect SoCal will provide a return of two dollars for every dollar invested compared with the Baseline alternative.

TCM Reasonably Available Control Measure Analysis

As required by the CAA, a Reasonably Available Control Measure (RACM) analysis must be included as part of the overall control strategy in the ozone SIP to ensure that all potential control measures are evaluated for implementation and that justification is provided for those measures that are not implemented. Appendix IV-C contains the TCM RACM component for the South Coast ozone control strategy. In accordance with the U.S. EPA procedures, this analysis considers TCMs in Connect SoCal, measures identified by the CAA, and relevant measures adopted in other ozone nonattainment areas of the country.

Based on this comprehensive review, it is determined that the TCMs being implemented in the South Coast Air Basin are inclusive of all TCM RACM.

Contingency Measures

Contingency measures are required by the Clean Air Act to be implemented should an area fail to make reasonable further progress or attain the NAAQS by the required date. Over the last few years, multiple court decisions in the 9th circuit and nation-wide have effectively disallowed the SIP-approved approach which CARB and the districts have historically used to meet contingency measure requirements. South Coast AQMD and CARB ~~continues~~continue to strive to meet the requirements, but the U.S. EPA has not yet released comprehensive and updated guidance encompassing the full scope of contingency measure requirements~~,~~ in light of the results of the ~~varying~~ court decisions. Guidance is needed for ~~CARB, and other~~ air agencies ~~across California and the U.S.,~~ to ensure that any resources devoted to creating, adopting, and implementing a measure will result in one that meets the requirements and be approved into the SIP.

Additionally, California faces the most difficult air quality challenges in the nation and, accordingly, leads the country with the most stringent air pollution control programs. Historically, the U.S. EPA guidance required contingency measures to achieve approximately one year's worth of emission reductions. CARB's mobile source control programs are advanced, ~~and~~but primarily-federally regulated sources contribute over half of the emissions. South Coast AQMD also has one of the most stringent stationary source control programs in the country and has recently expanded its regulatory activities to mobile sources using innovative approaches such as indirect source rules, voluntary Memoranda of Understanding, and incentive measures. Opportunities for a triggered contingency measure that can be implemented by the State and the South Coast AQMD and result in one year's worth of emission reductions in the required time frame are slim to non-existent. Further, even if there ~~existed~~were measures capable of achieving this level of emission reductions, ~~it~~they would not be withheld for contingency purposes. Instead, ~~it~~they would be adopted to improve air quality ~~and~~ in furtherance of the obligation to meet the NAAQS as soon as feasible. Despite recent court decisions, the U.S. EPA has the opportunity to justify a revised approach for contingency measures recognizing the maturity of control programs or allow states to provide a reasoned justification for achieving less than the required amount. California continues to work towards meeting contingency measure requirements, but the U.S. EPA must issue guidance to provide clarity and direction for states to move forward and pursue contingency measures that will meet the requirements.

Background

The Clean Air Act specifies that SIPs must provide for contingency measures, defined in section 172(c)(9) as "specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard by the attainment date…." The Clean Air Act is silent though on the specific level of emission reductions that must flow from contingency measures. In the absence of specific requirements for the amount of emission reductions required, in 1992, the U.S. EPA conveyed that ~~the~~ "contingency measures should, at a minimum, ensure that an appropriate level of emissions reduction progress continues to be made if attainment of RFP is not achieved and additional planning by the State is needed" (57 Federal Register 13510, 13512 (April 16, 1992)). Further, the U.S. EPA ozone guidance states that "contingency measures should represent one year's worth of progress amounting to reductions of 3 percent of the baseline emissions inventory for the nonattainment area~~”.~~.” The U.S. EPA, though, has accepted contingency measures that have equal to or less than a year’s worth of progress when the circumstances fit under the “U.S. EPA’s long-standing recommendation that states should consider ‘the potential nature and extent of any attainment shortfall for the area’ and that contingency measures ‘should represent a portion of the actual emission reductions necessary to bring about attainment in the area.’”[27]

Historically, the U.S. EPA allowed contingency measure requirements to be met via excess emission reductions from ongoing implementation of adopted emission reduction programs, a method that CARB has used for a contingency measure and the U.S. EPA has approved in the past. In 2016, in *Bahr v. U.S. Environmental Protection Agency*[28] *(Bahr),* the 9th Circuit Court of Appeals determined the U.S. EPA erred in approving a contingency measure that relied on an already-implemented measure for a nonattainment area in Arizona, thereby rejecting the U.S. EPA’s longstanding interpretation of section 172(c)(9). The U.S. EPA staff interpreted this decision to mean that contingency measures must include a future action triggered by a failure to attain or failure to make reasonable further progress. This decision was applicable to the states covered by the 9th Circuit Court. In the rest of the country, the U.S. EPA was still approving contingency measures using their pre-Bahr stance. In January 2021, in *Sierra Club v. Environmental Protection Agency*,[29] the United States Court of Appeals for the D.C. Circuit, ruled that already implemented measures do not qualify as contingency measures for the rest of the country (*Sierra Club*).

In response to *Bahr* and as part of the 75 ppb 8-hour ozone SIPs due in 2016, CARB developed the statewide Enhanced Enforcement Contingency Measure (Enforcement Contingency Measure) as a part of the *2018 Updates to the California State Implementation Plan* to address the need for a triggered action as a part of the contingency measure requirement. CARB worked closely with the U.S. EPA regional staff in developing the contingency measure package that included the triggered Enforcement Contingency Measure, a district triggered measure and emission reductions from implementation of CARB’s mobile source emissions program. However, as part of the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard* SIP action, the U.S. EPA wrote in their final approval that the Enforcement Contingency Measures did not satisfy requirements to be approved as a “standalone contingency measure” and approved it only as a “SIP strengthening” measure. The U.S. EPA did approve the district triggered measure and the implementation of the mobile reductions along with a CARB emission reduction commitment as meeting the contingency measure requirement for this SIP.

~~Subsequently~~South Coast AQMD initiated an independent response to *Bahr* that involved submitting contingency measure commitment letters to U.S. EPA and amending to Rule 445. On January 9, 2019, South Coast AQMD submitted a letter to U.S. EPA committing to adopt a new rule or amend an existing rule to satisfy the contingency measure requirement. On May 2, 2019, the Executive Officer sent an additional clarification letter, explaining what specific requirements would be changed in the rules if that rule is selected for a contingency measure. These actions culminated in the adoption of an amendment

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[27] See, e.g. 78 Fed. Reg. 37741, 37750 (Jun. 24, 2013), approval finalized with 78 Fed. Reg. 64402 (Oct. 29, 2013).

[28] *Bahr v. U.S. Environmental Protection Agency,* (9th Cir. 2016) 836 F.3d 1218.

[29] *Sierra Club v. Environmental Protection Agency,* (D.C. Cir. 2021) 985 F.3d 1055.

to Rule 445, which curtails wood-burning through "No-Burn" days when poor air quality is forecast. The amendment expanded the "No-Burn" season to encompass September-April and included contingency triggers for PM2.5. In addition, the amendment included contingency triggers for ozone which would automatically establish a No-Burn day threshold when the daily maximum 8-hour ozone is forecast to exceed 80 ppb in any Source Receptor Area. The threshold would automatically be lowered to 75 ppb and 70 ppb for a second and third U.S. EPA finding of a failure to comply with a milestone/attainment requirement by the applicable due date, respectively.

In addition to *Bahr*, the Association of Irritated Residents filed a lawsuit against the U.S. EPA for their approval of various elements within the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard*, including the contingency measure. The 9th Circuit Court of Appeals issued its decision in *Association of Irritated Residents v. EPA*[30] (*AIR*) that the U.S. EPA's approval of the contingency element was arbitrary and capricious and rejected the triggered contingency measure that achieves much less than one year's worth of emission reductions. Most importantly, the 9th Circuit Court said that, in line with the U.S. EPA's longstanding interpretation of what is required of a contingency measure and the purpose it serves, together with *Bahr*, all reductions needed to satisfy the Clean Air Act's contingency measure requirements need to come from the contingency measure itself and the amount of reductions needed for contingency should not be reduced by the fact of surplus emission reductions from ongoing programs absent the U.S. EPA formally changing its historic stance on the amount of reductions required. The U.S. EPA staff has interpreted *AIR* to mean that triggered contingency measures must achieve the entirety of the required one year's worth of emission reductions on their own. In addition, surplus emission reductions from ongoing programs cannot reduce the amount of reductions needed for contingency.

In response to *Bahr* and *Sierra Club*, in 2021, the U.S. EPA convened a nation-wide internal task force to develop guidance to support states in their development of contingency measures. That task force is now also considering the impact of *AIR*. The U.S. EPA has indicated that the contingency measure guidance may be released fall 2022. The SIPs for the 70 ppb 8-hour ozone standard are due to the U.S. EPA by August 3, 2022. In their updated guidance, the U.S. EPA needs to recognize that many State control programs are mature and opportunities to withhold measures for contingency are scarce.

Since *Bahr*, South Coast AQMD and CARB ~~has~~have worked closely with the U.S. EPA regional office in developing contingency measures with little success. South Coast AQMD and CARB ~~is~~are committed to meeting the Clean Air Act requirements for contingency measures, but without finalized national guidance on this complex issue, it is not a good use of resources to pursue contingency measures that may not ultimately coincide with the upcoming new guidance.

CARB's Opportunities for Contingency Measures

Much has changed since the U.S. EPA's 1992 guidance on contingency measures. Control programs across the country have matured as have the health-based standards. Ozone standards have strengthened in 2008 and 2015 with attainment years out to 2037. California has the only two "extreme" areas in the

[30] *Association of Irritated Residents v. U.S. Environmental Protection Agency*, (9th Cir. 2021) 10 F.4th 937.

country. Control measures identified for these areas must be implemented for meeting the standard and not held in reserve.

To address contingency measure requirements given the courts' decisions and current U.S. EPA guidance, CARB and local air districts would need to develop a measure or measures that, when triggered by a failure to attain or failure to meet RFP, will achieve one year's worth of emission reductions for the given nonattainment area, or approximately 3 percent of total baseline emissions.

Given CARB's wide array of mobile source control programs, the relatively limited portion of emissions primarily regulated by the local air district, and the fact that primarily-federally regulated sources are expected to account for approximately 56 percent of statewide NOx emissions by 2037,[31] finding a single triggered measure that will achieve the required reductions would be nearly impossible. That said, even ~~discounting~~reducing the ~~amount~~required percentage reductions to reflect the proportion of emissions that is primarily-federally regulated, approximately 1.3 percent of total baseline emissions would still be needed~~.~~ from CARB and the district from contingency measures. Even targeting a lower percentage, additional control measures that can be identified by CARB are scarce or nonexistent that would achieve the require emission reductions needed for a contingency measure.

Adding to the difficulty of identifying available control measures, not only does the suite of contingency measures need to achieve a large amount of reductions, but it will also need to achieve these reductions in the year following the year in which the failure to attain or meet RFP has been identified. Control measures achieving the level of reductions required may take years to implement and will likely not result in immediate reductions. In the 2022 State SIP Strategy, CARB's three largest NOx reduction measures, In-Use Locomotive Regulation, Zero Emission Standards for Space and Water Heaters and Advanced Clean Fleets, rely on accelerated turnover of older engines/trucks. Buildup of infrastructure and equipment options limits the availability to have significant emission reductions in a short amount of time. Unless the U.S. EPA changes its historic stance or finds a reasoned justification for requiring less than the stated amount, adopting a single triggered measure that can be implemented and achieve the necessary reductions in the time frame required is ~~scarce~~difficult in California and may not be possible.

CARB has over 50 years of experience reducing emissions from mobile and other sources of pollution under State authority. The Reasonably Available Control Measures for State Sources analysis illustrates the reach of CARB's current programs and regulations, many of which set the standard nationally for other states to follow. Few sources CARB has primary regulatory authority over remain without a control measure, and all control measures that are in place support the attainment of the NAAQS. There is a lack or scarcity of additional control measures that would be able to achieve the necessary reductions for a contingency measure. Due to the unique air quality challenges California faces, should such additional measures exist, CARB would pursue those measures to support expeditious attainment of the NAAQS and would not reserve such measures for contingency purposes. Nonetheless, CARB continues to explore options for potential statewide contingency measures utilizing its authorities in anticipation of the U.S. EPA's written guidance. CARB anticipates that the U.S. EPA's guidance will allow an assessment of viability of such a State-wide measure.

[31] Source: CARB 2019 CEPAM v1.03; based on 2037 emissions totals.

A central issue in considering a statewide contingency measure under CARB's authority, is that CARB is already fully committed to the "drive to zero" effort. In 2020, Governor Newsom signed Executive Order N-79-20 (Figure 4-6) that established a first-in-the-nation goal for 100 percent of California sales of new passenger cars and trucks to be zero emission by 2035. The Governor's order set a goal to transition 100 percent of the drayage truck fleet to zero emission by 2035, all off-road equipment where feasible to zero emission by 2035, and the remainder of the medium and heavy-duty vehicles to zero emission where feasible by 2045.

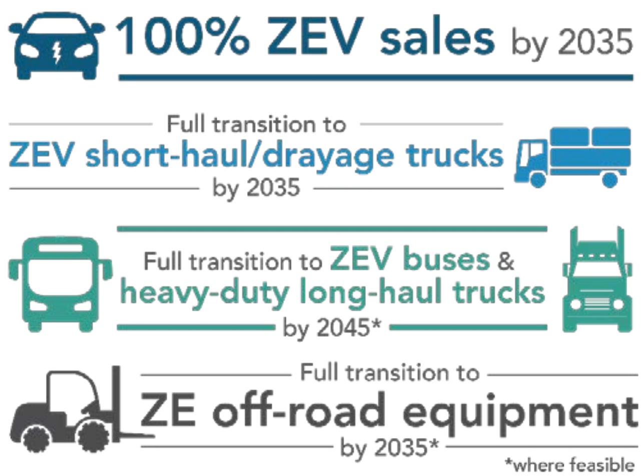


FIGURE 4-6
GOVERNOR NEWSON EXECUTIVE ORDER N-79-20

CARB is committed to achieving these goals. CARB's programs therefore not only go beyond emissions standards and programs set at the federal level, but many include zero emissions requirements or otherwise, through incentives and voluntary programs, drive mobile sources to zero emissions, as listed in Table 4-10 below. CARB is also exploring and developing a variety of new measures to drive more source categories to zero emissions and reduce emissions even further, as detailed in the 2022 State Strategy for the State Implementation Plan. With most source categories being driven to zero emissions, opportunities for which a triggered measure that could reduce emissions by the amount required for contingency measures are scarce.

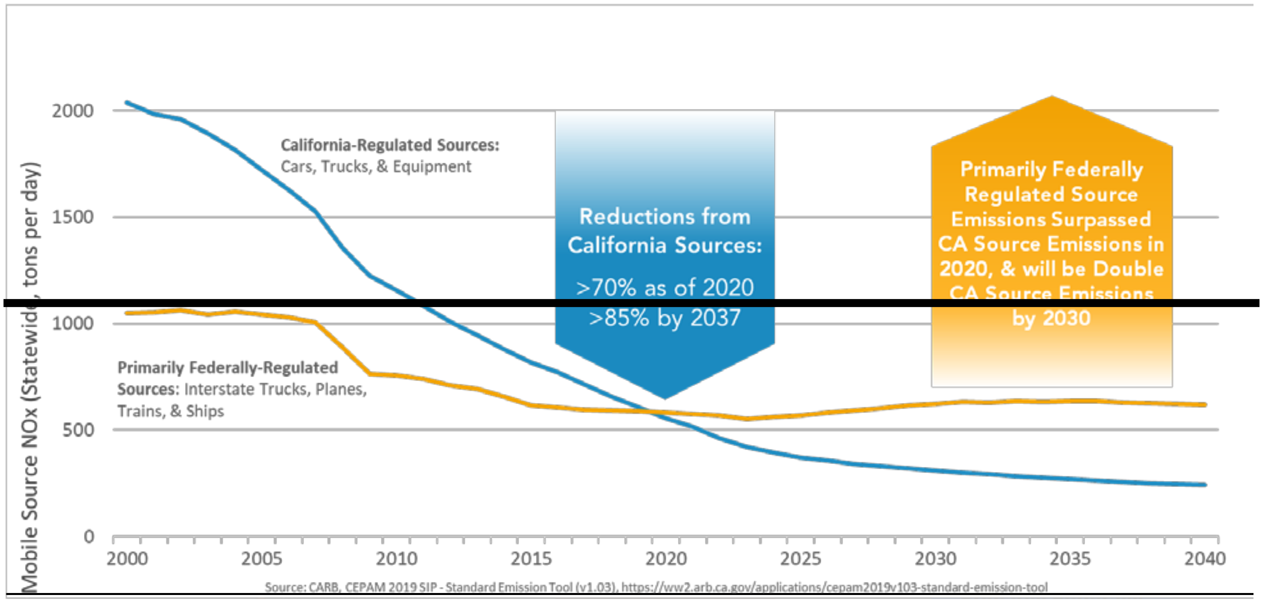
TABLE 4-10

EMISSIONS SOURCES AND RESPECTIVE CARB PROGRAMS WITH A ZERO EMISSIONS REQUIREMENT/COMPONENT

Emission Source	Regulatory Programs
Light-Duty Passenger Vehicles and Light-Duty Trucks	• Advanced Clean Cars Program (I and II[a]), including the Zero Emission Vehicle Regulation • Clean Miles Standard [a]
Motorcycles	• On-Road Motorcycle Regulation [a]
Medium-Duty Trucks	• Advanced Clean Cars Program (I and II [a]), including the Zero Emission Vehicle Regulation • Zero Emission Powertrain Certification Regulation • Advanced Clean Trucks Regulation • Advanced Clean Fleets Regulation [a]
Heavy-Duty Trucks	• Zero Emission Powertrain Certification Regulation • Advanced Clean Trucks Regulation • Advanced Clean Fleets Regulation [a]
Heavy-Duty Urban Buses	• Innovative Clean Transit • Advanced Clean Fleets Regulation [a]
Other Buses, Other Buses – Motor Coach	• Zero Emission Airport Shuttle Regulation • Advanced Clean Fleets Regulation [a]
Commercial Harbor Craft	• Commercial Harbor Craft Regulation
Recreational Boats	• Spark-Ignition Marine Engine Standards [a]
Transport Refrigeration Units	• Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (Parts I and II [a])
Industrial Equipment	• Zero Emission Forklifts [a] • Off-Road Zero Emission Targeted Manufacturer Rule [a]
Construction and Mining	• Off-Road Zero Emission Targeted Manufacturer Rule [a]
Airport Ground Support Equipment	• Zero Emission Forklifts [a]
Port Operations and Rail Operations	• Cargo Handling Equipment Regulation • Off-Road Zero Emission Targeted Manufacturer Rule [a]
Lawn and Garden	• Small Off-Road Engine Regulation • Off-Road Zero Emission Targeted Manufacturer Rule [a]
Ocean-Going Vessels	• At Berth Regulation
Locomotives	• In-Use Locomotive Regulation [a]

[a] Indicates program or regulation is in development.

There are few sources remaining without a control measure implemented by CARB, and those that do remain are primarily-federally regulated sources (Figure 4-7). This includes interstate trucks, ships, locomotives, aircraft, and certain categories of off-road equipment, constituting a large source of potential emission reductions. Since these are primarily regulated at the federal and, in some cases, international level, options to implement a contingency measure with reductions approximately equivalent to one year's worth of emission reductions are limited.



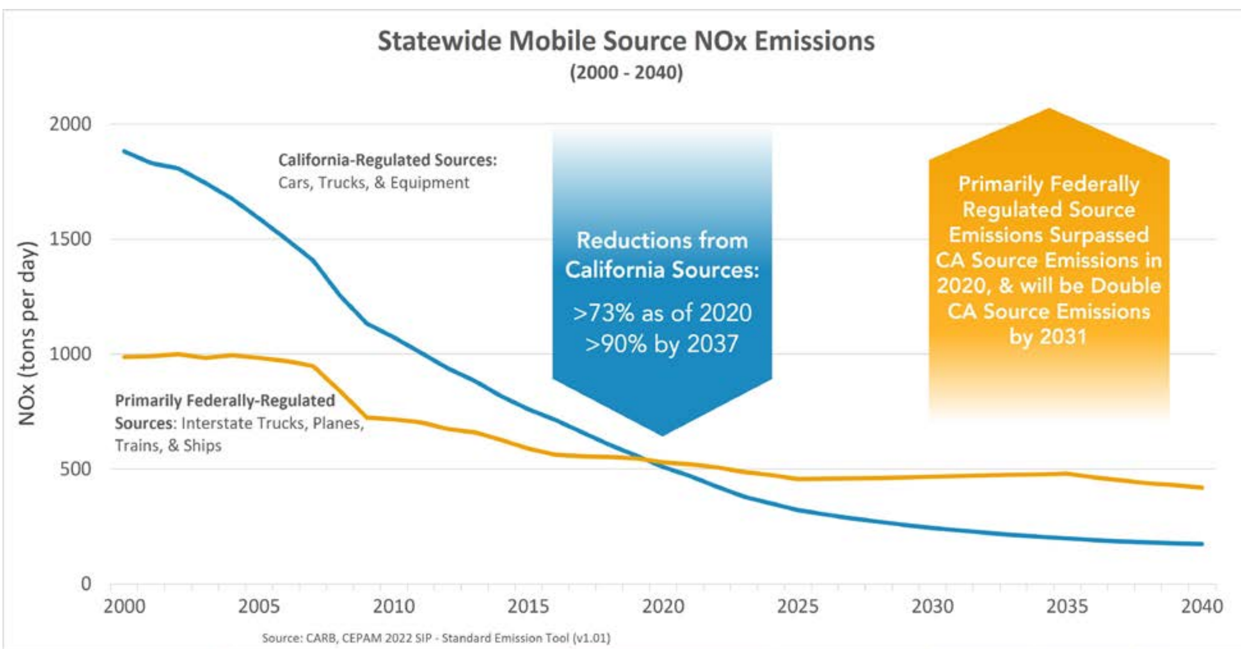


FIGURE 4-7
COMPARISON OF STATEWIDE NOx EMISSIONS SOURCES REGULATED PRIMARILY BY THE FEDERAL GOVERNMENT AND PRIMARILY BY CALIFORNIA

South Coast AQMD's Opportunities for Contingency Measures

South Coast AQMD has over 40 years of experience regulating stationary point and area sources with highly mature rules and programs in place to reduce emissions. Given the maturity of our control programs, opportunities to identify contingency measures that would achieve surplus reductions are limited – most feasible measures to reduce emissions have already been taken. Our ability to identify contingency measures is further hampered by recent case law as previously discussed. Contingency measures must take effect only if South Coast AQMD fails to meet Clean Air Act milestones. The primary milestone for the 2022 AQMP is the attainment year, 2037, which therefore requires us to anticipate a contingency measure that is surplus to our control strategy and could be enacted in 2038 if the South Coast Air Basin fails to attain the 70 ppb standard. Were such a measure to be identified, South Coast AQMD would not delay implementation until 2038, but would instead implement the measure as soon as possible to assist with attainment of other air quality standards with upcoming attainment deadlines.

Stationary sources are composed of several categories ranging from fuel combustion to surface coatings. A full list of stationary source emission source categories is shown in Table 4-11, which also displays the corresponding NOx and VOC rules. Developing a contingency measure would be straightforward if an emission source category remained unregulated. The only source category with the potential to emit VOC or NOx that does not have a corresponding rule is Pesticides/Fertilizers; however, a control measure targeting this category would achieve only marginal VOC reductions. Every other source category is already covered by at least one rule and as many as thirteen rules. Additional measures are proposed in the 2022 AQMP including those for residential and commercial buildings to ensure that all combustion sources are addressed. Thus, there are no unregulated emission sources in the Basin, highlighting an additional hurdle to designing effective contingency measures.

TABLE 4-11

SOUTH COAST AQMD RULES COVERING STATIONARY MAJOR SOURCE CATEGORIES (MSC)

MSC	Description	VOC Rules	NOx Rules
Fuel Combustion			
10	Electric Utilities		Rule 1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities Rule 429.2 - Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen from Electricity Generating Facilities
20	Cogeneration		Rule 1134 - Emissions of Oxides of Nitrogen from Stationary Gas Turbines Rule 429 - Start-Up and Shutdown Exemption Provisions for Oxides of Nitrogen Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
30	Oil and Gas Production (combustion)	Rule 1118.1 – Control of Emissions from Non-Refinery Flares	Rule 1118.1 – Control of Emissions from Non-Refinery Flares
40	Petroleum Refining (combustion)	Rule 1114 – Petroleum Refinery Coking Operations	Rule 1109.1 - Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations Rule 429.1 - Start-Up and Shutdown Provisions at Petroleum Refineries and Related Operations Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
50	Manufacturing and Industrial	Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines	Rule 1112 – Emissions of Oxides of Nitrogen from Cement Kilns Rule 1117 – Emissions from Container Glass Melting and Sodium Silicate Furnaces Rule 1147 – NOx Reductions from Miscellaneous Sources Rule 1147.1 - NOx Reductions from Aggregate Dryers Rule 1147.2 - NOx Reductions from Metal Melting and Heating Furnaces Rule 1159 – Nitric Acid Units – Oxides of Nitrogen Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters

MSC	Description	VOC Rules	NOx Rules
			Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
52	Food and Agricultural Processing	Rule 1138 – Control of Emissions from Restaurant Operations Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines	Rule 1153.1 - Emissions of Oxides of Nitrogen from Commercial Food Ovens Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters Rule 1147 – NOx Reductions from Miscellaneous Sources Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
60	Service and Commercial	Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines	Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters Rule 1147 – NOx Reductions from Miscellaneous Sources Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
99	Other (fuel combustion)	Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines	Rule 1110.2 - Emissions from Gaseous- and Liquid-Fueled Engines Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial

MSC	Description	VOC Rules	NOx Rules
			Boilers, Steam Generators, and Process Heaters Rule 1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters Rule 1147 – NOx Reductions from Miscellaneous Sources Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
Waste Disposal			
110	Sewage Treatment	Rule 1179 – Publicly Owned Treatment Works Operations Rule 442 – Usage of Solvents	Rule 1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities Rule 1118.1 – Control of Emissions from Non-Refinery Flares Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
120	Landfills	Rule 1150 – Excavation of Landfill Sites Rule 1150.1 – Control of Gaseous Emissions from Municipal Solid Waste Landfills Rule 1150.2 – Control of Gaseous Emissions from Inactive Landfills Rule 442 – Usage of Solvents	Rule 1150.3 – Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills Rule 1118.1 – Control of Emissions from Non-Refinery Flares Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
130	Incineration		Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen
140	Soil Remediation	Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil	Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen
199	Other (Waste Disposal)	Rule 1133.1 – Chipping and Grinding Activities Rule 1133.2 – Emission Reductions from Co-Composting Operations Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations Rule 442 – Usage of Solvents	Rule 1118.1 – Control of Emissions from Non-Refinery Flares Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
Cleaning and Surface Coatings			
210	Laundering	Rule 1102 – Dry Cleaners Using Solvent Other Than Perchloroethylene	
220	Degreasing	Rule 1122 – Solvent Degreasers	

MSC	Description	VOC Rules	NOx Rules
		Rule 1171 – Solvent Cleaning Operations Rule 442 – Usage of Solvents	
230	Coatings and Related Processes	Rule 1104 – Wood Flat Stock Coating Operations Rule 1106 – Marine and Pleasure Craft Coating Rule 1107 – Coating of Metal Parts and Products Rule 1115 – Motor Vehicle Assembly Line Coating Operations Rule 1124 – Aerospace Assembly and Component Manufacturing Operations Rule 1125 – Metal Container, Closure, and Coil Coating Operations Rule 1126 - Magnet Wire Coating Operations Rule 1132 – Further Control of VOC Emissions from High-Emitting Spray Booths Rule 1136 – Wood Products Coatings Rule 1145 – Plastic, Rubber, Leather, and Glass Coatings Rule 1151 – Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations Rule 1162 – Polyester Resin Operations Rule 442 – Usage of Solvents	
240	Printing	Rule 1128 – Paper, Fabric, and Film Coating Operations Rule 1130 – Graphic Arts Rule 1130.1 – Screen Printing Operation Rule 442 – Usage of Solvents	
250	Adhesives and Sealants	Rule 1168 – Adhesive and Sealant Applications Rule 442 – Usage of Solvents	
299	Other (Cleaning and Surface Coatings)	Rule 442 – Usage of Solvents Rule 1144 – Metalworking Fluids and Direct-Contact Lubricants Rule 1171 – Solvent Cleaning Operations	
Petroleum Production and Marketing			

MSC	Description	VOC Rules	NOx Rules
310	Oil and Gas Production	Rule 1148 – Thermally Enhanced Oil Recovery Wells Rule 1148.1 – Oil and Gas Production Wells Rule 1148.2 – Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers Rule 1176 – VOC Emissions from Wastewater Systems Rule 463 – Organic Liquid Storage	
320	Petroleum Refining	Rule 1123 - Refinery Process Turnarounds Rule 1149 – Storage Tank and Pipeline Cleaning and Degassing Rule 1173 – Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants Rule 1176 – VOC Emissions from Wastewater Systems Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities Rule 1180 – Refinery Fenceline and Community Air Monitoring Rule 462 – Organic Liquid Loading Rule 463 – Organic Liquid Storage Rule 464 – Wastewater Separators Rule 465 – Refinery Vacuum-Producing Devices or Systems Rule 466 – Pumps and Compressors Rule 466.1 – Valves and Flanges Rule 467 – Pressure Relief Devices	
330	Petroleum Marketing	Rule 1170 – Methanol Compatible Fuel Storage and Transfer Rule 1142 – Marine Tank Vessel Operations	

MSC	Description	VOC Rules	NOx Rules
		Rule 461 – Gasoline Transfer and Dispensing Rule 461.1 – Gasoline Transfer and Dispensing for Mobile Fueling Operations	
399	Other (Petroleum Production and Marketing)	Rule 1176 – VOC Emissions from Wastewater Systems Rule 1177 – Liquified Petroleum Gas Transfer and Dispensing Rule 1189 – Emissions from Hydrogen Plant Process Vents Rule 462 – Organic Liquid Loading Rule 463 – Organic Liquid Storage	
Industrial Processes			
410	Chemical	Rule 1103 – Pharmaceutical and Cosmetic Manufacturing Operations Rule 1141 – Control of Volatile Organic Compound Emissions from Resin Manufacturing Rule 1141.1 – Coatings and Ink Manufacturing Rule 1141.2 – Surfactant Manufacturing Rule 1163 – Control of Vinyl Chloride Emissions Rule 1173 - Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants Rule 442 – Usage of Solvents Rule 462 – Organic Liquid Loading Rule 463 – Organic Liquid Storage	Rule 1159 – Nitric Acid Units – Oxides of Nitrogen
420	Food and Agriculture	Rule 1131 – Food Product Manufacturing and Process Operations Rule 1138 – Control of Emissions from Restaurant Operations Rule 1153 – Commercial Bakery Ovens Rule 442 – Usage of Solvents	
430	Mineral Processes	Rule 442 – Usage of Solvents	
440	Metal Processes	Rule 442 – Usage of Solvents	

MSC	Description	VOC Rules	NOx Rules
450	Wood and Paper	Rule 442 – Usage of Solvents	
460	Glass and Related Products	Rule 442 – Usage of Solvents	
470	Electronics	Rule 1164 – Semiconductor Manufacturing	
499	Other (Industrial Processes)	Rule 1133 Composting and Related Operations – General Administrative Requirements Rule 1133.1 – Chipping and Grinding Activities Rule 1133.2 – Emission Reductions from Co-Composting Operations Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations Rule 1162 – Polyester Resin Operations Rule 442 – Usage of Solvents Rule 462 – Organic Liquid Loading Rule 463 – Organic Liquid Storage	
Solvent Evaporation			
510	Consumer Products	Rule 1143 – Consumer Paint Thinners and Multi-Purpose Solvents Rule 1168 – Adhesive and Sealant Applications	
520	Architectural Coatings and Related Solvent	Rule 1113 – Architectural Coatings	
530	Pesticides/Fertilizers	Rule 1133.2 – Emission Reductions from Co-Composting Operations Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations	
540	Asphalt Paving/Roofing	Rule 1108 – Cutback Asphalt Rule 1108.1 – Emulsified Asphalt Rule 470 – Asphalt Air Blowing	
Miscellaneous Processes			
610	Residential Fuel Combustion		Rule 1111 – Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces Rule 1121 – Control of Nitrogen Oxides from Residential Type, Natural-Gas-Fired Water Heaters

MSC	Description	VOC Rules	NOx Rules
620	Farming Operations	Rule 1127 – Emission Reductions from Livestock Waste	Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
630	Construction and Demolition	N/A	N/A
640	Paved Road Dust	N/A	N/A
645	Unpaved Road Dust	N/A	N/A
650	Fugitive Windblown Dust	N/A	N/A
660	Fires	Rule 444 – Open Burning Rule 445 – Wood Burning	Rule 444 – Open Burning Rule 445 – Wood Burning
670	Waste Burning and Disposal	Rule 473 – Disposal of Solid and Liquid Wastes	Rule 473 – Disposal of Solid and Liquid Wastes Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
690	Cooking	Rule 1174 – Control of Volatile Organic Compound Emissions from the Ignition of Barbecue Charcoal	Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
699	Other (Miscellaneous Processes)	Rule 442 – Usage of Solvents Rule 472 – Reduction of Animal Matter	Rule 1147 – NOx Reductions from Miscellaneous Sources Rule 474 – Fuel Burning Equipment – Oxides of Nitrogen Rule 476 – Steam Generating Equipment
999	RECLAIM	N/A	Rule 2002 – Allocations for Oxides of Nitrogen (NOx) and Oxides of Sulfur (SOx)

An additional factor that hampers efforts to develop approvable contingency measures is the stringency of the 2022 AQMP control strategy. The Draft Final 2022 AQMP includes 49 control measures, 31 of which target stationary sources. An aggressive drive to zero emission technologies is embedded within most control measures demonstrating the scarcity of remaining emissions that could be targeted for contingency purposes. Case law further dictates that contingency measures must either follow U.S. EPA's current guidance regarding the amount of emission reductions required, which is 3 percent of base year emissions, or be supported by a reasoned justification for departing from such guidance. U.S. EPA is considering issuing revised guidance that may address this concern. For the 2018 base year, this equates to approximately 10.5 tons per day of NOx emissions. Of the 49 control measures in the 2022 AQMP, no measure achieves the required amount of NOx reductions in 2037. This highlights the challenge of developing approvable contingency measures and also the need for such measures to be included in the control strategy rather than reserving them for contingency purposes.

Summary

~~At this time,~~ Both South Coast AQMD and CARB ~~is~~have decades of experience developing stringent regulations and, as a result, have robust control programs which limit the ability to identify potential contingency measures that achieve surplus reductions. The Draft Final 2022 AQMP further raises the bar by including a zero emission component wherever feasible in ~~most of our regulations, both those already adopted and those that are in development, and the vast majority of these regulations are statewide.~~control measures. Beyond the wide array of sources ~~CARB has~~that have been ~~regulating~~regulated over the last few decades, and especially considering those we are driving to zero emission, there are few sources of emissions left for CARB or South Coast AQMD to implement additional controls under ~~its~~our authorities. The few source categories that do not have control measures are primarily-federally and internationally regulated.–

Given the courts' decisions over the last few years, ~~CARB and local air districts will need to implement~~ contingency measures ~~that, when triggered,~~ would need to achieve one year's worth of emission reductions, or at least the relevant portion equivalent to the contribution of sources primarily regulated at the State and local level, unless a reasoned rationale for achieving less emission reductions can be provided. Considering the air quality challenges California and local air districts face, ~~CARB~~ such a measure would ~~implement the measure~~logically be implemented as soon as possible to support expeditious attainment of the NAAQS as the Clean Air Act requires rather than ~~withhold~~withholding it for contingency measure purposes. ~~Should there be~~Furthermore, it is unreasonable to withhold a measure ~~achieving~~that achieves the ~~required~~requisite emission reductions~~, the measure would likely~~ as such large emission reductions typically take ~~more than one year to reduce the necessary emissions~~several years to achieve following approval.

CARB and South Coast AQMD fully ~~intends~~intend to meet the contingency requirement as required by the Clean Air Act, but ~~written~~ U.S. EPA guidance that addresses the dilemma California faces is needed to provide direction and clarity ~~for CARB and local air districts~~ to develop and adopt approvable contingency measures. CARB ~~continues~~and South Coast AQMD continue to explore potential contingency measures while awaiting the U.S. EPA's revised written guidance. ~~Further, since it's been about~~Considering that 30 years~~,~~ have elapsed since the ~~U.S. EPA developed the~~original guidance was published, this may be the time for the U.S. EPA to update the guidance by formally changing its historic stance on the amount of reductions required to meet the contingency measure requirement and allowing states with mature control programs to demonstrate that contingency measure opportunities are scarce.

SIP Emission Reduction Commitment

The SIP emission reduction commitment in the 2022 AQMP reflects the estimated emission reductions from adopted rules and proposed measures. These are the emission reductions that we use to show progress in reducing emissions in an expeditious manner, and how the region will be able to meet the 2015 8-hour ozone standard. Not all emission reductions that occur are SIP-creditable – meaning they do not count for purposes of showing how an area will be able to meet federal air quality standards. To be SIP-creditable, emission reductions must meet specific U.S. EPA criteria (integrity elements) to provide confidence that the emission reductions relied upon to meet the standards will occur. The following sections first describe the methodology for calculating SIP emissions and creditable SIP reductions, then describe what procedures will be followed to ensure fulfillment of the commitment.

SIP Emission Reduction Tracking

For purposes of tracking progress in emission reductions, the baseline emissions for the year 2037 (summer planning inventory) in the 2022 AQMP will be used, regardless of any subsequent new inventory information that may reflect more recent knowledge. This is to ensure that the same "currency" is used in measuring progress as was used in designing the AQMP and that there is an "apples to apples" comparison in evaluating emissions.

Any emission reductions achieved beyond the existing South Coast AQMD regulations are creditable only if there is also a mechanism to ensure that the commitments to achieve those emission reductions are enforceable. Therefore, in certain instances, the South Coast AQMD may have to adopt regulations to reflect the existing industry practices in order to claim SIP reduction credit, with the understanding that there may not be additional reductions beyond what has already occurred. Exceptions can be made where reductions are real, quantifiable, surplus to the 2022 AQMP baseline inventories, and enforceable through other State and/or federal regulations. Further, any emission inventory revisions, which have gone through a peer review and public review process, can also be SIP creditable.

The 2022 AQMP includes emission reductions from voluntary incentive measures to help meet the 2015 8-hour ozone standard. With reliance on voluntary incentive measures to achieve attainment of the federal ozone standard and for those measures to be SIP approved, the South Coast AQMD must design programs such that the emission reductions from these incentive measures are proven to be real, quantifiable, surplus, enforceable, and permanent.

There are key components required of a SIP submittal in order to rely on discretionary incentive programs to satisfy the CAA emission reduction requirements. These components include a demonstration addressing the "integrity elements" (the five requirements listed above), federally enforceable "backstop" commitments, technical support, funding, legal authority, public disclosure and provisions to track results that are common among the various voluntary incentive programs. The "backstop" commitments include a requirement to monitor emission reductions achieved by the voluntary incentive measures and to report annually to the U.S. EPA the amount of reductions achieved. If the U.S. EPA determines that insufficient progress has been made, then substitute measures must be implemented to rectify the shortfall prior to the statutory implementation deadline. The South Coast AQMD is committed to developing detailed guidelines for voluntary incentive programs for individual incentive measures in accordance with the U.S. EPA's economic incentive programs guidelines. The following describes the necessary criteria that will be included in each of the incentive measures:

Integrity Elements to ensure Emission Reductions from Incentive Programs

To be SIP-creditable, emission reductions from voluntary incentive measures must meet the U.S. EPA's integrity elements. The emission reductions must be real, quantifiable, surplus, enforceable, and permanent. This demonstration must include project type(s); project life; applicable incentive program guidelines by title and year; and analysis of applicable incentive program guidelines for consistency with the integrity elements. For the purposes of this demonstration, the following defines and provides examples of the key elements:

Quantifiable

Emission reductions are quantitatively measurable, supported by existing and acceptable technical data. The quantification should use well-established, publicly available, and approved emission factors and accepted calculation methodology. There must be procedures to evaluate and verify over time the level of emission reductions that are actually achieved.

Surplus

Emission reductions must be above and beyond all current and known future District, State, or federal regulations already included in the SIP. Annual tracking will account for any potential overlapping future regulations that could conflict with the surplus reductions. Emission reductions used to meet air quality attainment requirements are surplus as long as they are not otherwise relied on in the SIP, SIP-related requirements, and other State air quality programs adopted but not in the SIP, a consent decree, or federal rules that focus on reducing criteria pollutants or their precursors. In the event that a voluntary incentive program's emission reductions are already relied on to meet air quality-related program requirements, they are no longer surplus. In addition, the emission reductions are available only for the remaining useful life of the equipment being replaced (e.g., if the equipment being replaced had a remaining useful life of five years, the additional emission reductions from the new equipment are available for SIP or conformity purposes under this guidance only for five years).

Enforceable

The South Coast AQMD will be responsible for assuring that the emission reductions credited in the SIP will occur. Emission reductions and other required actions are enforceable if:

a. They are independently verifiable;

b. Program violations are defined;

c. Those liable for emission reductions can be identified;

d. The South Coast AQMD and the U.S. EPA maintain the ability to apply penalties and secure appropriate corrective action where applicable;

e. The general public has access to the emissions-related information obtained from the source;

f. The general public can file suits against sources for violations (with the exception of those owned and operated by Tribes); and

g. They are practically enforceable in accordance with other U.S. EPA guidance on practicable enforceability.

Actual emission reductions, for example, can be assured through replacement equipment registration, recordkeeping and reporting, and inspections (initial inspection after installation and subsequent inspections on a regular basis thereafter, if needed) throughout the term of project. Specific enforcement mechanisms will be addressed in the guidelines for the individual incentive measures.

Permanent

The emission reductions are permanent if they occur over the duration of the voluntary incentive program, and for as long as they are relied on in the SIP. For example, those awarded incentives would need to ensure the projects are properly implemented and the reductions are occurring and will continue to occur. Recipients of the incentive awards would therefore agree to contract provisions, such as recordkeeping and reporting to track reductions and agreements that newly installed equipment would not be removed without concurrence of the South Coast AQMD (i.e., permanent placement) and the proof that the replaced equipment would be destroyed or at least not be operated in the Basin (e.g., pictures, certification). Detailed procedures to ensure permanent reductions will be described in the guidelines for the individual incentive measures.

Reductions from Adopted Rules

A number of control measures contained in the 2016 AQMP have been adopted as rules. These adopted rules and their projected emission reductions become assumptions in developing the AQMP future year inventories. Although they are not part of the control strategy in the 2022 AQMP, continued implementation of those rules is essential in achieving clean air goals and maintaining the attainment demonstration. Table 1-2 of Chapter 1 lists the ~~rules~~control measures adopted into rules by the South Coast AQMD since the adoption of the 2016 AQMP and their expected emission reductions.

Reductions from South Coast AQMD Control Measures

For purposes of implementing an approved SIP, the South Coast AQMD is committed to adopt and implement control measures that will achieve, in aggregate, emission reductions to demonstrate expeditious progress toward meeting the federal 2015 8-hour ozone standard. The South Coast AQMD is committed to adopt the control measures in Tables 4-2 and 4-3 unless these measures or a portion thereof are found infeasible, and other substitute measures that can achieve equivalent reductions in the same adoption or implementation timeframes are adopted. Findings of infeasibility will be made at a regularly scheduled meeting of the South Coast AQMD Governing Board with proper public notification. For purposes of the SIP commitment, infeasibility means that the proposed control technology is not reasonably likely to be available by the implementation date in question, or achievement of the emission reductions by that date is not technically or economically feasible. The reductions in Tables 4-2 and 4-3 are committed only to the extent needed to achieve attainment by the 2038 attainment deadline. If any substitution is needed, the alternative measures will need to achieve the same emission reductions or air quality benefit. The aggregate emission reduction commitments, along with the anticipated specific control measures to meet that reduction commitment are made with the understanding that if there is a shortfall in the individual measures for a particular year, emission reductions from other control measures could be substituted. The South Coast AQMD acknowledges that this commitment is enforceable under CAA section 304(f). The U.S. EPA will not credit SIP reductions unless the control measures are adopted and approved into the SIP at the time the U.S. EPA takes action on the plan.[32]

Cost Effectiveness

The CAA does not contemplate cost as a consideration in meeting NAAQS, and Supreme Court case law expressly prohibits the U.S. EPA from considering costs in establishing NAAQS. The cost of achieving additional emission reductions necessary to meet the standards will increase as the most cost-effective controls have already been implemented. Health and Safety Code (HSC) Section 40922 requires that the preliminary cost-effectiveness of each control measure be evaluated to the extent possible in the AQMP, and then ranked by cost-effectiveness. This cost-effectiveness ranking of each control measure is included in Chapter 6.–

~~For stationary source rules that will be implementing measures in the AQMP~~**Cost-Effectiveness Thresholds for Rulemaking**

Cost-effectiveness must be considered as part of the development of both the AQMP as well as rules where Best Available Retrofit Control Technology (BARCT) emission standards will be established~~, the Health and Safety Code Section 40920.6 establishes specific requirements for evaluating~~. Although not a required component of the ~~cost-effectiveness during rulemaking. Previous AQMPs have established~~ AQMP, cost-effectiveness thresholds have been established in previous AQMPs to ~~be considered during subsequent~~help guide the rule ~~making efforts~~development process. These thresholds are screening levels; they are not intended to ~~use~~serve as a ~~guide~~hard cap on cost-effectiveness for ~~establishing new~~a given regulatory option. The section below discusses two potential options for thresholds and the process that would follow if a threshold is exceeded during rule development.

Background

To help guide the rule development process, past AQMPs have developed cost-effectiveness thresholds for VOC and ~~revised BARCT emission standards~~NOx. Thresholds were established based on the expected cost of controls in these previous plans. The 2012 AQMP established \$16,500 per ton of VOC and \$22,500 per ton of NOx (in 2012 dollars), and the 2016 AQMP established thresholds of \$30,000 per ton of VOC and \$50,000 per ton of NOx (in 2015 dollars) as the thresholds to help guide the analysis in subsequent rulemaking. In 2021 dollars, the ~~threshold~~2016 AQMP thresholds would be \$36,000 per ton of VOC and \$59,000 per ton of NOx~~. In order to account~~, adjusting for ~~normal~~ inflation ~~that occurs every year, these~~

[32] U.S. EPA has in the past allowed about 10 percent of required reductions to be in the form of “enforceable commitments.”

~~values will be adjusted~~and without considering updates to the ~~dollar year used for socioeconomic modeling in each subsequent rulemaking.~~ ~~[33]~~ control cost estimates.[34]

~~Staff is seeking input regarding revisions to the NOx threshold recognizing that the most cost-effective controls have likely been implemented and that additional NOx reductions from stationary sources are expected to cost more with less reductions than prior rulemaking efforts. As shown in Table 4-11~~At the August 2022 Board meeting, staff provided an update on the Draft 2022 AQMP. Several board members had expressed concern that a NOx cost-effectiveness threshold of $59,000 (as proposed in the Draft 2022 AQMP) may be too low to achieve the needed stationary source emission reductions. The Draft Final 2022 AQMP includes an aggressive stationary source control strategy that is generally based on a hierarchy of where emission standards would be based on technical and economic feasibility of first zero emission technologies, then low NOx emission technologies, and lastly ultra low NOx combustion technologies. Since the Draft 2022 AQMP has a higher commitment to zero emission and low NOx emission technologies, many stationary control measures have cost-effective ranges that are expected to be well above $59,000 per ton of NOx reduced.

The methods to estimate costs during rulemaking are well established, however the thresholds used when considering those costs can vary. Below are two potential options for thresholds where staff is seeking feedback. As discussed in detail below, the first option would adjust the threshold put forward in the 2016 AQMP from $50,000/ton of NOx and $30,000/ton of VOC to $59,000/ton NOx and $36,000/ton VOC. These thresholds are based on previous costs of control technology as well as inflation of costs through time. The second option would consider the potential monetized health benefits of reducing pollution. This health-based option would result in a threshold of $325,000/ton NOx. Staff sought comment on these two options. The proposed public process would be the same regardless of the threshold option that will be used to help guide future rulemaking. If a threshold is exceeded, staff would hold a public meeting to discuss rule options above and below the cost-effectiveness threshold, and seek public feedback. The rule package presented to the Board for its consideration would also include options above and below the threshold.

While both options are described below, the Draft Final AQMP adopts the health-based approach to cost-effectiveness outlined in Option 2. This option is more consistent with the benefit/cost analysis used in federal and CARB rulemaking, and ensures that the social costs/health impacts associated with air pollution are fully considered as well as the costs of compliance. Note that staff will continue to seek out the most cost-effective approach to reduce emissions during rulemaking, and the $325,000/ton threshold neither considered a starting point for control costs, nor an absolute cap.

Option 1 – Thresholds Based on Control Costs

~~[33] Traditionally, the socioeconomic impact assessment accompanying each rulemaking uses the Marshall and Swift Equipment Cost Index to bring all costs to the same dollar year.~~

[34] The values shown here for stationary sources use the discounted cash flow method.

This option reflects the approach used in previous AQMPs. Using the cost-effectiveness thresholds from the 2016 AQMP and adjusting for inflation, the thresholds for the 2022 AQMP would be \$36,000 per ton of VOC and \$59,000 per ton of NOx. This option would also adjust cost-effectiveness thresholds for inflation annually instead of waiting for the next AQMP to update these values.[35]

As shown in Table 4-12 below, the cost-effectiveness of recently adopted or amended rules were generally under the cost-effective thresholds established in the 2016 AQMP. During the rulemaking process, emission standards that had controls that were well above the cost-effectiveness threshold were rejected with the goal of keeping the average cost-effectiveness for each class and category of equipment under the cost-effectiveness threshold. Additional details are available in the staff report for each adopted or amended rule.

[35] Traditionally, the socioeconomic impact assessment accompanying each rulemaking uses the Marshall and Swift Equipment Cost Index to bring all costs to the same dollar year.

~~**TABLE 4-11**~~

TABLE 4-12

COST-EFFECTIVENESS FOR RECENTLY ADOPTED SOUTH COAST AQMD RULES

Rule Adoption/Amendment*	Rule Adoption/ Amendment Year	Cost-_Effectiveness ($/ton)**
1150.3 – Emissions of Oxides of Nitrogen from Combustion Equipment at Landfills	2021	$27,200
1147.1 – NOx Reductions from Aggregate Dryers	2021	$46,000
1109.1 – Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations	2021	$11,000 to $50,500
1117 – Emissions from Container Glass Melting and Sodium Silicate Furnaces	2020	$22,700
1179.1 – Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities	2020	$50,000
1118.1 – Control of Emissions from Refinery Flares	2019	$45,000
1134 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines	2019	$4,900 to $11,500
1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines	2019	$41,000
1135 – Emissions of Oxides of Nitrogen from Electricity Generating Facilities	2018	$5,630 to $23,000
1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters/1146.1 – Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters/1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters	2018	$26,500
1168 – Adhesive and Sealant Applications	2017	$12,400

* Rules only shown if they required a cost-_effectiveness calculation in the socioeconomic analysis.

** Cost-_effectiveness is for NOx, except for Rule 1168 which is for VOC.

~~The cost-effectiveness thresholds are designed to provide a guide for establishing BARCT emission standards. To ensure that the maximum emission reductions can be achieved, it is important that an emission standard that can achieve significant reductions that are above the cost-effectiveness threshold are not automatically rejected. During the rulemaking process, if a proposed BARCT emission standard has a cost-effectiveness that is above the threshold, staff will hold a public meeting to discuss other emission standards with a cost-effectiveness at or below the cost-effectiveness threshold and/or compliance or implementation options to address an emission standard that is above the cost-effectiveness threshold. At the public hearing for the adoption or amendment of the emission standard,~~

~~staff must present the options to the emission standard if the cost-effectiveness is above the threshold, highlighting the potential emission reductions associated with each option. Staff is seeking input on this approach.~~

The South Coast AQMD rulemaking has traditionally focused on stationary source rules, however the 2016 AQMP and the 2022 AQMP include several mobile source control measures to be developed by the South Coast AQMD. The cost-effectiveness thresholds established in previous AQMPs have been developed specifically in consideration of costs that stationary sources are anticipated to face. Mobile source controls typically have higher costs per ton of emissions than stationary controls, especially if the control measure requires turnover before the end of the useful life of the mobile source equipment. As an example, many stationary controls allow for add-on controls to existing equipment, whereas mobile source controls often require complete replacement of vehicles by a compliance date or during the end of vehicle life. Another consideration is that mobile source technology is rapidly evolving, and costs for zero emissions vehicles are often anticipated to be significantly lower in future years (e.g., in the 2030s and 2040s). CARB implements many control measures related to mobile sources, including regulations and incentives, and cost data from those efforts can inform how the South Coast AQMD may consider cost-effectiveness for implementation of its own control measures. Given the anticipated rapidly declining costs of zero emissions technology, the potential overall costs of a mobile source regulation will vary depending on the time horizon evaluated, with near-term actions typically resulting in higher costs. Table 4-~~12~~13 below shows the cost-effectiveness of recent CARB rulemakings through 2032. ~~Most~~Similarly, most of the Rule 2305 - Warehouse Indirect Source Rule options also are within the range of cost-effectiveness shown in Table 4-~~12~~13, with 14 of 18 scenarios analyzed below $315,000/ton.

TABLE 4-13

~~TABLE 4-12~~

NEAR-TERM COST-EFFECTIVENESS FOR RECENTLY ADOPTED CARB MOBILE SOURCE RULES

CARB Regulation	Approximate Cost-Effectiveness (through 2032)
Airport Shuttle Bus	$430,000/ton NOx
Innovative Clean Transit	$271,000/ton NOx
At Berth (Ocean Going Vessels)	$~~83~~120,000/ton NOx
Low NOx Omnibus	$39,000/ton NOx
Advanced Clean Trucks	$22,000/ton NOx

An additional point of reference is the cost-effectiveness approach that CARB uses to implement various mobile source funding programs. While an incentive-based approach has many differences with a regulatory approach, it provides an example of potential costs to replace older, higher emitting vehicles with newer, lower emitting vehicles. For incentive programs, CARB typically calculates a weighted cost-effectiveness using multiple pollutants where the incentive cost is divided by NOx + ~~reactive organic gas (ROG)~~VOC + (20 x PM). ~~For on-road heavy duty zero~~ As mobile source fleets continue to move to lower emissions technologies through regulations (e.g., CARB's Truck and Bus rule), cost-effectiveness values are expected to increase because newer, more expensive technologies will achieve less emission ~~vehicles following~~reductions relative to a cleaner fleet. This is reflected in how cost-effectiveness thresholds have evolved through the years for Carl Moyer ~~Guidelines, CARB recently increased~~ project funding. For example, in 1998 the cost-effectiveness ~~as high as~~limit was $12,000 per weighted ton. As of 2021, this value has increased to $33,000 per weighted ton for all projects, and up to $500,000 per weighted ton for zero emissions on-road heavy duty projects.[36,37] In addition, a summary of recent funding program implementation is shown in Table 4-~~13~~14 below, with their cost-effectiveness values calculated based on the Carl Moyer Guidelines.[38]

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[36] Carl Moyer Guidelines Appendix C: https://ww2.arb.ca.gov/sites/default/files/2022-01/FINAL_2017_gl_appendix_c_ADA_2021%20Board%20Approved%20Changes_11.19.21%20v1.2.pdf.

[37] Weighted ton is a combined total emissions reduction based on the following formula: NOx + ~~ROG~~VOC + (20 x PM)

[38] Fiscal Year 2021-2022 Funding Plan for Clean Transportation Incentives Appendix H: https://ww2.arb.ca.gov/sites/default/files/2021-10/fy21-22_fundingplan_appendix_h.pdf.

~~TABLE 4-13~~

TABLE 4-14

NEAR-TERM COST-EFFECTIVENESS FOR RECENTLY ADOPTED CARB MOBILE SOURCE INCENTIVES*

~~Funding Program~~	~~Project Type~~	~~Average Cost-Effectiveness ($/weighted ton)~~ [a]	~~Total Funding ($ millions)~~
Funding Program	**Project Type**	**Average Cost-Effectiveness ($/weighted ton)** **	**Total Funding ($ millions)**
Funding Agricultural Replacement Measures for Emissions Reductions (FARMER)	Off-Road Agriculture	$12,900	$131
	On-Road Trucks	$946,000	$22
	Zero Emission Agricultural Utility Terrain Vehicles (UTV)	$129,000	$18
Community Air Protection (AB 617)	Infrastructure	N/A	$30
	Locomotives	$18,000	$25
	Marine Vessels	$23,000	$38
	Off-Road Agricultural	$8,000	$71
	Off-Road Other	$24,358	$58
	On-Road	$101,000	$55
Carl Moyer	Infrastructure	N/A	$23
	Locomotives	$12,000	$84
	Marine Vessels	$14,000	$160
	Off-Road Agricultural	$12,000	$375
	Off-Road Other	$18,000	$264
	On-Road	$39,000	$210
	Car Scrap	$12,000	$33

TABLE 4-~~13~~14 (CONTINUED)

NEAR-TERM COST-EFFECTIVENESS FOR RECENTLY ADOPTED CARB MOBILE SOURCE INCENTIVES*

Funding Program	Project Type	Average Cost-Effectiveness ($/weighted ton) ~~a~~**	Total Funding ($ millions)
Low Carbon Transportation (Vehicle Purchase)	Clean Vehicle Rebate Project (Standard)	$258,705	$991
	Clean Vehicle Rebate Project (Increased)	$581,936	$100
	Clean Cars 4 All	$463,187	$104
	Financing Assistance for Low Income Consumers	$912,243	$9
Low Carbon Transportation (Clean Mobility)	Clean Mobility Options	$6,043,789	$10
	Clean Mobility in Schools	$1,283,000	$25
	Agricultural Worker Vanpools	$714,020	$6
	Rural School Bus Pilot	$78,234	$62
Low Carbon Transportation (Heavy-Duty and Off-Road)	Heavy-Duty Demos and Pilots	$760,000	$149
	Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP)	$213,776	$385
	Clean Off-Road Equipment (CORE)	$222,458	$19
	Truck Loan Assistance Program	$16,093	$108

~~a~~ * This table shows average cost-effectiveness of funded projects in the past several years. Individual projects within each program are more expensive than the averages shown here (e.g., projects within Carl Moyer can reach $500,000/weighted ton).
** Weighted ton is a combined total emissions reduction based on the following formula: NOx + ~~ROG~~VOC + (20 x PM).

The average cost-effectiveness across the $3.5 billion of projects shown in Table 4-~~13~~14 is about $200,000 per weighted ton.[39] This cost-effectiveness level is the proposed threshold that would be applied to the South Coast AQMD mobile source control measures. Similar to the thresholds proposed for stationary sources, this threshold would be inflated through time to the dollar year used in a control measure-specific socioeconomic analysis. The proposed cost-effectiveness thresholds presented here do not consider the potential reduction in cost due to availability of incentives. Table 4-~~14~~15 presents a summary of ~~proposed~~the Option 1 cost-effectiveness thresholds ~~to~~that would be considered during implementation of control measures.

[39] The values shown for mobile source incentives do not use the discounted cash flow method, and instead are more similar to a levelized cash flow method.

TABLE 4-~~14~~15
PROPOSED COST-EFFECTIVENESS THRESHOLDS TRIGGERING ADDITIONAL ANALYSIS DURING SOUTH COAST AQMD CONTROL MEASURE IMPLEMENTATION

Source Type	Cost-Effectiveness Threshold[a,b]
Stationary Sources	$59,000/ton NOx / $36,000/ton VOC
Mobile Sources	$200,000/weighted ton *[NOx+~~ROG~~VOC+(20 x PM)]*

[a] Thresholds are in 2021 dollars and ~~will~~would be inflated to the dollar year used in a socioeconomic analysis for each specific control measure as it is implemented.

[b] The threshold for stationary sources is based on the Discounted Cash Flow method, as traditionally used in South Coast AQMD rulemaking. In comparison, the threshold for mobile sources is based on the Levelized Cash Flow method to be consistent with CARB practice for statewide mobile source regulations. The Socioeconomic Report for each AQMP will continue to present the cost-effectiveness values using both methods for each control measure with quantified emission reductions.

With release of the Draft 2022 AQMP staff sought input regarding revisions to the NOx threshold recognizing that the most cost-effective controls have likely been implemented and that additional NOx reductions from stationary sources are expected to cost more with less reductions than prior rulemaking efforts. Two concerns raised about Option 1 are that costs are expected to be higher than the thresholds presented in Option 1, and setting a threshold too low could forego some needed emission reductions. Secondly, inconsistent thresholds for mobile and stationary sources may not be appropriate because emission reductions that are not achieved in one sector will need to be achieved in the other sector. Option 2 described below provides an alternative threshold approach to Option 1, and is the approach adopted in the Draft Final 2022 AQMP.

Option 2 – Health Benefit Based Threshold

The approach described above for Option 1 is unique, and agencies such as CARB and U.S. EPA instead use a different approach of comparing the potential societal benefits of a regulation against the costs. Rulemaking for these agencies generally can proceed if the benefits of the regulation are expected to exceed its costs.[40]

This approach utilizes a benefit-cost analysis as a screening threshold instead of a cost-based approach. U.S. EPA has developed societal monetized benefit-per-ton estimates for PM2.5 and ozone for many industrial sectors.[41] This analysis considers the societal public health benefit from improved air quality, such as reduced hospitalizations, reduced premature mortality, and other adverse public health outcomes. U.S. EPA's analysis includes estimates for 21 industrial sectors at the national level, with more refined analysis of some sectors at the state level. An example of national-level estimates of NOx reductions and their contribution to ozone and PM2.5 reductions across 21 industrial sectors is shown in Table 4-16 below. Total benefit-per-ton of NOx reduction ranges from about $71,000 to about $159,000. The monetized benefits in Table 4-16 are based on avoided premature mortality and other less severe

[40] Guidelines for Preparing Economic Analyses, 2010. https://www.epa.gov/sites/default/files/2017-08/documents/ee-0568-50.pdf.

[41] www.epa.gov/benmap/estimating-benefit-ton-reducing-directly-emitted-pm25-pm25-precursors-and-ozone-precursors.

health outcomes associated with either short-term (e.g., 8-hours) or long-term (e.g., several months) exposure to ozone, as well as exposure to PM2.5. Appendix I describes the expected health effects from ozone and PM2.5 exposure in more detail.

TABLE 4-16

NATIONAL ESTIMATES OF MONETIZED SOCIETAL BENEFITS-PER-TON OF NOx REDUCTION IN 2035 ACROSS 21 INDUSTRIES (2016 DOLLARS)

Industrial Sector	Short Term Ozone*	Long Term Ozone*	PM2.5**	Total
Oil and Natural Gas	$6,280	$54,800	$9,800	$70,880
Taconite Mining	$6,060	$55,300	$11,150	$72,510
Primary Copper Smelting	$8,560	$63,300	$5,365	$77,225
Internal Combustion Engines	$7,620	$66,900	$13,000	$87,520
Residential Woodstoves	$5,620	$48,700	$40,600	$94,920
Oil and Natural Gas Transmissions	$8,190	$74,000	$16,400	$98,590
Boilers	$8,850	$79,400	$18,600	$106,850
Refineries	$8,420	$71,000	$28,900	$108,320
Coke Ovens	$7,900	$73,800	$30,650	$112,350
Cement Kilns	$9,630	$85,100	$17,800	$112,530
Synthetic Organic Chemical	$9,240	$85,300	$20,600	$115,140
Pulp and Paper	$10,300	$93,100	$13,700	$117,100
Integrated Iron and Steel	$9,250	$84,200	$28,300	$121,750
Electric Arc Furnaces and Argon-Oxygen Decarburization	$10,200	$90,700	$23,400	$124,300
Brick	$10,800	$97,000	$33,200	$141,000
Iron and Steel Foundries	$11,400	$102,000	$28,950	$142,350
Ferroalloys	$12,300	$115,000	$18,600	$145,900
Secondary Lead Smelters	$12,500	$111,000	$28,400	$151,900
Electrical Generating Unit	$15,400	$136,000	$7,645	$159,045

** 3% Discount Rate, ** Mid-Point Estimate*

More specific state-level analysis is available for three industrial sectors, including Internal Combustion Engines, Boilers, and Electrical Generating Units (Table 4-16), for both NOx and VOC. Although there are only three sectors detailed at the state level, these sectors are all present widely in the South Coast Air Basin and are broadly representative in terms of cost for the 21 sectors shown in Table 4-16. The total benefits-per-ton in Table 4-17 can be viewed as the monetized societal benefit of reducing one ton of NOx. The costs are higher in Table 4-16 for the California-specific analysis compared to national estimates in Table 4-16 due to the higher population in California compared to other states (and hence greater monetized health benefits for reduced pollution) as well as the benefits from reducing emissions in regions with much higher pollution levels (e.g., South Coast Air Basin ozone and PM2.5 levels are higher than elsewhere in the nation).

TABLE 4-17

2035 BENEFITS-PER-TON OF NOx ESTIMATES IN CALIFORNIA (2021 DOLLARS)

Sector Name	NOx (tpy)*	Short-Term O_3 Exposure	Long-Term O_3 Exposure	PM2.5	Total
Boilers	5,706	$14,793	$119,972	$57,074	$191,839
ICE	4,121	$22,946	$180,540	$88,057	$291,543
EGU	9,403	$40,767	$313,325	$30,867	$384,959
Benefits-per-ton (weighted by tons reduced)					***$307,636***

** Technical Support Document: Estimating the Benefit per Ton of Reducing Directly-Emitted PM2.5, PM2.5 Precursors and Ozone Precursors from 21 Sectors, www.epa.gov/system/files/documents/2021-10/source-apportionment-tsd-oct-2021_0.pdf*

As an additional check on this estimate based on U.S. EPA analysis, a comparison can be made with estimates from the 2016 AQMP and its associated Socioeconomic Impact Assessment. The 2016 AQMP called for reducing 603,167 tons of NOx between 2017-2031. The total monetized public health benefit was estimated to be $173.2 billion (in 2015 dollars). This results in a benefit of about $342,000 per ton (2021 dollars), which is about 11% higher than the $307,636 estimate in Table 4-17. Based on these analyses, Option 2 would use a screening threshold of $325,000 per ton (2021 dollars) when evaluating the cost-effectiveness of proposed rules ($325,00 is the mid-point between the estimates from the 2016 AQMP and Table 4-17). Cost-effectiveness would continue to be evaluated as the cost of controls divided by the tons of NOx reduced.

The mobile source regulatory and incentive-based cost-effectiveness values shown in Tables 4-13 and 4-14 are similar to the $325,000 per ton screening threshold shown for Option 2. In order to be consistent across stationary and mobile source measures, the same screening threshold would be used for both mobile and stationary sources. This approach would be consistent with the monetized public health benefit analysis of the overall benefits of the AQMP, which account for all control measures (stationary and mobile). This benefits-based screening threshold would be inflated through time to the dollar year used in a control measure-specific socioeconomic analysis.

Public Process if a Cost-Effectiveness Threshold is Exceeded

It is important to set a threshold that is reflective of the cost of the technologies needed to achieve the emission reductions required for attainment. During the rulemaking process, if a proposed BARCT emission standard has a cost-effectiveness that is above the threshold, staff will hold a public meeting to discuss other emission standards with a cost-effectiveness at or below the proposed screening threshold and/or compliance or implementation options to address an emission standard that is above the proposed screening threshold. At the public hearing for the adoption or amendment of the emission standard, staff must present the options to the emission standard if the cost-effectiveness is above the threshold, highlighting the potential emission reductions associated with each option.

The 2022 AQMP proposes to use the health benefit based cost-effectiveness threshold for NOx as a screening tool moving forward. This will align South Coast AQMD's cost-effectiveness approach with those of CARB and U.S. EPA. VOC measures would continue to use the cost-effectiveness threshold previously adopted in the 2016 adjusted with consumer price index. That value is currently $36,000/ton VOC, and would be inflated by the consumer price index annually.

Alternative/Substitute Measures

Under the 2022 AQMP, the South Coast AQMD will be allowed to substitute South Coast AQMD measures in Tables 4-2 and 4-3 with other measures, provided the overall equivalent emission reductions by the implementation dates in Tables 4-2 and 4-3 are maintained and the applicable measure in Tables 4-2 and 4-3 is deemed infeasible. In order to provide meaningful public participation, when new control concepts are introduced for rule development, the South Coast AQMD is committed to provide advanced public notification beyond its regulatory requirements (i.e., through its Rule Forecast Report). The South Coast AQMD will also report quantitatively on the AQMP's implementation progress annually at its regularly scheduled Governing Board meetings. Included in the reports will be any control measures being proposed or measures, or portions thereof, that have been found to be infeasible and the basis of such findings. In addition, at the beginning of the year, any significant emission reduction related rules to be considered are listed in the Governing Board's Rule Forecast Report. The annual report would also provide any finding of a new feasible control measure to substitute for a measure that has been deemed infeasible. The existing rule development outreach efforts such as public workshops, stakeholder working group meetings or public consultation meetings will continue to solicit public input. In addition, if additional technical analysis, including source testing, indicates that actual emissions are less than previously estimated, the reductions would then be creditable toward SIP commitments. In order for reductions from improved emission calculation methodologies to be SIP creditable, a public process and the Governing Board adoption hearing will also be instituted to solicit comments and make appropriate revisions, if necessary.

Reductions from CARB Control Measures

The CARB proposed control measures presented in Table 4-9, combined with ongoing implementation of current control programs, will provide further reductions to enhance air quality progress and achieve the 2015 8-hour ozone standard. Ongoing implementation of current control programs is projected to reduce NOx emissions in the South Coast Air Basin from today's levels by ~~151~~167 tons per day in 2037. Achieving the benefits projected from the current control program will continue to require significant efforts for implementation and enforcement and thus, represents an important element of the overall strategy. The new measures contained in the 2022 State SIP Strategy commitment reflect a combination of State actions, petitions and advocacy for federal action, as well as actions that outline an additional transition to cleaner technologies and systems. Emissions reductions in the South Coast Air Basin from the new measures identified and quantified to date in the ~~Draft~~ 2022- State SIP Strategy are estimated to be ~~72.9~~89.3[42] tons per day of NOx and 13.5 tons per day of VOC in 2037. Even when coupled with the emission reductions associated with ongoing implementation of the existing control program, additional reductions were needed to meet the 2015 8-hourozone standard, which is significantly more stringent than previous ozone standards.

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[42] ~~CARB 2022 Draft State SIP Strategy (https://ww2.arb.ca.gov/sites/default/files/2022-01/Draft_2022_State_SIP_Strategy.pdf.~~ CARB 2022 State SIP Strategy can be downloaded at CARB's website: https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy.

Overall Emission Reductions

Tables 4-~~15~~18 and 4-~~16~~19 identify projected reductions for the South Coast Air Basin based on the summer planning inventory for NOx and VOC emissions for the year of 2037 and 2032 respectively. These reductions reflect the emission reductions associated with implementation of control measures under local, State, and federal jurisdiction. Emission reductions represent the difference between the projected baseline and the remaining emissions.

TABLE 4-~~15~~18

EMISSION REDUCTIONS FOR 2032 BASED ON SUMMER PLANNING INVENTORY (TONS PER DAY)

Sources	NOx	VOC
Year 2032 Baseline[a]	~~230~~199	~~386~~345
Emission Reductions:		
South Coast AQMD Stationary Sources	3	1
South Coast AQMD Mobile Sources	~~11~~7	0
Sources under CARB's Direct Authority	24	5.5
~~CARB Mobile Sources~~Primarily-Federally and Internationally Regulated Sources – CARB Measures	~~66~~10	~~39~~0.5
~~Federal Measures~~ Primarily-Federally and Internationally Regulated Sources – Federal Action Needed [b]	~~0~~41	~~0~~2
Total Reductions (all measures)[~~b~~c]	~~80~~85	~~40~~10
2032 Remaining Emissions	~~151~~114	~~346~~336

a Emission assumptions from SCAG's 2020 RTP/SCS are already reflected in the AQMP baseline, including TCMs

~~b~~b 182(e)(5) reductions from federal measures are allowed only for "extreme" nonattainment area. Include 26.2 tons per day NOx reduction from Ocean Going Vessel and 14.6 tons per day NOx reduction from aircraft emissions interpolated from 2022 to 2037.

c Numbers may not sum due to rounding

~~TABLE 4-16~~

TABLE 4-19

EMISSION REDUCTIONS FOR 2037 BASED ON SUMMER PLANNING INVENTORY (TONS PER DAY)

Sources	NOx	VOC
Year 2037 Baseline [a]	~~220~~184	~~389~~339
Emission Reductions:		
South Coast AQMD Stationary Sources [b]	~~21~~19	1
South Coast AQMD Mobile Sources	~~10~~7	0
CARB's Zero Emission Standard for Space and Water Heaters[c]	3	0
Sources under CARB's Direct Authority except residential and commercial Space and Water Heaters	30	17.5
~~CARB SIP Strategy [b]~~Primarily-Federally and Internationally Regulated Sources – CARB Measures	~~104~~11	~~69~~0.5
~~Aircraft~~Primarily-Federally and Internationally Regulated Sources – Federal Action Needed	~~19~~51	3
South Coast Stationary Sources – Further Deployment of Cleaner Technology	3	0
Total Reductions (all measures)	~~157~~125	~~73~~22
Set-Aside Accounts [~~c~~d]	-0.5	-4
2037 Remaining Emissions [~~d~~e]	~~63~~60	321

[a] Emission assumptions from SCAG's 2020 RTP/SCS are already reflected in the AQMP baseline, including TCMs.

~~[b] Reductions from mobile sources include CARB 2016 and 2022 State Strategy. The emission reductions do not match with the draft 2022 SIP Strategy due to discrepancy in emissions inventory versions and base year used to forecast future emissions from. Final version will reconcile the discrepancy.~~

[~~c~~b] Exclude South Coast AQMD's C-CMB-01, C-CMB-02, R-CMB-01 and R-CMB-02 reductions

[c] South Coast AQMD's C-CMB-01, C-CMB-02, R-CMB-01 and R-CMB-02 will assist the CARB's measure

[d] SIP reserve for potential technology assessment and phaseout of toxics for VOC.

[~~d~~e] Numbers may not sum due to rounding.

Implementation of the ~~Proposed~~ Control Strategy

The 2022 AQMP requires significant amount of NOx emission reductions to meet the 2015 8-hour ozone standard. The only viable pathway to achieving this standard is a significant push to zero emissions technology across all sectors, where feasible, and implementation of the cleanest technologies available where not feasible. This approach requires economy-wide transition to different energy sources. The following sections ~~discussed~~discuss the plans to implement the control strategies of the 2022 AQMP.

Regulatory and Incentive Approach

The control strategies in the 2022 AQMP include new regulations and the development of incentive programs and supporting infrastructure for early deployment of advanced control technologies. The regulatory approach for the control strategy is described in detail for individual control measure as included in Appendix IV-A. Tables 4-~~17~~20 and 4-~~18~~21 list proposed adoption and implementation dates of the proposed stationary source control measures and mobile source control measures, respectively.

TABLE 4-20

~~TABLE 4-17~~

ADOPTION AND IMPLEMENTATION SCHEDULE OF STAIONARY SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
South Coast AQMD Stationary Source NOx Measures:			
Residential Combustion Source Measures:			
R-CMB-01	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Water Heating [NOx]	2024	2029
R-CMB-02	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Space Heating [NOx]	2024	2029
R-CMB-03	Emissions Reductions from Residential Cooking Devices [NOx]	2024	2029
R-CMB-04	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Residential Other Combustion Sources [NOx]	2024	2029
Commercial Combustion Source Measures:			
C-CMB-01	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Water Heating [NOx]	2025	2031
C-CMB-02	Emission Reductions from Replacement with Zero Emission or Low NOx Appliances - Commercial Space Heating [NOx]	2025	2031
C-CMB-03	Emission Reductions from Commercial Cooking Devices [NOx]	2025	2031
C-CMB-04	Emission Reductions from Small Internal Combustion Engines [NOx]	2025	2026
C-CMB-05	NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted) [NOx]	2027	2037

TABLE 4-~~17~~20 (CONTINUED)

ADOPTION AND IMPLEMENTATION SCHEDULE OF STAIONARY SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
South Coast AQMD Stationary Source NOx Measures:			
Large Combustion Source Measures:			
L-CMB-01	NOx Reductions from RECLAIM Facilities [NOx]	2022	2025
L-CMB-02	Reductions from Boilers and Process Heaters (Permitted) [NOx]	2027	2037
L-CMB-03	NOx Emission Reductions from Permitted Non-Emergency Internal Combustion Engines [NOx]	2026	2031
L-CMB-04	Emission Reductions from Emergency Standby Engines (Permitted) [NOx, ~~VOC~~VOCs]	2025	2031
L-CMB-05	NOx Emission Reductions from Large Turbines [NOx]	2027	2037
L-CMB-06	NOx Emission Reductions from Electric Generating Facilities [NOx]	2027	2037
L-CMB-07	Emission Reductions from Petroleum Refineries [NOx]	2027	2037
L-CMB-08	NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works [NOx]	2025	2037
L-CMB-09	NOx Reductions from Incinerators [NOx]	2024	2029
L-CMB-10	NOx Reductions from Miscellaneous Permitted Equipment [NOx]	2027	2037
South Coast AQMD Co-Benefits from Energy and Climate Change Programs Measures:			
ECC-01	Co-Benefits from Existing and Future Greenhouse Gas Programs, Policies, and Incentives [NOx]	2023	2023
ECC-02	Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures [NOx, VOCs]	2024	2024
ECC-03	Additional Enhancements in Reducing Existing Residential Building Energy Use [NOx, VOCs]	2025	2029

TABLE 4-~~17~~20 (CONCLUDED)

ADOPTION AND IMPLEMENTATION SCHEDULE OF ~~STAIONARY~~STATIONARY SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
South Coast AQMD Stationary Source VOC Measures:			
FUG-01	Improved Leak Detection and Repair [VOCs]	2023	2028
FUG-02	Emission Reductions from Industrial Cooling Towers [VOCs]	2026	2031
CTS-01	Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants [VOCs]	2023	2031
FLX-02	Stationary Source VOC Incentives [VOCs]	2024	2025
BIO-01	Assessing Emissions from Urban Vegetation [VOCs]	2025	2025
L-CMB-04[a]	Emission Reductions from Emergency Standby Engines (Permitted) [NOx, ~~VOC~~VOCs]	2025	2031
South Coast AQMD Stationary Source Other Measures:			
MCS-01	Application of All Feasible Measures [All Pollutants]	2023	2037
MCS-02	Wildfire Prevention [NOx, PM]	2026	2031
FLX-01	Improved Education and Public Outreach [All Pollutants]	2023	2023

[a] This is a NOx control measure with co-benefits of VOC reductions.

TABLE 4-~~18~~21

ADOPTION AND IMPLEMENTATION SCHEDULE OF MOBILE SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
Emission Growth Management Measures:			
EGM-01	Emission Reductions from New Development and Redevelopment [All Pollutants]	2025	2026-2037
EGM-02	Emission Reductions from Projects Subject to General Conformity Requirements [All Pollutants]	2026	2026-2037
EGM-03	Emission Reductions from Clean Construction Policy [All Pollutants]	2025	2025-2037
Facility-Based Mobile Source Measures:			
MOB-01	Emission Reductions at Commercial Marine Ports [NOx, SOx, PM]	2023	2023-2037
MOB-02A	Emission Reductions at New Rail Yards and Intermodal Facilities [NOx, PM]	2022-2024	2023-2037
MOB-02B	Emission Reductions at Existing Rail Yards and Intermodal Facilities [NOx, PM]	2022-2024	2023-2037
MOB-03	Emission Reductions at Warehouse Distribution Centers [NOx]	Adopted 2021 (Reassess every three years)	2022-2037
MOB-04	Emission Reductions at Commercial Airports [All Pollutants]	Approved 2019 (Reassess in 2027)	2020-2037
On-Road and Off-Road Mobile Source Measures:			
MOB-05	Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles [~~VOC,~~ NOx, ~~CO~~PM]	N/A	Ongoing
MOB-06	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	N/A	Ongoing
MOB-07	On-Road Mobile Source Emission Reduction Credit Generating Program [NOx, PM]	TBD	TBD
MOB-08	Small Off-Road Engine Equipment Exchange Program [~~VOC~~VOCs, NOx, PM]	N/A	Ongoing
MOB-09	Further Emission Reductions from Passenger Locomotives [NOx, PM]	N/A	Ongoing
MOB-10	Off-Road Mobile Source Emission Reduction Credit Generation Program [NOx, PM]	TBD	TBD

TABLE 4-~~18~~21 (CONTINUED)

ADOPTION AND IMPLEMENTATION SCHEDULE OF MOBILE SOURCE CONTROL MEASURES

Number	Title [Pollutant]	Proposed Adoption Date	Proposed Implementation Timeframe
Incentive-Based Measures:			
MOB-11	Emission Reductions from Incentive Programs [NOx, PM]	N/A	Ongoing
MOB-12	Pacific Rim Initiative for Maritime Emission Reductions	N/A	Ongoing
Other Measures			
MOB-13	Fugitive VOC Emissions from Tanker Vessels [~~VOC~~VOCs]	2024	2024-2037
MOB-14	Rule 2202 – On-Road Motor Vehicle Mitigation Options [~~VOC~~VOCs, NOx, CO]	2023	2023-2037
MOB-15	Zero Emission Infrastructure for Mobile Sources [All Pollutants]	N/A	Ongoing

In addition to the regulatory approach, incentive funds will be used to subsidize low-emitting or zero emission equipment purchases. Expansion of supporting infrastructure for implementation of cleaner fuels also helps to accelerate the use of ultra-low emitting and zero-emitting vehicles and equipment. For implementation of incentive programs/measures, two key approaches are (1) promoting widespread deployment of available zero and low NOx technologies and (2) developing new zero emissions and ultra-low NOx technologies for other use cases where technology is not currently available.

Stationary source control measures for R-CMB series, C-CMB series, and ECC-03 target emission reductions from residential and commercial buildings, include incentive components as part of the proposed control approach. Among control measures R-CMB-01, R-CMB-02, R-CMB-04, C-CMB-01 and C-CMB-02, a mitigation fee will be considered where appropriate. The mitigation fee collected would be utilized as incentives to accelerate the adoption of zero emission units or utilized to assist in panel upgrades or infrastructure at residences in disadvantaged communities.

Incentive programs will be of particular importance for measures regarding zero emission building ~~electrification~~measures. Programs to change out gas appliances, heaters and boilers may be *cost-effective*, but not necessarily *affordable*. First, there is the cost of replacing the appliances themselves – which would not be insignificant for many smaller businesses or residential households. Second, many buildings will likely need additional electrical panel upgrades and other infrastructure to support the increased electrical load needed to power the replacement appliances. These infrastructure upgrades can be far more costly than the cost of replacing gas appliances. These issues are further magnified in economically disadvantaged communities, where switches from gas to electrical appliances may be cost-prohibitive unless a substantial portion of those costs – if not all – are covered by other programs. Existing rebate programs, such as the South Coast AQMD's Clear Air Furnace program, funded by Rule 1111 mitigation fees, provides rebates to those installing a residential electric heat pump to replace a natural gas furnace. In addition, a specific percentage of the funding was dedicated to those applying from a disadvantaged community. This program can be further funded to enhance the existing rebate program or expanded to include other building appliances such as water heaters. In addition, partnerships with other organizations, such as Technology and Equipment for Clean Heating (TECH) Clean California or Southern California Edison, with similar programs and directives could assist in providing more rebate money to further incentivize early deployment of cleaner technologies. Evaluating funding needs and sourcing funding to support control measures associated with zero emission building ~~electrification~~measures will therefore be critical. But a much larger issue will be structuring incentive/rebate programs in a way that is equitable and does not leave economically disadvantaged communities behind. In developing these incentive programs, the South Coast AQMD will seek community input and also evaluate ways to prioritize distribution of funding to benefit the most disadvantaged communities.

Coordination with Other Agencies

The 2022 AQMP relies strongly upon partnerships at federal, State, and local levels, seeking to expand existing collaborations and establish new coalitions. To achieve widespread adoption of clean fuel policies and technologies, close coordination with other agencies will be necessary. To implement zero and low NOx technologies in a cost-effective manner, incentive funding programs for stationary sources should align with other local, State, and federal initiatives.

CARB - As part of the 2022 State Strategy for the State Implementation Plan ~~(2022 State SIP Strategy),~~, CARB has proposed statewide emissions standards for combustion-based appliances in residential and commercial buildings to accelerate the transition from fossil fuels. CARB proposed to adopt a statewide zero emission GHG standard for space and water heaters, which would have co-benefits of reducing criteria pollutants. Beginning in 2030, 100 percent of sales of new space and water heaters would need to meet zero emission standards. This requirement applies to both new construction and replacement of burned-out equipment in existing buildings. As part of the public measure suggestions, the 2022 State SIP Strategy includes the possibility of additional emissions standards for combustion-based appliances used in buildings such as stoves, work with air districts to set further such standards, work with building and energy code agencies to ready more buildings for zero emission appliances, or take other actions (including potentially incentive programs) to accelerate the removal of fossil fuels from the building stock in both new and existing buildings. The South Coast AQMD will work closely with ~~ARB~~CARB in the development of such measures and address the concerns on cost feasibility and affordability especially in environmental justice (EJ) areas.

California Public Utilities Commission (CPUC) - As part of the State's efforts to reduce GHG emissions, in January 2019, the CPUC instituted a new rulemaking on building decarbonization (R.19-01-011) including implementation of incentive programs and establishing a building decarbonization policy framework. Examples of CPUC approved zero emission building ~~electrification~~measures incentive programs include Self-Generation Incentive Program Heat Pump Water Heaters (SGIP HPWH) and TECH (Technology and Equipment for Clean Heating).

California Energy Commission (CEC) - CEC is the State's primary energy policy and planning agency, and one of its core responsibilities is to establish certain appliance efficiency regulations with Title 20 and building standards with Title 24. CEC is also responsible for developing the Integrated Energy Policy Report (IEPR) every two years, an integrated assessment of major energy trends and issues facing California's electricity, natural gas, and transportation fuel sectors. CEC has also recently launched the Building Initiative for Low-Emissions Development (BUILD) Program, which is designed to provide incentives for new all-electric low-income residential buildings that reduce GHG emissions.

Overall, there are ongoing efforts statewide to continue to reduce GHG from various sectors. The South Coast AQMD will work with agencies, utilities, and other stakeholders to further implement measures that provide co-benefit of criteria pollutant reductions within the Basin.

Incentive Approach for Mobile Sources

Given the significant level of NOx reductions needed to attain the 2015 8-hour ozone standard by the 2037 attainment year, regulations alone will not provide sufficient emission reductions. There is a clear need to promote and accelerate the deployment of zero and low NOx technologies as we reach the limits of the emission reductions achievable through conventional technologies. The need is even greater for national and international transportation sources to develop and commercialize the cleanest locomotives, ocean-going vessels, and aircraft as well as to promulgate cleaner exhaust emissions standards. One of the effective approaches to accelerate the deployment of cleaner technologies is through financial incentive measures to encourage the targeted industries to adopt new technologies. This approach also provides a signal for technology providers, engine and automobile manufacturers, and academic researchers to develop and commercialize the cleanest technologies possible and further the efforts to commercialize zero emission technologies into a wider market.

The South Coast AQMD has a long history of successful implementation of incentive programs that help fund the accelerated deployment of cleaner technologies in on-road vehicles and off-road mobile equipment. Some of the major incentive programs that are administered by the South Coast AQMD include Carl Moyer Memorial Air Quality Standards Attainment Program, Proposition 1B Goods Movement Emissions Reductions Program, and Lower School Bus Emission Program. Recently, Community Air Protection Program and VW Environmental Mitigation Trust for California were also added to the portfolio of the South Coast AQMD-administered incentive programs. These incentive programs are further described in the South Coast AQMD's mobile source control measures (Appendix IV-A).

In order to estimate the prospective emission reductions from these incentive programs, South Coast AQMD staff conducted an analysis to forecast the incentive funding through 2036 based on the current or projected allocations. These allocations are assumed to be maintained through 2036 and applied to mobile source sectors based on program-specific guidelines and internal projections. For example, CARB recently increased Carl Moyer Program funding. As a result of AB 1274 which expands the smog check exemption to vehicles that are seven and eight model years old with an assessment of a $25 smog abatement fee on these vehicles. Most of the fee revenues collected will be directed to the Carl Moyer Program with approximately $20 million in additional funding to be provided to the South Coast AQMD. South Coast AQMD staff assumed that the increased Moyer funding allocation will be maintained through 2036 and applied it to the following sectors in this analysis: on-road (10 percent), off-road (58 percent), locomotive (1 percent), marine harbor craft (15 percent), TRU (1 percent), and infrastructure (15 percent).

Table 4-~~19~~22 below shows the estimated incentive funding for each mobile source sector based on the projected funding allocations for the South Coast AQMD-administered incentive programs.

TABLE 4-~~19~~22

ESTIMATED ANNUAL INCENTIVE FUNDING FOR MOBILE SOURCE SECTORS

Mobile Source Sector	Annual Funding*
Light- and Medium-Duty Vehicles	$16,372,~~000~~396
Heavy Heavy-Duty Trucks	$~~34,326,000~~32,442,160
School Buses	$21,~~637,000~~623,250
Off-Road Agriculture	$~~5,229,000~~1,692,918
Off-Road Construction	$~~60,243,000~~55,017,213
Other Off-Road and Cargo Handling Equipment (CHE)	$~~4,491,000~~22,525,515
Marine Harbor Craft	$~~24,212,000~~14,855,608
Transport Refrigeration Units (TRU)	$1,~~399,000~~970,713
Locomotives	$~~6,275,000~~15,782,837
Residential/Commercial Lawn and Garden	$~~875~~1,000,000
Infrastructure	$~~25,147,000~~16,779,164
Total	**$200,~~206,000~~061,774**

* Annual Funding includes administrative cost which is typically 6.25 percent.

As shown in Table 4-~~20~~23, NOx emission reductions are calculated based on these incentive funding estimates with the following assumptions:

- Average NOx emission reductions and average incentive amount per vehicle/equipment from existing projects that have been funded from 2018 through 2021 are used as the basis;
- For mobile sources other than on-road sectors, control factors from CARB are applied to the average NOx emission reductions to discount for future reductions from the proposed regulations and SIP strategies. Additional adjustment factors for the implementation of zero emission technologies are also applied to agricultural equipment and harbor ~~crafts~~craft;
- For on-road vehicle sectors (LD and MD vehicles, HD vehicles and school buses), the Calculator for Spending Incentives (CSI), which is an internally developed model to identify at a screening level the most cost-effective projects, is used to calculate NOx emission reductions. Additional adjustment

factors for electrification or other zero emission technology implementation in 2037 is also applied; and

- Carl Moyer Program's maximum project life is used to calculate SIP-eligible emission reductions. For example, the maximum project life allowed for the replacement of HD trucks is 7 years according to the 2017 Carl Moyer Guidelines whereas the useful life for new HD trucks is likely to be longer. If SB 1 milestones were to be used as the guide, it would be 13+ years. The use of maximum project life in the analysis is to ensure that the emission reductions from the South Coast AQMD-administered incentive programs would satisfy the SIP eligibility elements per the U.S. EPA protocols.

TABLE 4-23

~~TABLE 4-20~~

PRELIMINARY 2037 NOX REDUCTIONS FROM INCENTIVE PROGRAMS*

Mobile Source Sector	Project Type	NOx Emission Reduction** (tons/day)	Affected Population	Average Funding per Unit	Total Incentive Funding
Light- and Medium-Duty Vehicles	Replacement	0.~~16~~11	5,440	$5,000	$~~31,999~~27,200,000
Heavy-Duty Vehicles	Replacement	~~2.67~~1.34	~~16,083~~8,214	$~~10,700~~17,677	$~~186,011~~145,200,000
School Buses	Replacement	0.~~31~~30	8,~~937~~032	$~~21,300~~23,705	$~~203,759~~190,400,000
Off-Road Agriculture	Replacement	0.~~59~~08	~~388~~125	$~~134,800~~135,626	$~~52,380,000~~16,886,589
Off-Road Construction	Repower	~~2.00~~1.18	~~746~~656	$~~291,200~~307,545	$~~217,086,000~~201,665,966
Off-Road Construction	Replacement	~~1.30~~0.62	~~564~~365	$~~264,300~~286,351	$~~148,896,000~~104,399,982
Other Off-Road and CHE	Replacement	0.~~05~~37	~~90~~428	$~~194,200~~235,335	$~~17,460,000~~100,623,218
Marine Harbor Craft	Repower	~~2.61~~1.82	~~1,199~~683	$~~300,900~~322,000	$~~360,899,000~~220,005,964
TRU	Replacement	0.01	~~145~~224	$45,~~500~~533	$~~6,670,000~~10,194,772
Locomotives	Replacement	0.~~39~~98	~~57~~125	$1,~~611,100~~854,353	$~~91,827,000~~232,347,363
~~**Commercial Lawn and Garden**~~	~~Replacement~~	~~0.001~~	~~2,986~~	~~$550~~	~~$1,640,000~~
Total		**~~10.09~~6.8**			**$1,~~318,627,000~~248,923,855**

* Based on active projects with emission reductions in 2037 using the maximum project life allowed per 2017 Carl Moyer Guidelines.

** ~~Annual Average~~Summer Planning-based NOx reductions.

In summary, the NOx emission reductions from the continued implementation of the South Coast AQMD-administered incentive programs are estimated to be ~~10.09~~6.8 tons per day in 2037. This is based on the average funding allocation of $~~205~~200 million per year through 2036. As noted earlier, the NOx reductions are estimated using the maximum project life in the 2017 Carl Moyer Guidelines to quantify prospective SIP credits.

Future Funding Opportunities

Achieving the emission reductions from 2022 AQMP incentive-based control measures for mobile sources will likely require at least $200 million per year. Although the South Coast AQMD currently has received about this level of funding for incentives over the past few years, it is not certain that this level of funding will persist out through 2037. In addition, new funding streams will need to be identified for technology research, design, and development for some source categories in order to achieve 'black box' emission reductions (e.g., for ~~aircraft emissions).~~black box measures for stationary sources). Given the emission reductions needed to attain federal and State ozone air quality standards, additional actions by local, State, and federal government, and other partnerships will be needed to ensure the requisite levels of funding are secured as early as possible and sustained out to 2037. The South Coast AQMD will work with interested stakeholders from the public and private sector to identify and pursue potential new funding opportunities.

Proposed Workplan on Zero Emissions Fueling/Charging Infrastructure

The 2022 AQMP relies on a significant transition to zero emissions technologies across many sectors. Two leading fuels for zero emissions technologies today that have the potential to be adopted at scale by 2037 are electricity and hydrogen. Each of these fuels present unique challenges including production, regional and local distribution, fueling locations, policy approaches, regulatory environment, costs, incentive programs, etc. These challenges require many different levels of government to engage and participate in policy development to ensure that they are appropriately addressed to meet the many goals of the State, including attainment of air quality standards.

Strategies in Proposed South Coast AQMD Workplan for Zero Emissions Fueling / Charging Infrastructure
• *Assess Zero Emission Infrastructure Needs for the South Coast AQMD*
• *Assist in Developing Cost Projections*
• *Assist in Assessing Funding Needs*
• *Identify Targeted Policies and Strategies to Support Zero Emission Vehicle Adoption*
• *Collaborate with Local Utilities*
• *Identify Policy Needs Across Different Sectors*
• *Pursue Equitable and Affordable Solutions*
• *Align Efforts with Other Local, State, and Federal initiatives*

MOB-15 includes a proposed workplan for the South Coast AQMD specifically related to zero emissions fueling and charging infrastructure. The workplan includes broad strategies as well as specific actions that the South Coast AQMD would take to implement those strategies. All actions would require close partnership with many different stakeholders. Potential actions include identifying and carrying out key research needs, targeted advocacy for policy goals with other agencies, developing specific data products for other agencies to use in their assessments, convening stakeholders together to focus on air quality goals as a primary component of zero emissions planning efforts, and potentially including zero emissions fueling and charging infrastructure in proposed rules (e.g., indirect source rules).

Responsible Agencies

Implementation of the control strategies in the 2022 AQMP is not within the control of the South Coast AQMD alone. Instead, meeting the standard will require a cooperative partnership of governmental agencies at the federal, State, regional and local level.

At the federal level, the U.S. EPA, and sometimes other federal agencies, are charged with reducing emissions from federally controlled sources such as aircraft, trains, marine vessels, and other sources. Emissions from sources subject to federal authority are projected to comprise approximately ~~95~~85 tons per day of NOx in 2037. This is just ~~over 50~~approximately 42 percent above the maximum amount of NOx that can remain in the atmosphere and still meet the standard. At that level it will be impossible for the Basin to meet the 2015 8-hour standard regardless of the actions taken by the South Coast AQMD and CARB. Further, regulations to address NOx emissions from these sources have not kept pace with the need for emission reductions, and emissions from many of these sources are projected to increase by 2037 absent further action. It is therefore essential that the federal government start developing the regulatory plan to address federally-regulated sources.

At the State level, CARB is primarily responsible for reducing emissions from motor vehicles and consumer products. CARB has developed a robust regulatory scheme to reduce mobile source emissions subject to State authority and would continue to do so under the ~~Draft~~ 2022 State SIP Strategy. Given that mobile sources comprise over 80 percent of NOx emissions in the basin, continued regulatory action and incentive programs will be key to future attainment.–

At the regional level, SCAG assists sub-regional and local governments in playing a formative role in the air quality elements of transportation planning. In addition, local governments serve an important role in developing and implementing the transportation control measures that are included in the 2022 AQMP. SCAG is responsible for providing the socioeconomic forecast (e.g., population and growth forecasts) upon which the AQMP is based. SCAG also provides assessments for conformity of regionally significant transportation projects with the overall AQMP and is responsible for the adoption of the RTP and the Regional Transportation Improvement Program (RTIP) which include growth assumptions and transportation improvement projects that could have significant air quality impacts, and transportation control measures as required by the CAA.–

At the regional level, the South Coast AQMD is responsible for the overall development and implementation of the AQMP. The South Coast AQMD is specifically authorized to reduce the emissions from stationary point and some area sources such as coatings and industrial solvents. Emission reductions are also sought through funding programs designed to accelerate vehicle turnover and the purchase of cleaner vehicles. In addition, the South Coast AQMD has authority to regulate indirect sources under the California Health and Safety Code Sections 40716 (a)(1) and 40440(b)(3). As a means of achieving further emission reductions, the South Coast AQMD may seek additional authority to regulate sources that have not been completely under the South Coast AQMD's jurisdiction in the past such as marine vessels, consumer products, and other on-road and off-road sources. The South Coast AQMD implements its responsibilities with participation from the regulated community and other stakeholders through an extensive rule development and implementation program. This approach maximizes the input of those parties affected by the proposed rule through consultation meetings, public workshops, and ongoing working groups.

Chapter 5

Future Air Quality

- **Without additional control measures, the South Coast Air Basin (Basin) will be unable to attain the 2015 8-hour ozone standard by the required deadline of 2037.**
- **To attain the standard, NOx emissions need to be reduced to 60.2~~2.8~~ tons per day, which is 67~~71~~ percent lower than the 2037 baseline.**
- **The control strategy discussed in Chapter 4 provides a path to attain the standard by 2037, with a design value at our highest monitoring site of 70.3 ppb.**
- **With the control strategy, all areas of the Basin are projected to attain the standard.**

In This Chapter

Introduction

The primary objective of the 2022 Air Quality Management Plan (AQMP) is to address attainment of the 2015 8-hour ozone standard of 70 parts per billion (ppb). Attainment strategies for the other ozone standards were discussed in the 2016 AQMP.

Air quality modeling to demonstrate future attainment of the ozone standard is an integral part of the planning process to achieve clean air. Modeling provides the means to relate emission reductions to air quality improvements through an attainment demonstration, which is the modeling exercise that shows the path to attainment. It reflects updated emissions estimates, new technical information, enhanced air quality modeling techniques, updated attainment demonstration methodology, and the control strategy.

The South Coast Air Quality Management District (South Coast AQMD)'s goal is to develop an attainment demonstration that: 1) ensures that ambient air quality standards for all criteria pollutants are met by the established deadlines in the federal Clean Air Act (CAA) and 2) achieves an expeditious rate of progress towards attaining the air quality standards. The overall control strategy is designed such that efforts to achieve the standard for one criteria pollutant complements efforts to meet the standards for other pollutants.

Base Design Values

The trend of the South Coast Air Basin (Basin) ozone design values is presented in Figure 5-1. Both 8-hour and 1-hour ozone design values have decreased over the 30-year period, although concentrations have increased in the last few years due to adverse meteorology. The current 8-hour design value, 114 ppb based on 2019-2021 data, continues to exceed the 1997 8-hour ozone standard (80 ppb) by 43 percent, the 2008 ozone standard (75 ppb) by 52 percent, and the 2015 ozone standard (70 ppb) by 63 percent. In addition, the most recent 1-hour design value of 167 ppb exceeds the 1979 1-hour ozone standard (120 ppb) by 39 percent. Refer to Chapter 2 of this report for details.

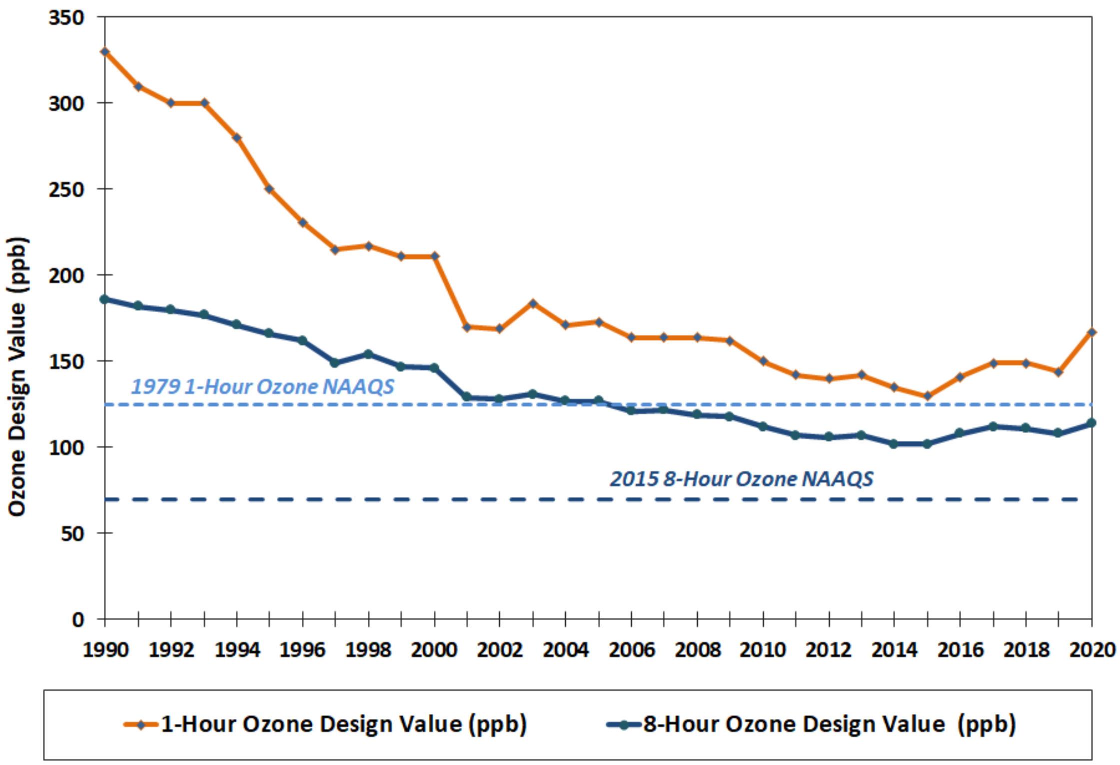

FIGURE 5-1
SOUTH COAST AIR BASIN OZONE DESIGN VALUES
(*EACH 8-HOUR VALUE REPRESENTS THE 3-YEAR AVERAGE OF THE ANNUAL FOURTH HIGHEST 8-HOUR AVERAGE OZONE CONCENTRATION. THE 1-HOUR VALUES REPRESENT THE FOURTH HIGHEST 1-HOUR OZONE OVER A 3-YEAR PERIOD*)

The United States Environmental Protection Agency (U.S. EPA) guidance[1] for attainment demonstrations recommends the use of multiple year averages of design values, where appropriate, to dampen the effects of single year anomalies in the air quality trend due to factors such as adverse or favorable meteorology or radical changes in the local emissions profile. The attainment demonstration therefore employs ~~five~~5-year weighted design values, which were calculated by averaging the U.S. EPA's published design values for 2017, 2018, and 2019. Since each design value represents a ~~three~~3-year average of the fourth highest measured ozone, the ~~five~~5-year design values incorporate measurements between 2015 and 2019. The design values were centered on 2017 to discard the anomalies caused by the effects of COVID on emissions and resulting air quality in 2020. Table 5-1 lists the ~~five~~5-year design values and compares these values to those in the 2016 AQMP, where available. The higher design values in the 2022 AQMP compared

[1] U.S. EPA (2018) Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5, and Regional Haze. Available at: https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf.

to those in the 2016 AQMP reflect the adverse meteorology experienced during the 2015-2019 base design value period.

TABLE 5-1
FIVE-YEAR WEIGHTED DESIGN VALUES IN THE 2016 AND 2022 AQMPs

Station*	2016 AQMP 5-Year Weighted Design Value (ppb)	2022 AQMP 5-Year Weighted Design Value (ppb)
Azusa	79.3	97.6
Banning	95.3	97.0
Crestline	103.0	110.3
Fontana	101.0	98.3
Glendora	92.7	102.3
La Habra	N/A	75.6
Los Angeles	N/A	73.3
Lake Elsinore	85.3	89.0
Mira Loma	92.7	97.3
Mission Viejo	N/A	78.3
Pasadena	N/A	86.3
Perris	91.0	93.0
Pico Rivera	N/A	75.3
Pomona	84.3	91.3
Redlands	104.7	106.3
Reseda	89.0	90.3
Rubidoux	96.3	97.3
San Bernardino	98.0	110.0
Santa Clarita	97.3	99.3
Temecula	N/A	79.6
Upland	96.7	107.0

*Stations having design values greater than 70 ppb and meeting data completeness criteria

Ozone Modeling Approach

The approach used in this AQMP is similar to the approach used in the 2016 AQMP and is consistent with the U.S. EPA guidance (U.S. EPA, 2018).[2] Air quality simulations using the Community Multiscale Air Quality (CMAQ) model were conducted for each hour in the 2018 ozone season (May 1st to September 30th).

Meteorology, Emissions, and Model Configuration

The emissions inventory and meteorological conditions were developed for 2018 as the base year. This differs from the base design value period, which was centered on 2017. The year 2018 was selected as the base year for emissions and meteorology because that was the year of designation of the Basin as an "extreme" non-attainment area. In addition, the Multiple Air Toxics Exposure Study V (MATES V)[3] was conducted during 2018 and involved a comprehensive campaign of monitoring and modeling that allowed for the development of a robust and extensively validated modeling framework.

The 2022 AQMP ozone attainment demonstration framework is an upgrade from the modeling platform used in the 2016 AQMP and more recent SIP revisions. It is built using the U.S. EPA-supported CMAQ (version 5.2.1) modeling platform with Statewide Air Pollution Research Center (SAPRC) 07 chemistry, and the Weather Research and Forecasting Model (WRF) meteorological fields. The modeling platform tracks primary pollutants directly emitted that includes precursors of ozone and particulate matter (PM2.5) and the formation of secondary pollutants like ozone and particles formed from the chemical reactions that occur in the atmosphere. The ozone attainment demonstration focused on the period from May through September. The simulations were conducted over an area with a western boundary over 100 miles west of the Ports of Los Angeles and Long Beach. The eastern boundary extends slightly beyond the Colorado River while the northern and southern boundaries of the domain extend to the San Joaquin Valley and the Northern portions of Mexico, respectively. CMAQ was simulated with a 4-kilometer grid resolution.

For the 2022 AQMP, WRF was updated to the most recent version (4.0.3) available at the time of protocol preparation. The WRF simulations were initialized using National Centers for Environmental Prediction (NCEP) re-analysis data[4] and run for three-day increments with four-dimensional data assimilation (FDDA). Prior to completion of the 2022 AQMP, a more recent version of WRF (4.3) was tested and confirmed to produce similar results as the WRF model employed in this analysis. Details on the meteorological setup and the specific physics options used in the meteorological projections are described in Appendix V.

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[2] https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf.

[3] http://www.aqmd.gov/docs/default-source/planning/mates-v/mates-v-final-report-9-24-21.pdf?sfvrsn=6.

[4] NCEP Reanalysis data provided by the NOAA/OAR/ESRL PSL, Boulder, Colorado, USA, from their Web site at: https://psl.noaa.gov/data/gridded/data.narr.html.

Point source emissions were extracted from the South Coast AQMD's Annual Emissions Reporting Program[5] and allocated to a specific day of a year using temporal allocation factors developed by CARB.[6] On-road mobile source emissions were calculated using CARB's EMFAC2017 emissions model, with vehicle travel activity data provided by Southern California Association of Governments (SCAG). Vehicle emissions accounted for meteorological effects on operational and evaporative emissions (temperature and relative humidity effects) which were derived from daily WRF-derived meteorological variables. In addition, hourly vehicle activity profiles based on the California Department of Transportation (Caltrans) Performance Measurement System (PeMS) were used to refine the temporal variation of vehicle emissions. Spatial and temporal allocation of emissions from area sources and most off-road emissions sources were calculated using the latest update in spatial and temporal surrogates developed by CARB and released in January 2021. In addition, ocean-going vessel emissions were spatially allocated using data from the Automated Identification System (AIS), and aircraft emissions from major airports in the basin were allocated using data derived from the Aircraft Communication Addressing and Reporting System (ACARS). Gridded hourly biogenic emissions were calculated using the Model of Emissions of Gases and Aerosols from Nature version 3.0 (MEGAN3.0), which required meteorological inputs from WRF. Detailed information on the modeling approach, data retrieval, model development and enhancement, model application, emissions inventory development, and interpretation of results is presented in Appendix V.

Ozone Representativeness

Figure 5-2 depicts the observed maximum daily average 8-hour (MDA8) ozone levels Basin-wide and at Crestline and Redlands during the 2018 ozone season. Crestline is depicted as it exhibits the highest base design value and Redlands is shown since it was the site with the highest base design value in the 2016 AQMP. During this period, several well-defined multi-day ozone episodes occurred in the Basin, with 122 days having daily maximum concentrations of 70 ppb or higher. Redlands exhibited the highest ozone design value (104.7 ppb) for 2010-2014, the ~~five~~5-year base design value period in the 2016 AQMP. However, Crestline showed the highest base design value (110.3 ppb) for the ~~five~~5-year period in the current analysis. Stations located in San Bernardino and Riverside counties show similar levels of elevated ozone as Crestline and Redlands, highlighting the influence of similar transport and chemistry patterns.

[5] https://www.aqmd.gov/home/rules-compliance/compliance/annual-emission-reporting.

[6] California Emission Inventory Database and Reporting System (CEIDARS) 2018.

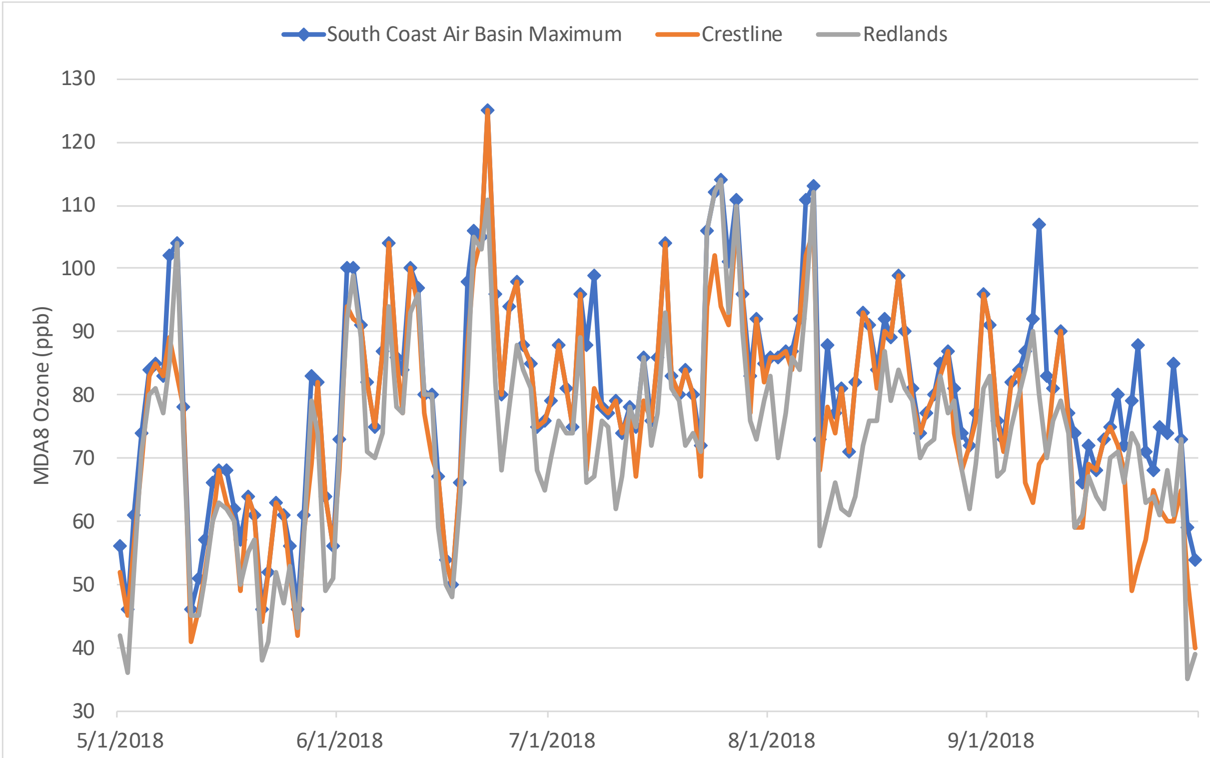


FIGURE 5-2
OBSERVED BASIN, REDLANDS, AND CRESTLINE MAXIMUM DAILY AVERAGE 8-HOUR OZONE CONCENTRATIONS: MAY 1 THROUGH SEPT 30, 2018

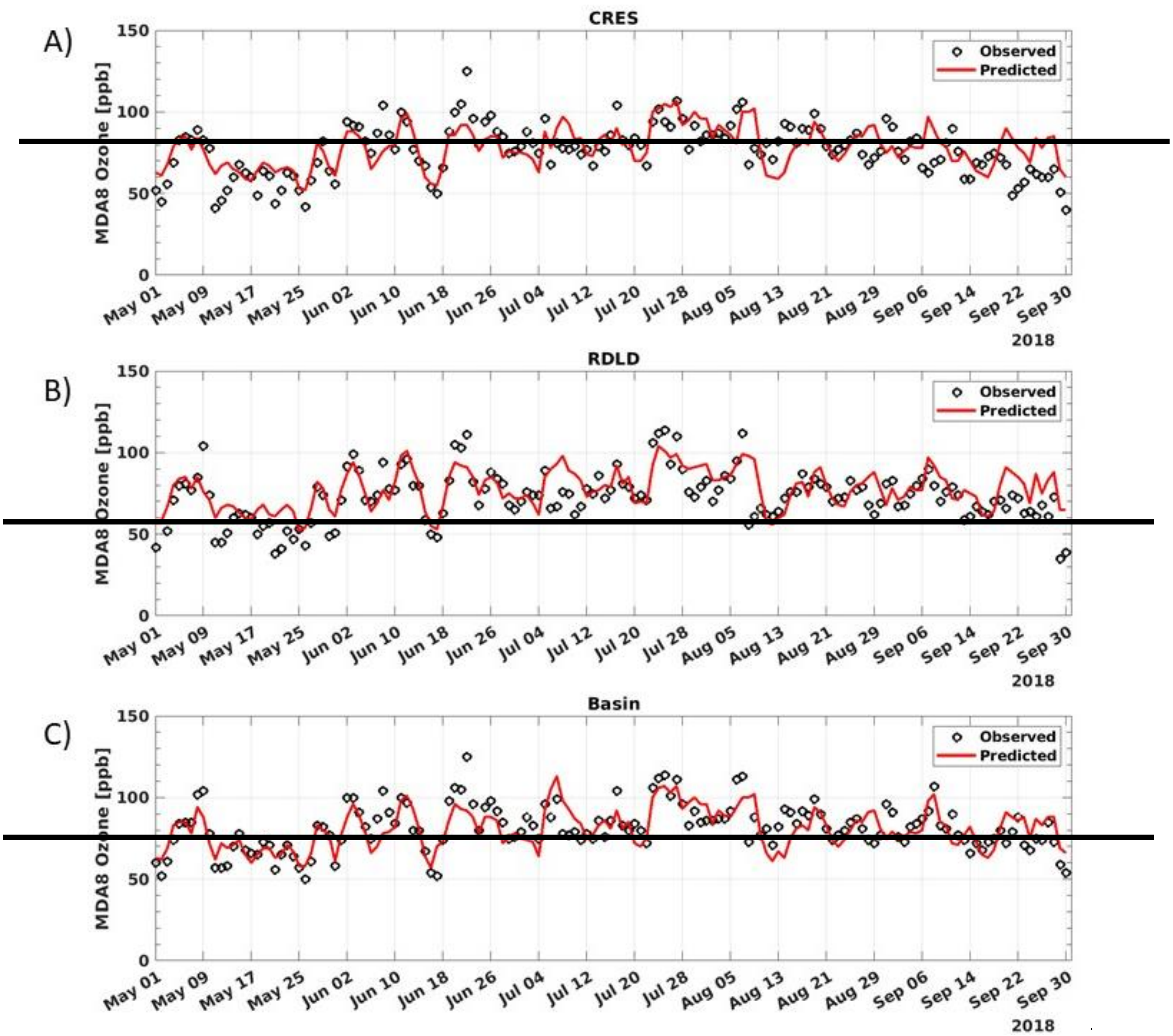
Design Values and Relative Response Factors (RRF)

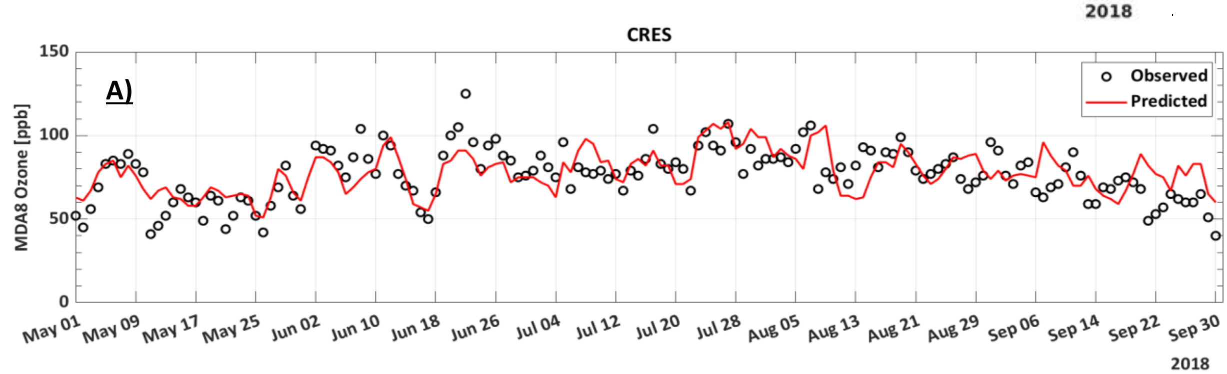
To bridge the gap between air quality model predictions and measurements, the U.S. EPA recommends the use of relative response factors (RRFs). In this approach, future year concentration predictions require two elements: base year design values and RRFs. The RRF is simply a ratio of the future year predicted air quality to the simulated air quality in the base year, representing the model-predicted change in air quality in response to predicted emissions changes. Only the top 10 days were used to calculate the RRF provided that modeled maximum daily average 8-hour ozone exceeded 60 ppb, a requirement satisfied at all monitoring sites in the current analysis. The same top 10 dates in the base corresponded to those in the future year and the maximum modeled value in the 3 by 3 grid surrounding each station is compared to the corresponding grid position in the future year. Future year concentrations are estimated by multiplying the non-dimensional RRF by the base year design value, thus applying the model-predicted change in air quality directly to the measured concentrations in the base year. Assuming any potential modeling biases are similar in the base and future years, the RRF approach acts to minimize their impact on predictions.

Model Performance

The U.S. EPA recommends an operational evaluation to assess how accurately the model predicts observed concentrations. The basis for this recommendation is that if the model can characterize base year ozone, then greater confidence can be placed in the model-prediction of future concentrations.

Figure 5-3 depicts the modeled and measured maximum daily average 8-hour (MDA8) ozone concentrations at Crestline and Redlands during the 2018 ozone season. The Basin maximum ozone concentration is also depicted. These data demonstrate that the model captures high ozone episodes, which suggests reasonable model performance especially for the top 10 days that are used in the RRF. A comprehensive model performance evaluation is presented in Appendix V.





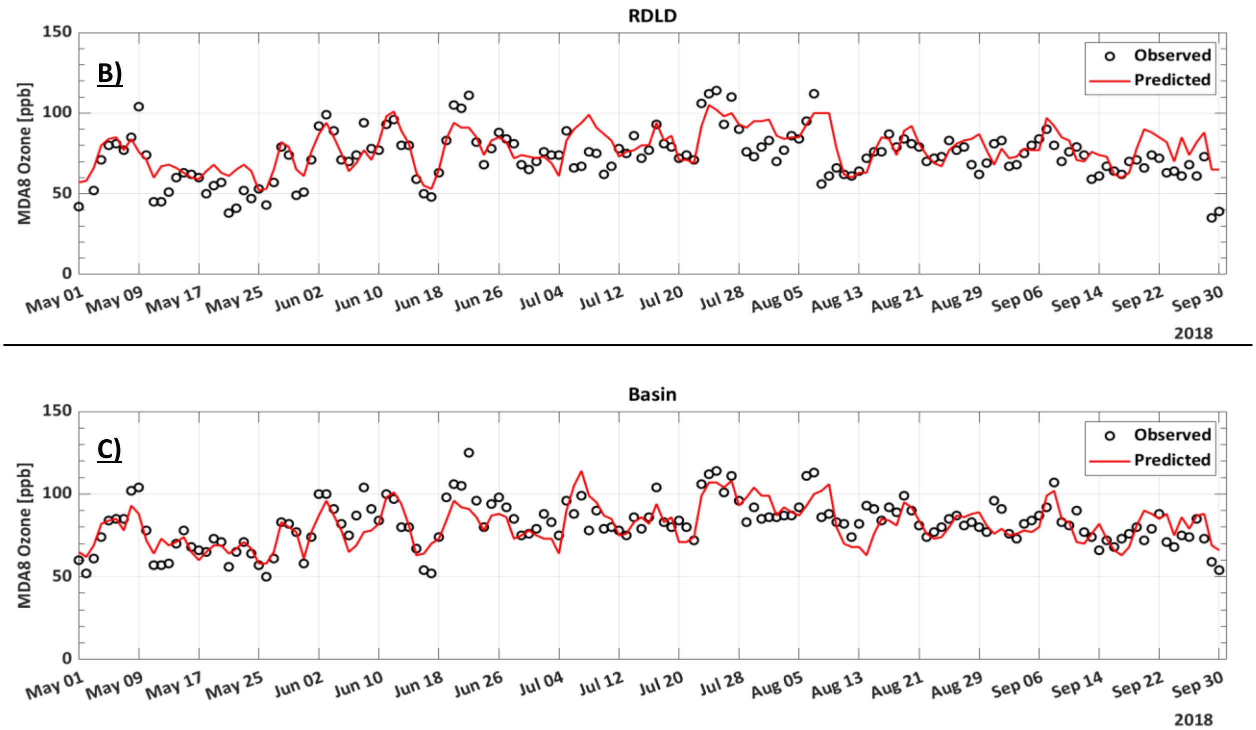


FIGURE 5-3

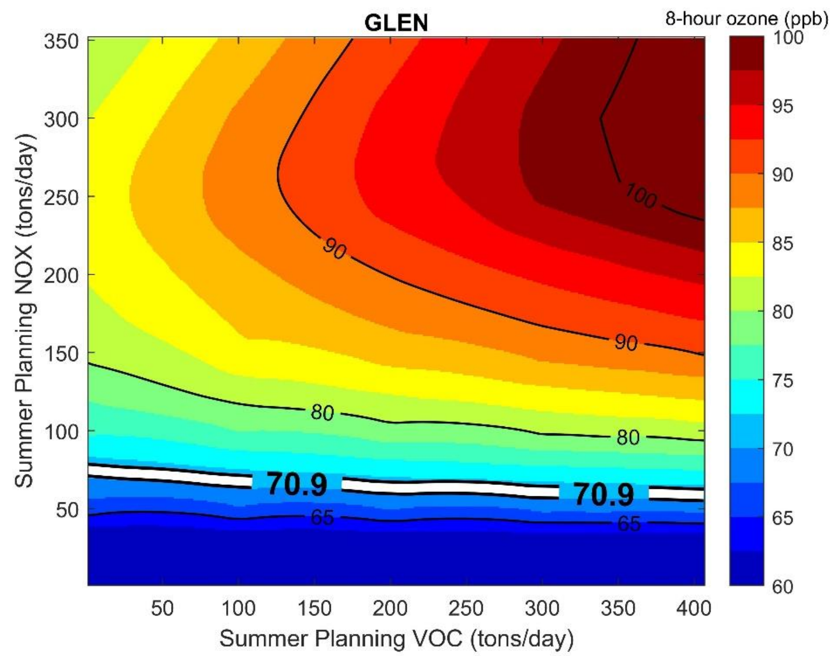
MODELED AND OBSERVED CRESTLINE (A), REDLANDS (B), AND BASIN (C) MAXIMUM DAILY AVERAGE 8-HOUR (MDA8) OZONE CONCENTRATIONS: MAY 1 THROUGH SEPT 30, 2018

Future Ozone Air Quality

Future 8-hour ozone design values, adjusted by the RRF, were estimated for the 2037 baseline and the 2037 control cases. The baseline represents the level of emissions with no additional reductions beyond adopted measures, while the control case contains additional emission reductions proposed in this AQMP to reach attainment. Both the Basin-maximum predicted ozone level (future design value) and spatial distribution of the future ozone levels are presented.

Ozone Isopleths

To estimate the amount of reductions required to meet the standard, a series of ozone simulations with varying VOC and NOx emissions were conducted. The first simulation corresponds to the baseline emissions, while each subsequent simulation incrementally reduces either VOC, NOx, or both. The final simulation contains zero anthropogenic emissions. This results in approximately 48 total ozone season simulations, which require extensive computational resources. The results are then plotted as isopleths for each station and are included in Appendix V Attachment 4. The isopleths approximate the expected ozone design value for a given level of VOC and NOx emissions. Thus, the isopleths can be used to guide the attainment strategy. The isopleth for Glendora (GLEN), the site with the highest predicted design value in the attainment scenario, is depicted in Figure 5-4. The NOx and VOC emissions correspond to the Basin total. Attainment occurs for design values less than or equal to 70.9 ppb, which is denoted by the white contour in the isopleth. With VOC emissions greater than 300 tons per day, the corresponding NOx emissions along the white contour are approximately 60-70 tons per day. The isopleth further demonstrates that VOC reductions alone are insufficient to demonstrate attainment.



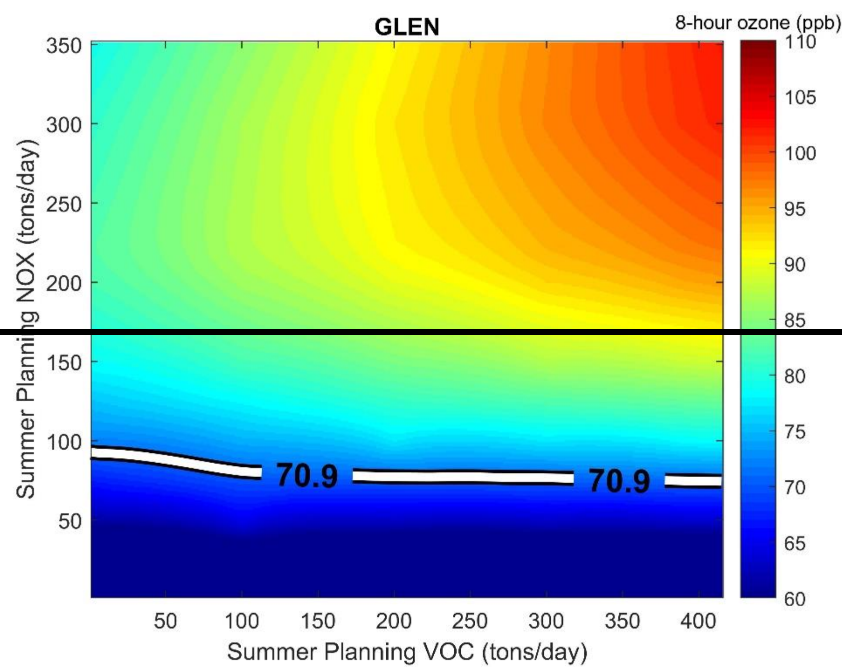


FIGURE 5-4
ISOPLETH FOR GLENDORA DEPICTING BASIN TOTAL NOX AND VOC EMISSIONS AND CORRESPONDING OZONE DESIGN VALUE

8-Hour Ozone Attainment

While the isopleths serve as a useful guide to visualize the pathway to attainment, they only provide a rough estimate of the required NOx reductions. To provide a more accurate estimate, the emissions used in the attainment demonstration are based on implementation of the control strategy, which is based on need, feasibility, affordability, and other factors associated with each source category. This results in a more accurate estimation of the carrying capacity, the maximum allowable NOx emissions to meet the ozone standard.

The 2037 baseline scenario was first explored to determine whether attainment would be achieved through the implementation of adopted regulations and programs. The 2037 baseline (~~220~~184 tons per day) includes ~~127~~167 tons per day of NOx reductions beyond the 2018 baseline (~~347~~351 tons per day). As shown in Table 5-2, Crestline remains the site with the highest design value (~~100.3~~93.4 ppb) in the baseline scenario. In addition to Crestline, multiple~~ other~~ sites also exceed the 2015 8-hour ozone standard. Thus, the baseline scenario fails to demonstrate attainment, indicating that additional emission reductions are necessary to meet the standard.

A series of simulations with category-specific emission reductions were conducted to pinpoint the carrying capacity. Based on these simulations, the carrying capacity is estimated to be ~~62.8~~60.2 tons per day NOx in 2037. This is equivalent to an additional ~~71~~67~~%~~ percent reduction from the 2037 baseline NOx emissions. The attainment scenario reflects the overall ~~71~~67~~%~~ percent reduction and relied on a ~~64~~60~~%~~ percent reduction from all stationary source categories, ~~70~~61~~%~~ percent from on-road mobile, and ~~76~~72~~%~~ percent from other mobile sources. Table 5-3 summarizes the emission reductions reflected in the attainment scenario. The attainment scenario also includes Further Deployment of Cleaner Technologies NOx reductions of 3 tons per day for stationary sources and ~~a 70% reduction for aircraft.~~0.5 tons per day for SIP reserve for potential technology assessments. Detailed descriptions of control measures and expected reductions for each measure are provided in Chapter 4 and Appendix IV. These reductions will ensure attainment of the 2015 federal 8-hour standard in 2037 at all stations, with a maximum design value of 70.3 ppb in Glendora.

TABLE 5-2
MODEL-PREDICTED 8-HOUR OZONE DESIGN VALUES (PPB)

Station	2037 Baseline	2037 Controlled
Azusa	~~94.7~~90.3	~~69.2~~68.8
Banning	~~85~~79.7	~~61.5~~60.6
Crestline	~~100.6~~93.4	~~68.1~~67.0
Fontana	~~90.6~~85.0	~~63.0~~61.9
Glendora	~~98.4~~93.3	70.3
La Habra	~~75~~72.4	~~60.0~~59.2
Los Angeles	~~75.3~~73.5	63.~~2~~4
Lake Elsinore	~~78.5~~72.4	~~58.1~~55.2
Mira Loma	~~89.6~~84.0	~~65.3~~63.8
Mission Viejo	~~77.5~~74.8	61.~~8~~9
Pasadena	~~85.3~~81.8	64.~~9~~6
Perris	~~82.4~~76.0	~~61.6~~57.7
Pico Rivera	~~76.9~~74.2	~~61.5~~60.4
Pomona	~~84.8~~80.6	59.~~6~~3
Redlands	~~95.8~~89.2	~~67.2~~65.3
Reseda	~~85.2~~81.8	64.~~4~~5
Rubidoux	~~88.9~~83.7	~~64~~63.6
San Bernardino	~~99.9~~93.2	~~69.0~~67.3
Santa Clarita	~~90~~85.0	~~65.2~~63.8
Temecula	~~72.7~~69.3	~~60.8~~59.7
Upland	~~98.8~~80.6	~~69.0~~68.1

TABLE 5-3

SUMMARY OF CATEGORY-SPECIFIC NOX EMISSION REDUCTIONS (TONS PER DAY) FROM CARB AND SOUTH COAST CONTROL MEASURES IN THE ATTAINMENT SCENARIO IN ~~2037~~2037[1]

Control Measure	NOx Baseline	NOx Reduction	Category Remaining NOx
South Coast AQMD stationary ~~measures~~measures[1]	~~39~~41.3	~~20.8~~22.4	18.~~5~~9
CARB Passenger Vehicles~~ measures[1]~~/Motorcycle measures	~~13.5~~15.3	5.~~3~~8	~~8.2~~9.5
CARB Medium-Duty Vehicles ~~measures[1]~~measures	~~2.0~~1.4	0.~~4~~0	1.~~6~~4
CARB Heavy-Duty Vehicles ~~measures[1]~~measures	~~45.0~~20.1	~~36.6~~14.5	~~8.4~~5.6
CARB Locomotive ~~measures[1]~~measures	15.4	~~12.8~~10.9	2.7
CARB Ocean Going Vessels (OGV) ~~measures[1]~~measures	~~27.8~~30.7	~~21.7~~24.5	6.~~1~~2
CARB Off-Road Equipment ~~measures[1]~~measures	~~39.5~~23.6	~~24.2~~14.5	~~15.3~~9.1
CARB Commercial Harbor Craft measures	5.~~9~~4	2.~~9~~6	~~3.0~~2.8
CARB Recreational Boast measures	3.3	0.~~2~~3	3.~~1~~0
CARB Aircraft measures	27.9	19.4	8.5
Total CARB and South Coast AQMD Measures	**~~191.7~~184.5**	**~~124~~114.9**	**~~66.9~~69.5**
South Coast AQMD MOB-05 incentive ~~program[2]~~program[3]	N/A	0.1	N/A
South Coast AQMD MOB-11 incentive ~~program[3]~~program[4]	N/A	~~9.9~~6.7	N/A
Further Deployment of Cleaner Technologies (Stationary Sources)	N/A	3	N/A
~~Aircraft[4]~~	~~27.7~~	~~19.4~~	~~8.3~~
Set-Aside Accounts[5]	N/A	-0.5	N/A
Total (All Measures)	**~~219~~184.5**	**~~157.7~~124.3**	**~~62.8~~60.2**

~~[1]The emission reductions do not agree with those in the Draft 2022 State SIP Strategy due to a discrepancy in emissions inventory versions and base year used to forecast future emissions. CARB's mobile source measures reflect reductions from the 2016 and 2022 State Strategy.~~

~~[2]Estimated~~[1] Details of South Coast AQMD stationary measures estimated reduction in 2037 can be found in Table 4.

[2]Count 3.2 tons per day as the combined reduction from CARB and South Coast AQMD measures for Zero Emission building, for South Coast AQMD measures C-CMB-01, C-CMB-02, R-CMB-01 and R-CMB-02, the reduction is 2.87 tons per day. See detail in Chapter 4 Table 4-2.

[3]Estimated reductions from Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles.

~~[3]Estimated~~[4]Estimated reductions from mobile sources with Emission Reductions from Incentive Programs.

~~[4]Assume 70% reductions from aircraft emission baseline in 2037~~ See detail in Chapter 4 Table 4-20.

[5] 0.5 tons per day NOx emission in 2037 for SIP reserve for potential technology assessments, see detail in Appendix III.

Discussion

Between 2018 and 2037, the baseline NOx emissions decline by ~~127~~167 tons per day (tpd), yet the design value will only decrease by ~~10~~17 ppb (~~10~~17 ppb/~~127~~167 tpd = 0.~~08~~10 ppb/tpd). However, the controlled emissions scenario results in an additional ~~157~~124 tons per day of NOx reductions beyond the 2037 baseline which reduces the ozone design value by ~~30~~23 ppb (~~30~~23 ppb/~~157~~124 tpd = 0.19 ppb/tpd). Thus, the rate of ozone decrease in response to an equivalent reduction of NOx is expected to increase by ~~more than~~nearly a factor of two. This is consistent with the expected response based on the Glendora isopleth shown in Figure 5-4~~.~~, the benefit of NOx reductions accelerating as the Basin progresses toward a NOx lean condition. In addition, recent observations of the ozone weekend effect support the increasing importance of continued NOx reductions as the most effective strategy for attainment.

A weekend effect, typically experienced in urban areas, results from reduced NOx emissions on weekends leading to higher ozone and consequently a greater fraction of weekend days exceeding the standard. However, sufficient NOx reductions with concurrent VOC reductions will alleviate the weekend effect and eventually lead to lower ozone levels on weekends compared to weekdays.

Table 5-4 lists the number of weekend days and weekdays exceeding the 2015 8-hour ozone standard during the 2018 ozone season for stations that meet U.S. EPA's data completeness requirement and have design values greater than 70 ppb. Table 5-5 compares the ratio of weekday to weekend exceedance days in 2018 to those in 2012, the base year for the 2016 AQMP. Note that the 2012 analysis counted days exceeding 75 ppb, whereas the 2018 analysis counts days exceeding 70 ppb. The ratio increased in 2018 compared to 2012, indicating that ozone exceedances are increasingly likely on weekdays rather than on weekends. This is evidence that the weekend effect is diminishing and that the Basin is progressing towards NOx-limited ozone formation and will therefore benefit from the NOx control strategy. Overall, ozone responsiveness to NOx reductions as illustrated by the diminishing weekend effect and ozone isopleth provides supplemental evidence that sufficient NOx emission reductions will ensure attainment of the 2015 8-hour ozone standard. Further details on this analysis are presented in Appendix V as part of the weight of evidence discussion.

TABLE 5-4
FIVE-YEAR WEIGHTED DESIGN VALUES AND NUMBER OF DAYS DAILY MAXIMUM CONCENTRATIONS EXCEEDED 70 PPB DURING 2018 OZONE SEASON

Station*	2015-2019 Weighted Design Value (ppb)	Number Of Weekend Days In 2018 With Observed daily max 8-hour Ozone > 70 ppb	Number Of Weekday Days In 2018 With Observed daily max 8-hour Ozone > 70 ppb
Azusa	97.6	17	21
Banning	97.0	14	47
Crestline	110.3	28	72
Fontana	98.3	23	44
Glendora	102.3	18	26
La Habra	75.6	1	3
Los Angeles	73.3	2	2
Lake Elsinore	89.0	4	25
Mira Loma	97.3	14	40
Mission Viejo	78.3	2	4
Pasadena	86.3	9	8
Perris	93.0	16	48
Pico Rivera	75.3	2	3
Pomona	91.3	2	8
Redlands	106.3	23	67
Reseda	90.3	10	32
Rubidoux	97.3	13	37
San Bernardino	110.0	28	67
Santa Clarita	99.3	15	37
Temecula	79.6	5	8
Upland	107.0	17	32

*Stations having design values greater than 70 ppb and meeting data completeness criteria

TABLE 5-5
COMPARISON OF WEEKDAY TO WEEKEND OZONE EXCEEDANCES IN 2012 AND 2018

Station*	2012 Ratio (Weekday:Weekend)	2018 Ratio (Weekday:Weekend)	Change (2018-2012)
Azusa	0.22	1.24	1.01
Banning	2.14	3.36	1.21
Crestline	1.97	2.57	0.60
Fontana	0.86	1.91	1.06
Glendora	0.62	1.44	0.82
Lake Elsinore	1.83	6.25	4.42
Mira Loma	1.21	2.86	1.65
Perris	1.88	3.00	1.12
Pomona	0.42	4.00	3.58
Redlands	1.43	2.91	1.48
Reseda	1.55	3.20	1.65
Rubidoux	1.21	2.85	1.64
San Bernardino	0.97	2.39	1.43
Santa Clarita	1.07	2.47	1.40
Upland	0.96	1.88	0.92

*Only stations included in the 2016 AQMP analysis are presented here

Spatial Projections of 8-Hour Ozone Design Values

The spatial distribution of ozone design values for the 2018 base year is shown in Figure 5-5. Currently, the San Bernardino foothills and mountains are the areas with the highest ozone in the Basin. Projected 8-hour ozone design values for 2037 with and without implementation of all proposed control measures are presented in Figures 5-6 through 5-7. Although many areas experience lower ozone under the 2037 baseline condition, large portions of the eastern Basin remain unhealthy. The predicted ozone concentrations will be significantly reduced in future years in all parts of the Basin with the proposed control measures. The NOx emission reductions listed in Chapter 4 are expected to ensure attainment of the 2015 8-hour ozone standard at every monitoring station in the Basin. An unmonitored area analysis, presented in detail in Appendix V, was conducted to confirm attainment in all areas of the Basin.

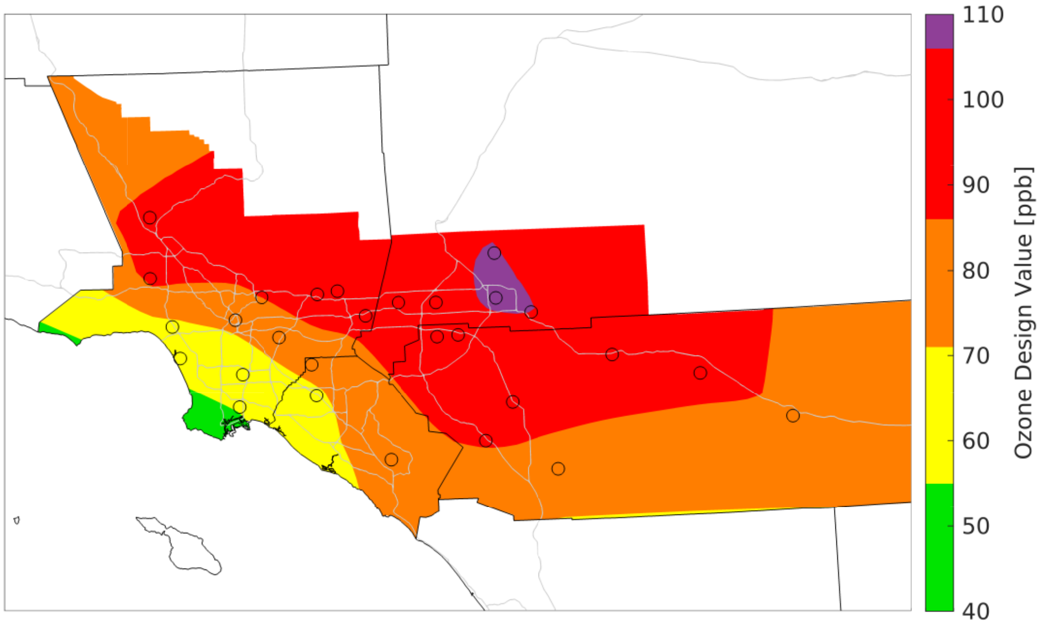
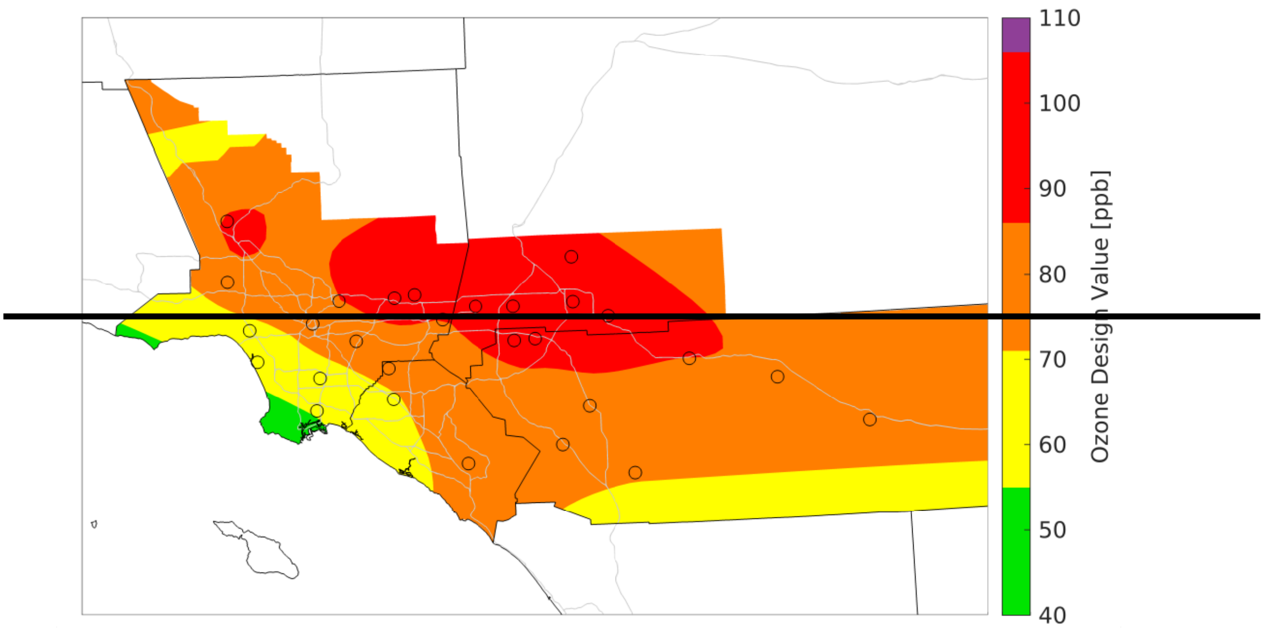


FIGURE 5-5
INTERPOLATED 5-YEAR WEIGHTED 8-HOUR OZONE DESIGN VALUES (PPB) FOR 2018
(VALUES ARE COLOR-CODED TO CORRESPOND TO THE 2015 70 PPB AIR QUALITY INDEX)



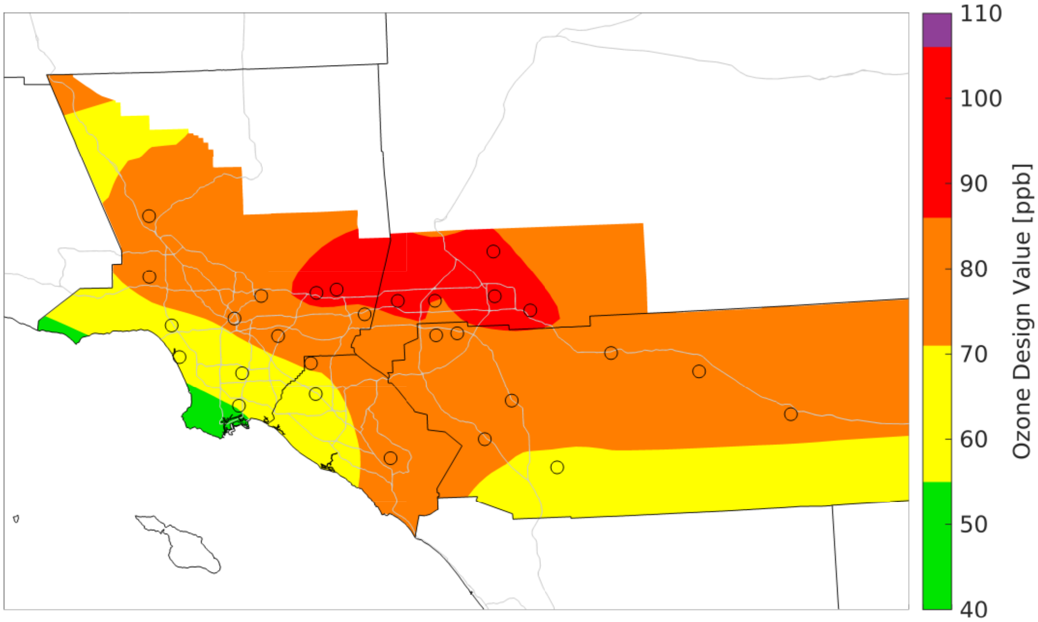
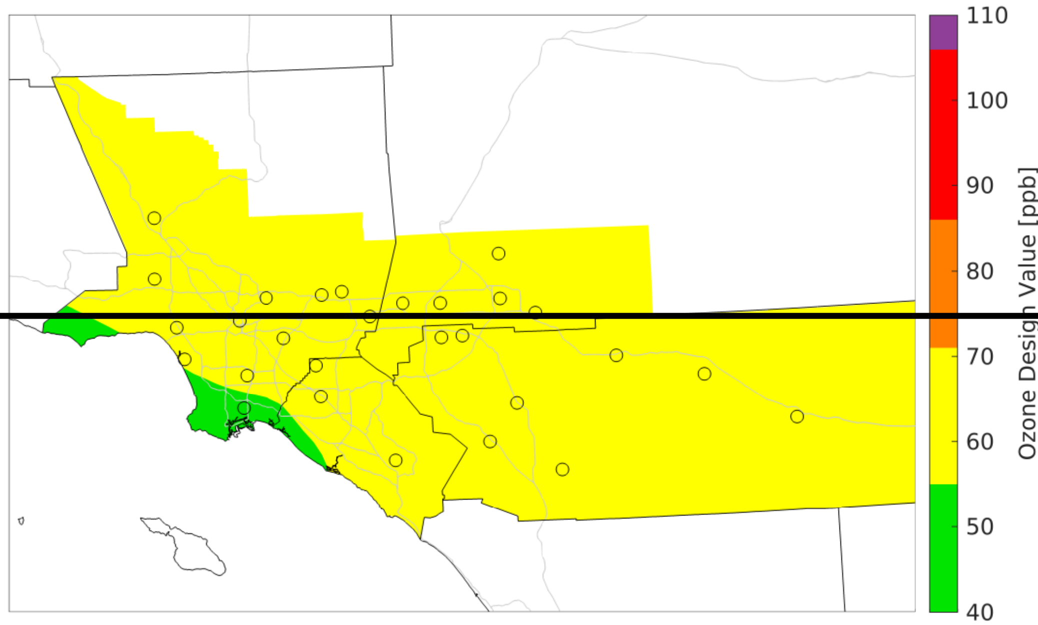


FIGURE 5-6
INTERPOLATED 2037 BASELINE 8-HOUR OZONE CONCENTRATIONS (PPB)
(VALUES ARE COLOR-CODED TO CORRESPOND TO THE 2015 70 PPB AIR QUALITY INDEX)



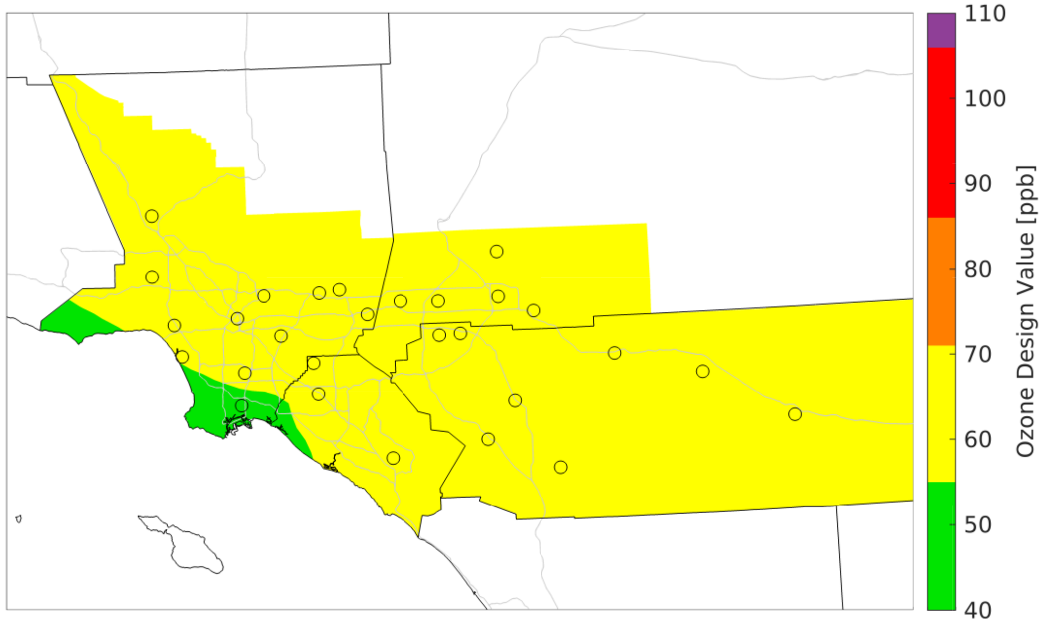


FIGURE 5-7
INTERPOLATED 2037 CONTROLLED 8-HOUR OZONE CONCENTRATIONS (PPB)
(VALUES ARE COLOR-CODED TO CORRESPOND TO THE 2015 70 PPB AIR QUALITY INDEX)

Summary and Conclusions

Figure 5-8 shows the Basin-wide maximum 5-year weighted ozone base design value along with the projected design value for the attainment deadline of the 2015 8-hour federal standard (2037). Approximately ~~157~~124 tons per day of NOx reductions from the 2037 baseline are needed to meet the 8-hour ozone standard in 2037 (see Figure 5-9). This equates to an approximately ~~71~~67~~%~~ percent reduction from the 2037 baseline (see Figure 5-10). With the controls proposed in this AQMP, future ozone concentrations are expected to meet the federal 2015 8-hour ozone standard by 2037.

California Ambient Air Quality Standards (CAAQS) are distinct from NAAQS. The current 8-hour and 1-hour ozone CAAQS are 70 ppb and 90 ppb, respectively. CAAQS are based on designation values, while NAAQS are based on design values. Due to the stringency of the CAAQS designation values, attainment is not anticipated in 2037 for either the 8-hour or 1-hour standard. Further emission reductions and additional time will be required to attain the CAAQS. A detailed analysis is presented in Appendix V.

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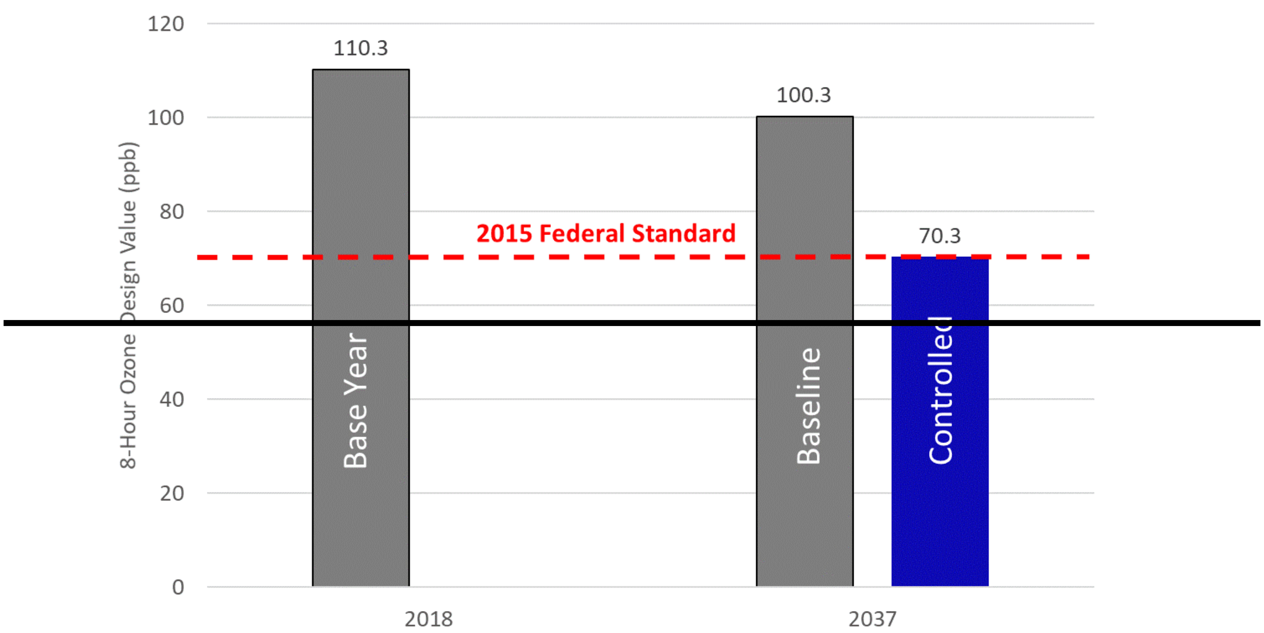

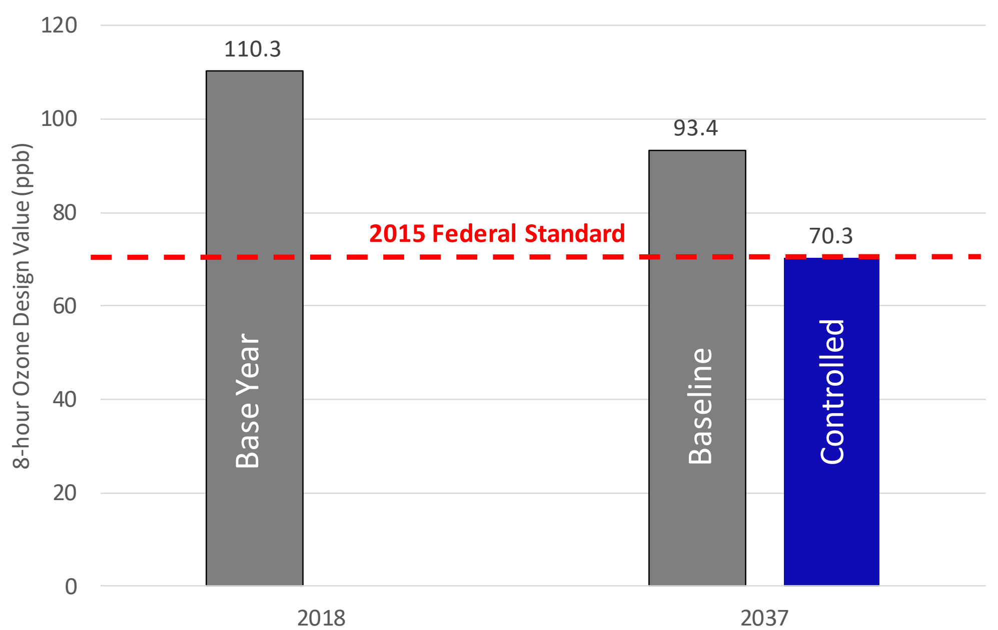

FIGURE 5-8
PROJECTION OF FUTURE 8-HOUR OZONE AIR QUALITY IN THE BASIN IN COMPARISON TO FEDERAL STANDARDS

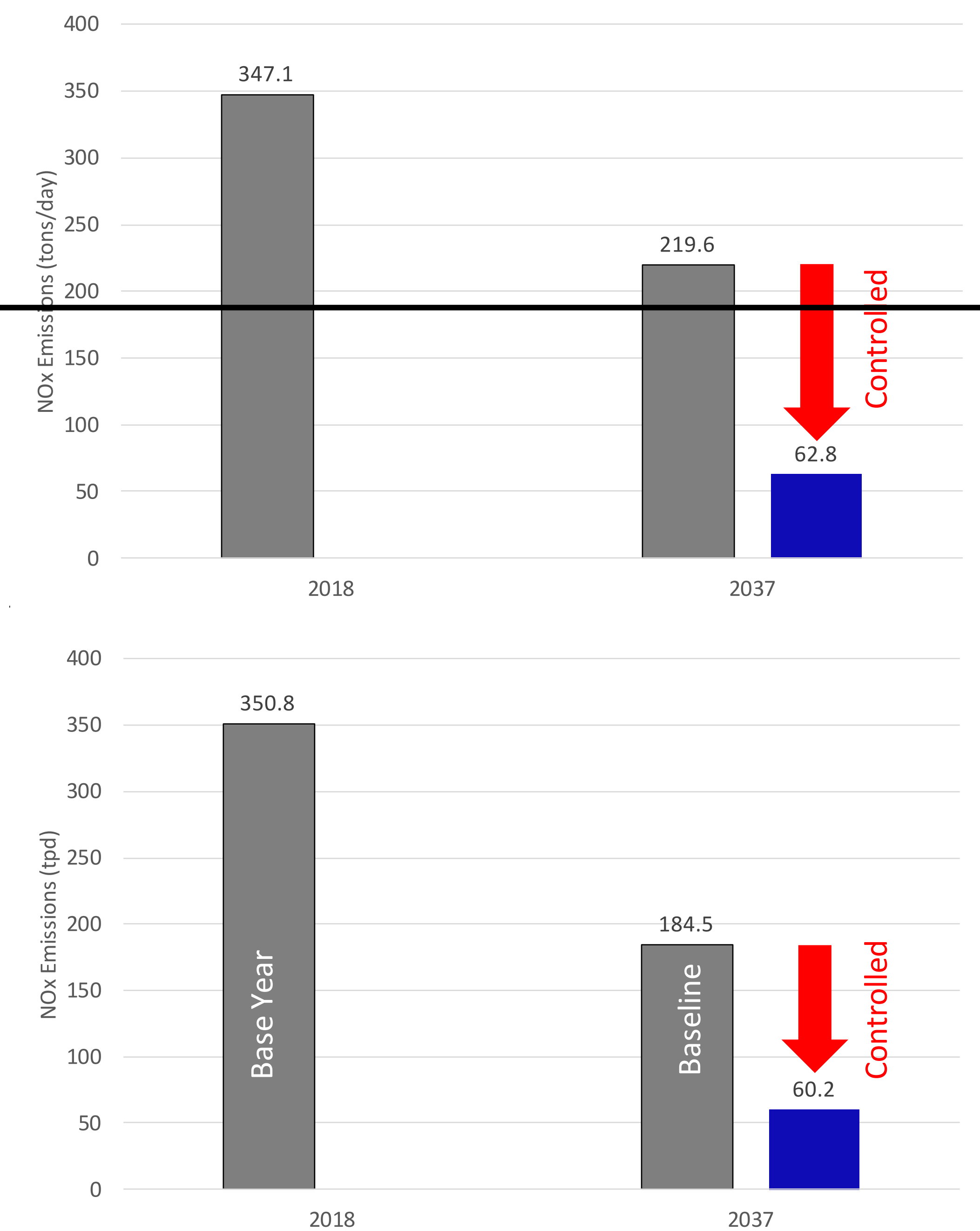

FIGURE 5-9
BASELINE AND FUTURE NOX EMISSION INVENTORIES IN THE BASIN

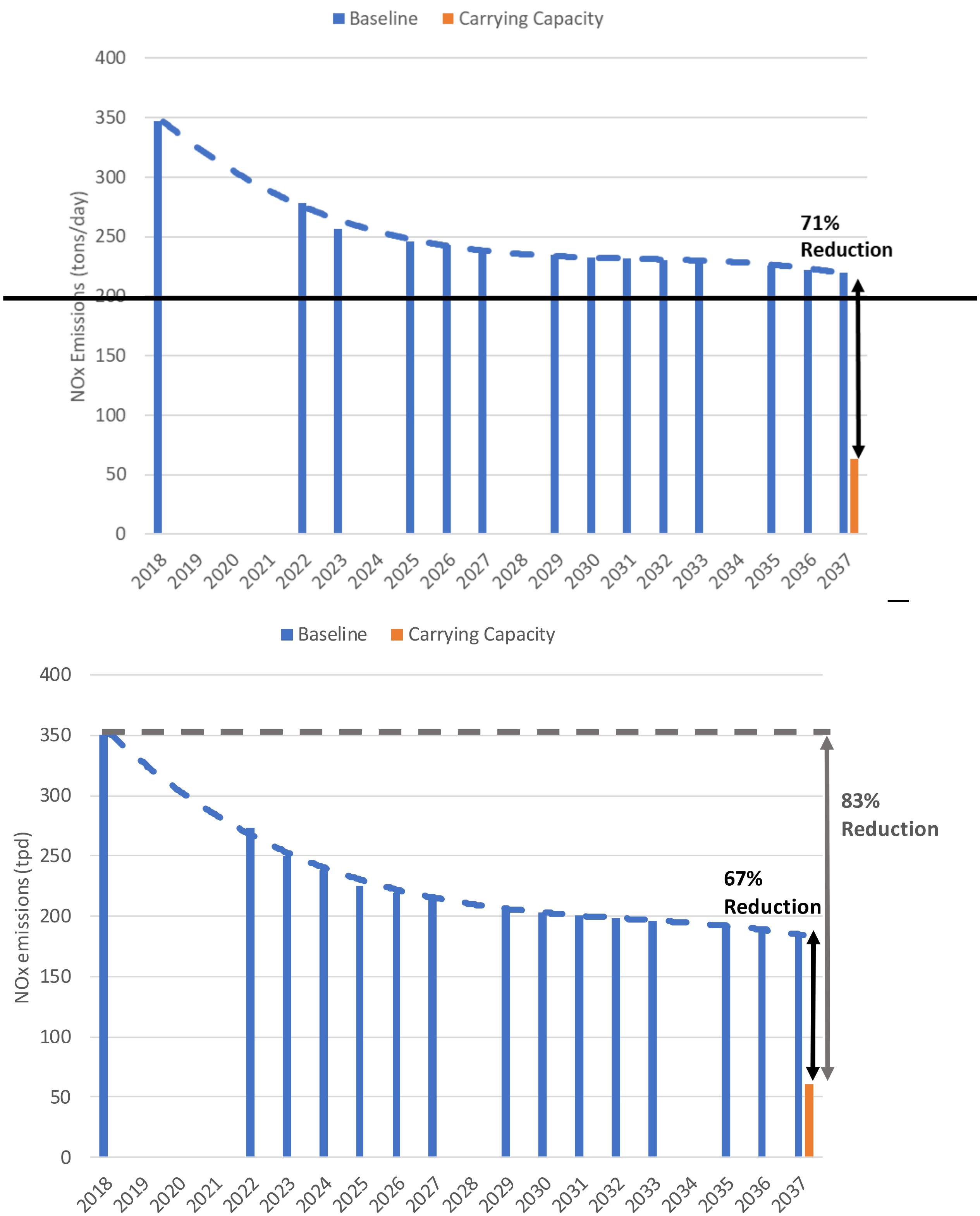

FIGURE 5-10
SUMMER PLANNING BASELINE EMISSIONS AND OZONE CARRYING CAPACITY

Chapter 6

Federal and State Clean Air Act Requirements

- **Both South Coast Air Basin (Basin) and Coachella Valley are required to satisfy several obligations under the federal and State clean air acts for ozone nonattainment areas.**
- **The 2022 AQMP addresses the federal requirements, including the implementation of reasonably available control measures, reasonable further progress, a comprehensive emission inventory, control strategies, contingency measures, general conformity, and vehicle miles traveled.**
- **The 2022 AQMP also addresses state clean air act requirements including plan effectiveness, emission reductions, population exposure, and cost-effectiveness elements.**

In This Chapter

Introduction

The 2022 Air Quality Management Plan (AQMP) is designed to satisfy several requirements under the federal and state clean air acts. While the primary focus of the plan is the strategy to attain the 2015 8-hour ozone national ambient air quality standard (NAAQS), other elements include requirements for the California Clean Air Act (CCAA) triennial update, and the requirement to update transportation emissions budgets based on the latest approved motor vehicle emissions model and planning assumptions. Specific information related to the air quality and planning requirements for portions of the Salton Sea Air Basin (SSAB) under ~~the~~ South Coast Air Quality Management District (South Coast AQMD)'s jurisdiction is~~are~~ discussed in Chapter 7. Upon approval by the South Coast AQMD Governing Board and California Air Resources Board (CARB), the 2022 AQMP will be submitted to the United States Environmental Protection Agency (U.S. EPA) as a revision to the State Implementation Plan (SIP).

In November 1990, Congress enacted a series of amendments to the federal CAA intended to strengthen air pollution control efforts across the nation. One of the primary goals of the 1990 CAA Amendments was to overhaul the planning provisions for those areas not currently meeting the federal standards. The CAA identifies specific emission reduction goals, requires both a demonstration of reasonable further progress (RFP) and attainment. Title I (Air Pollution Prevention and Control) of the CAA contains four parts (Part A through Part D) that provide provisions for air pollution prevention and control. Specifically, Part D describes the Plan requirements for nonattainment areas within six subparts as outlined in Figure 6-1. Subpart 1 describes the general provisions that apply to all applicable criteria pollutants unless superseded by pollutant-specific requirements in Subparts 2 through 5.

There are several sets of general planning requirements in the CAA, both for nonattainment areas (Section 172(c)) and for SIPs in general (Section 110(a)(2)). These requirements are listed and briefly described in Chapter 1. This chapter presents the CAA requirements for the ozone NAAQS and demonstrates how the 2022 AQMP satisfies these requirements.

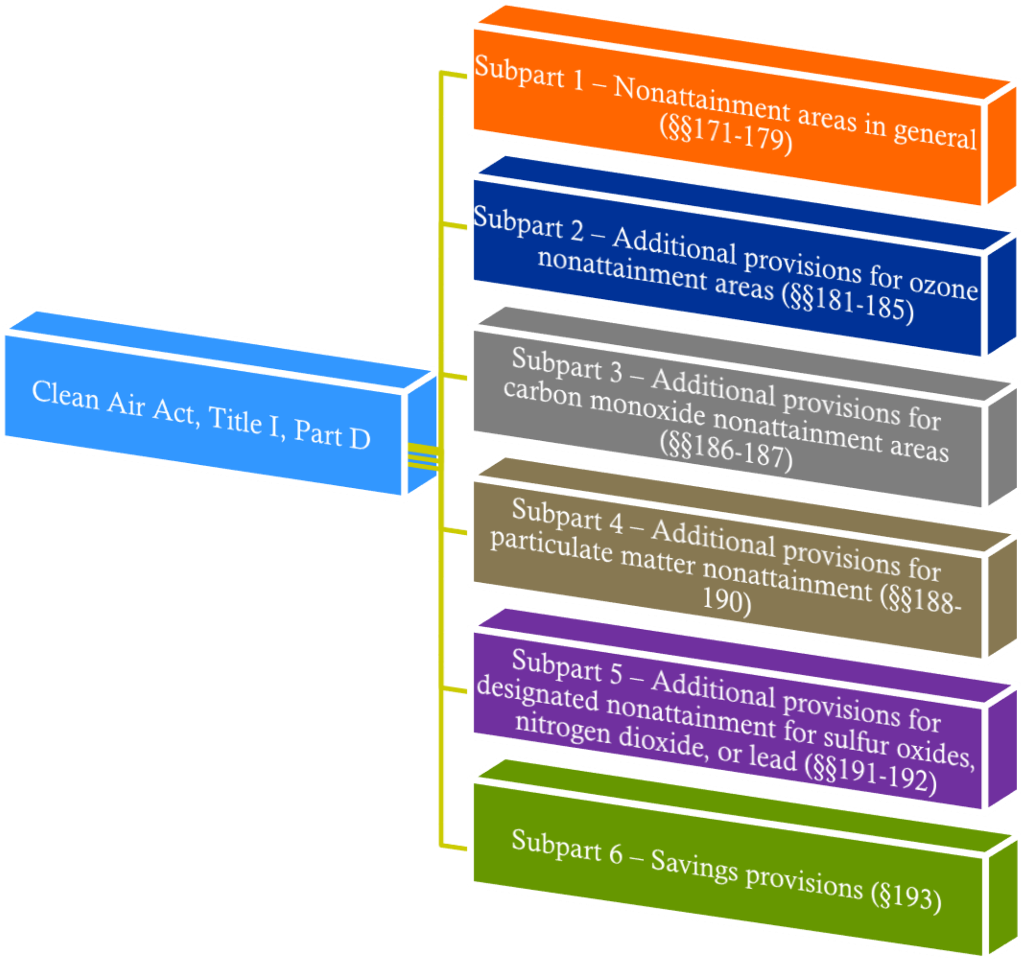

FIGURE 6-1

CLEAN AIR ACT, TITLE I, PART D – PLAN REQUIREMENTS FOR NONATTAINMENT AREAS

Federal Air Quality Standards for Ozone

Background

In 1979, the U.S. EPA established a primary health-based NAAQS for ozone at 120 parts per billion (ppb) averaged over a 1-hour period. Pursuant to the 1990 CAA amendments, the U.S. EPA later classified nonattainment areas on a scale from "marginal" to "extreme," based on the severity of the ozone problem. "Extreme" areas were provided the most time to attain the standard until November 15, 2010, but with more stringent requirements. The Basin was classified as "extreme" nonattainment on November 6, 1991[1] and a 1-hour ozone SIP was submitted in 1994 by ~~the~~ South Coast AQMD and CARB. The U.S. EPA approved the 1-hour ozone SIP for the South Coast in 1997 as well as the CARB revisions to the SIP in 2000. Subsequently, revisions to the 1-hour ozone SIP in 2003 included updated emissions inventories

[1] 56 FR 56694.

along with new commitments to achieve nitrogen oxides (NOx) and volatile organic co~~u~~mpounds (VOCs) reductions.

In 2009, the U.S. EPA approved certain elements of the 2003 SIP but disapproved the attainment demonstration, largely because CARB withdrew emission reduction commitments in 2008 rendering the plan insufficient to demonstrate attainment. The U.S. EPA concluded that consequences[2] for a disapproved plan were initially not triggered because the U.S. EPA determined that the approved SIP already contained an approved 1-hour attainment demonstration meeting CAA requirements, which was all that was necessary regarding the now revoked 1-hour standard.[3] Litigation on this issue resulted in the Court stating in 2012 that “the U.S. EPA should have ordered California to submit a revised attainment plan for the South Coast after it disapproved the 2003 Attainment Plan.”[4] In response to the U.S. EPA “SIP call” that same year, a plan containing a demonstration of attainment of the 1-hour ozone NAAQS was included as part of the 2012 AQMP and approved by the U.S. EPA effective October 3, 2014. The 2016 AQMP provided an updated attainment demonstration with the latest NOx and VOC reduction commitments to ensure the 1-hour ozone NAAQS is met by December 31, 2022. In 2018, an updated attainment demonstration was submitted, with attainment strategy relying only on ~~the~~ South Coast AQMD’s proposed control measures in the 2016 AQMP. The U.S. EPA has approved the 2018 SIP update in 2019.[5]

In July 1997, the U.S. EPA promulgated a more stringent 8-hour ozone standard to replace the 1-hour ozone standard. The 8-hour ozone standard established by the U.S. EPA was challenged, and eventually upheld in March 2002. The 1997 8-hour ozone standard was set at 80 ppb (0.08 parts per million or ppm), calculated as the annual fourth-highest daily maximum 8-hour concentration, averaged over three years. The U.S. EPA finalized Phase 1 of the ozone implementation rule in April 2004. This rule set forth the classifications for nonattainment areas and continued obligations with respect to the existing 1-hour ozone requirements even though the 1-hour ozone standard was revoked. As described by the Phase 1 rule, the Basin was classified as “severe-17” with an attainment date of June 2021, while the portion of the SSAB under ~~the~~ South Coast AQMD’s jurisdiction (Coachella Valley Planning Area) was classified as “serious,” with an attainment date of June 2013. In May 2010, the U.S. EPA granted the State’s request to (1) reclassify the Basin as an “extreme” nonattainment area with an attainment date of 2024 and (2) designate the Coachella Valley as “severe-15” with an attainment date of 2019.[6] As higher ozone levels were experienced throughout California including in Coachella Valley in 2017 and 2018, resulting in levels higher than the 1997 8-hour ozone standard, a request to reclassify the Coachella Valley from “severe-15” to “extreme” nonattainment was submitted to the U.S. EPA in 2019. Effective July 10, 2019, the U.S.

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[2] Consequences include highways sanctions, increased offset ratio (NSR), and a Federal Implementation Plan (FIP) (CAA, Title I, Part D, Subpart 1, Section 179 and Part A, Section 110(c)).

[3] Even though U.S. EPA revoked the standard, the underlying SIP obligations are still in place.

[4] 77 FR 58072.

[5] 84 FR 52005.

[6] 75 FR 24409.

EPA approved the voluntary "bump-up" request[7] and the Coachella Valley is currently an "extreme" nonattainment area for the 1997 8-hour ozone standard with an attainment date of 2024. The federal 1-hour ozone standard was revoked, effective June 15, 2005, but "anti-backsliding" measures,[8] including implementation of an approved attainment plan, remain in effect for areas that have not yet attained these standards.

On March 12, 2008, the U.S. EPA lowered the NAAQS for ground-level ozone to a level of 75 ppb (0.075 ppm) from the previous standard of 80 ppb, set in 1997. The U.S. EPA designated the Basin as "extreme" nonattainment and the Coachella Valley as "severe-15" nonattainment effective July 20, 2012, and pursuant to the CAA Section 181(a)(1), the U.S. EPA requires that all areas with an "extreme" classification meet the 2008 8-hour ozone standard as expeditiously as practicable but no later than 20 years from the effective date of designation, or July 20, 2032 and all areas with an "severe-15" classification meet the 2008 ozone standard by July 20, 2027.[9] It should be noted that since the attainment deadline falls mid-year, emission reductions need to be in place by January 1, 2031 for the Basin and by January 1, 2026 for the Coachella Valley, so that emission reductions can be realized in the full previous calendar of 2031 and 2026, respectively. The 1997 ozone standard was subsequently revoked on April 6, 2015, but as with the revoked 1-hour standard areas are still subject to anti-backsliding provisions.

On October 1, 2015, U.S. EPA revised the NAAQS for ground-level ozone to a level of 70 ppb (0.070 ppm) from the previous standard of 75 ppb, and the Basin is designated as "extreme" nonattainment with an attainment date of August 3, 2038 and the Coachella Valley is designated as "severe" nonattainment with an attainment date of August 3, 2033.[10] The Basin's ozone attainment date is August 3, 2038, which is 20 years from the designation as "extreme" nonattainment areas. U.S. EPA requires all control measures in the attainment demonstration must be implemented no later than the beginning of the attainment year ozone season. U.S. EPA also defines the attainment year ozone season is the ozone season immediately preceding a nonattainment area's maximum attainment date, which is August 3, 2038, therefore, 2037 is the attainment year for the Basin. In December 2018, U.S. EPA finalized the "Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements."[11] This final rule addressed a range of nonattainment area SIP requirements for the 2015 ozone NAAQS, and served as a guideline for the development of the 2022 AQMP. The 2022 AQMP provides the pathway to attain the 2015 8-hour ozone NAAQS by the attainment year of 2037 for the Basin and 2032 for Coachella Valley, respectively. Figure 6-2 summarizes the U.S. EPA's ozone standards to date. Figures 6-3 and 6-4 provides a timeline for the implementation of the ozone standards for the Basin and Coachella Valley, respectively.

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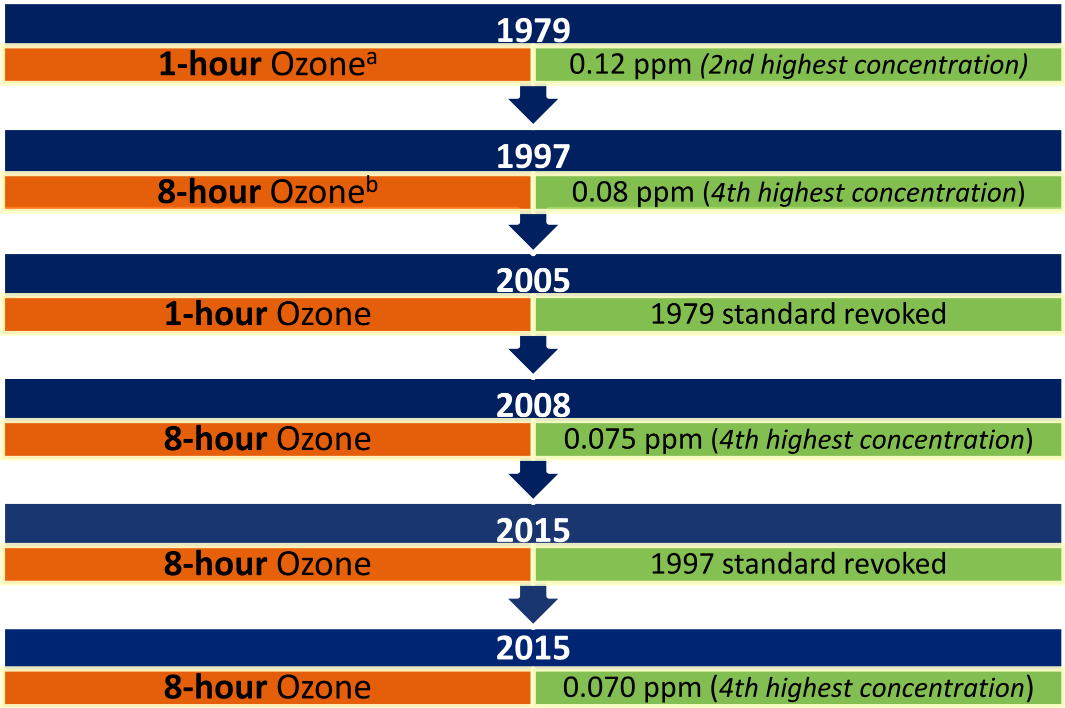
[7] 84 FR 32841.

[8] Section 172(e) of the CAA ("anti-backsliding" provision) requires U.S. EPA to develop regulations to ensure that controls are "not less stringent" than those which applied to areas designated nonattainment prior to relaxing a standard where U.S. EPA has revised a NAAQS to make it less stringent.

[9] 80 FR 12264.

[10] 83 FR 25776.

[11] 83 FR 62998.



[a] 1-hour standard allows three exceedances in three years, so the 4th highest during the three year is compared to the standard

[b] Design value is average of the 4th highest of a year averaged over three years and compared with the standard

FIGURE 6-2
U.S. EPA'S OZONE STANDARDS[12]

[12] The 1997 ozone standard was revoked on April 6, 2015 (80 FR 12264).

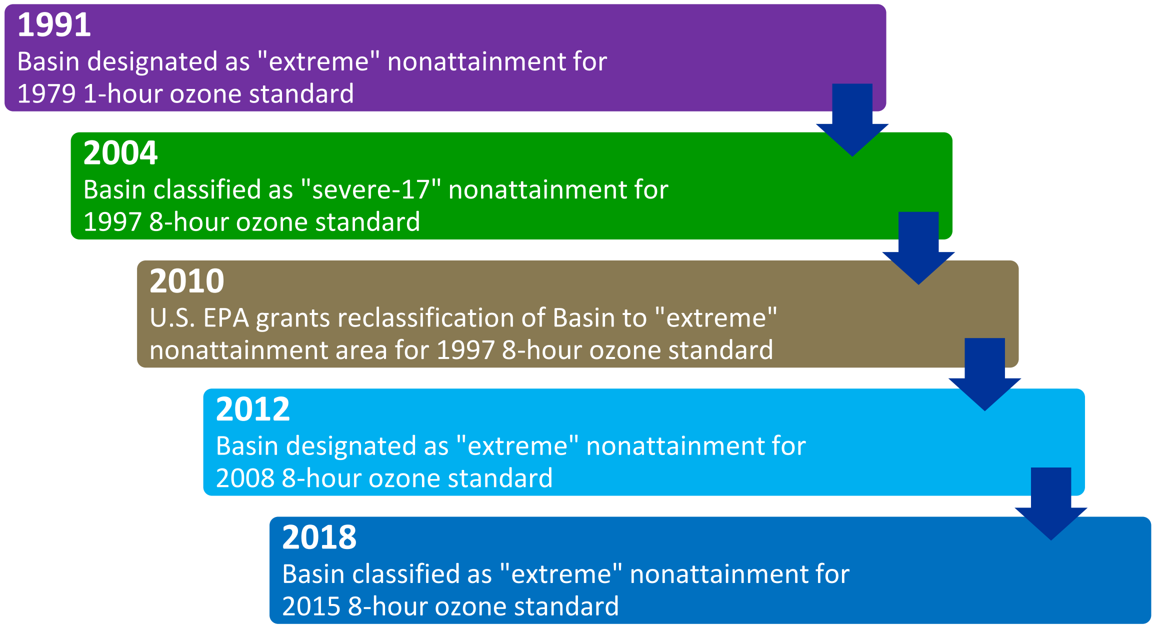


FIGURE 6-3

TIMELINE FOR THE IMPLEMENTATION OF OZONE NAAQS IN THE BASIN

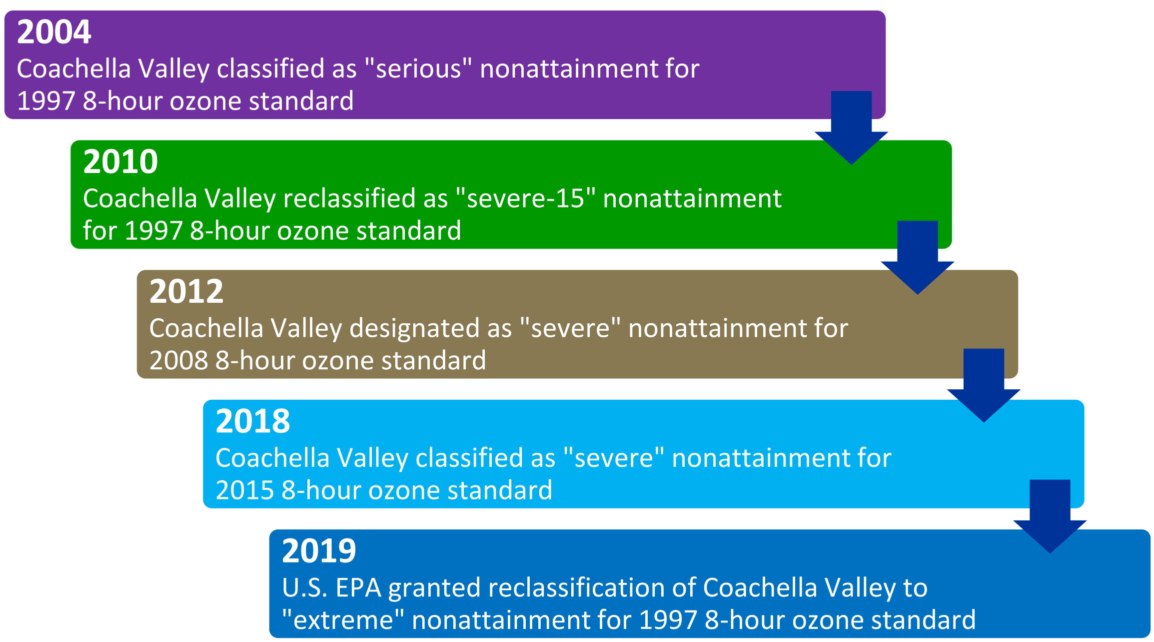


FIGURE 6-4

TIMELINE FOR THE IMPLEMENTATION OF OZONE NAAQS IN THE COACHELLA VALLEY[13]

[13] Coachella Valley attained the 1979 1-hour ozone standard in 2013.

Federal Clean Air Act Requirements for Nonattainment Areas

Subpart 1

For ozone nonattainment areas, such as the South Coast Air Basin, Section 172 of Subpart 1 of the CAA applies. Section 172(c)(1) of the CAA requires nonattainment areas to provide for implementation of all Reasonably Available Control Measures (RACM) as expeditiously as possible, including the adoption of ~~r~~Reasonably A~~a~~vailable C~~c~~ontrol T~~t~~echnology (RACT). Section 172(c)(2) requires that nonattainment areas demonstrate Reasonable Further Progress (RFP). A comprehensive emission inventory is required under Section 172(c)(3). Nonattainment area SIPs must include control strategies (Section 172(c)(6)), RFP (Section 172(c)(2)), and attainment contingency measures (Section 172(c)(9))~~, and provisions for making demonstrations of conformity (Section 176(c))~~. However, according to the U.S. EPA's latest Ozone Implementation Rule released in December 2018,[14] "extreme" nonattainment areas with approved Section 182(e)(5) commitments only have to submit attainment contingency measures three years before the attainment date.

Subpart 2

Subpart 2 provides additional provisions for ozone nonattainment areas. An attainment demonstration is required under Section 182(c)(2)(A) for areas classified as "serious" or above. Areas classified as "severe" or "extreme" nonattainment are required to demonstrate that sufficient transportation control strategies and transportation control measures have been identified to offset growth in emissions due to growth in vehicle miles traveled (VMT) under Section 182(d)(1)(A). Section 182(g) requires that each nonattainment area (other than an area classified as "marginal" or "moderate") achieve specific emission reduction targets in the applicable milestone years.

[14] 83 FR 25776.

TABLE 6-1

FEDERAL CLEAN AIR ACT REQUIREMENTS APPLICABLE FOR 2015 8-HOUR OZONE NAAQS

Requirement	Federal CAA Section	2022 AQMP
Emission Inventory	Subpart 1 §172(c)(3) Subpart 2 182(a)(1)	Chapter 3 & Appendix III[15]
Reasonably Available Control Technology (RACT)	Subpart 1 §172(c)(1) Subpart 2 182(b)(2)	Submitted to the U.S. EPA in 2020[16]
Reasonably Available Control Measures (RACM)	Subpart 1 §172(c)(1) Subpart 2 182(b)(2)	Appendix VI-A
Control Strategy & Other Measures	Subpart 1 §172(c)(6)	Chapter 4, Appendix IV & Appendix VI
Attainment Demonstration	Subpart 2 §182(c)(2)(A) & 182(e)	Chapter 5, Chapter 7 & Appendix V
Reasonable Further Progress (RFP) & Milestones	Subpart 1 §172(c)(2) Subpart 2 §182(c)(2)(B) & §182(g)	Appendix VI-B and Chapter 7
Contingency Measures & Contingency Measures Associated with Areas Utilizing CAA §182(e)(5)	Subpart 1 §172(c)(9) Subpart 2 §182(e)(5)	Chapter 4
~~General Conformity~~	~~Subpart 1 §176(c)~~	~~Appendix VI~~
Transportation Conformity	Subpart 1 §176(c)	Appendix VI-C
Vehicle Miles Traveled (VMT) Offset	Subpart 2 §182(d)(1)(A)	Submitted to the U.S. EPA in 2020[17]

[15] https://ww2.arb.ca.gov/resources/documents/2017-baseline-inventory-and-vehicle-miles-traveled-offset-demonstration-2015-70.

[16] http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2020/2020-Jun5-028.pdf?sfvrsn=8.

[17] https://ww2.arb.ca.gov/resources/documents/2017-baseline-inventory-and-vehicle-miles-traveled-offset-demonstration-2015-70.

TABLE 6-1 (CONTINUED)

FEDERAL CLEAN AIR ACT REQUIREMENTS APPLICABLE FOR 2015 8-HOUR OZONE NAAQS

Requirement	Federal CAA Section	2022 AQMP
New Source Review (NSR)	Subpart 1 §172(c)(5) & §173; §182(e)(1&2)	Submitted to the U.S. EPA in 2021[18]
Emissions Statements	Subpart 2 §182(a)(3)(B)	Submitted to the U.S. EPA in 2020[19]
Vehicle Inspection / Maintenance Programs	Subpart 2 §182(b)(4) & Subpart 2 §182(c)(3)	Appendix IV-B
Clean Fuels Fleet Program	Subpart 2 §182(c)(4)	Submitted to the U.S. EPA in 2022[20]
Clean Fuels for Boilers	Subpart 2 §182(e)(3)	Submitted in 2021[21]
Transportation Control Measures during Heavy Traffic Hours	Subpart 2 §182(e)(4)	Appendix IV-C
Enhanced (Ambient) Monitoring	Subpart 2 §182(c)(1)	2021 Annual Air Quality Monitoring Network Plan,[22] Chapter 2 & Appendix II
Transportation Controls	Subpart 2 §182(c)(5)	Appendix IV-B, Appendix IV-C & Appendix VI
NOx Requirements	Subpart 2 §182(f)	Appendix III, Appendix IV & Appendix VI
Penalty Fee Program Requirements	Subpart 2 §185	Due in 2028;[23] To be determined

Table 6-2 provides the explanation of the different requirements and conclusions as to how the requirements are satisfied.

18 http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-june4-033.pdf?sfvrsn=2.

19 http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2020/2020-Jun5-028.pdf?sfvrsn=8.

20 https://ww2.arb.ca.gov/70ppb-clean-fuels-fleet-certification.

21 http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-june4-033.pdf?sfvrsn=2.

22 http://www.aqmd.gov/home/air-quality/clean-air-plans/monitoring-network-plan.

23 This SIP requirement is due 10 years from the effective date of designation. For the 2015 8-hour ozone standard, the due date is August 3, 2028.

TABLE 6-2

REQUIREMENTS AND COMPLIANCE CONCLUSIONS

Requirement	Clean Air Act Title I Part D Definition	Analysis
Emission Inventory	A comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutants in such area.	Annual average and summer planning emissions for VOCs and NOx from point, area, and mobile sources are provided in Chapter 3 and Appendix III for base year (2018), RFP milestone years and attainment year.[24]
Reasonably Available Control Measures (RACM)	Lowest emissions met with reasonably available (technical and economic feasibility) technology for mobile, area, and point sources, that can collectively advance the attainment date by at least one year. Does not include unenforceable or impractical measures.	Appendix VI-A contains analyses of potential control measures for emission reduction opportunities, as well as economic and technological feasibility. The analyses concluded that ~~the~~ South Coast AQMD's rules and regulations were in general equivalent to, or more stringent than rules and regulations in other areas. For areas where improvements are possible, they are included as plan commitments or have been targeted for further evaluation.
Control Strategy & Other Measures	Further emission reductions achieved from actions such as requiring air pollution control technologies and emission reduction programs.	Chapter 4 and Appendix IV provide the comprehensive control strategy that includes ~~the~~ South Coast AQMD stationary and mobile measures, CARB mobile source and consumer product emission reductions, and required federal actions.
Attainment Demonstration	Apply the proposed control strategy implemented as "expeditiously as practicable" to demonstrate attainment of standards based on photochemical transport modeling pursuant to the U.S. EPA guidance.	Chapter 5 and Appendix V provide the attainment demonstration by the statutory deadline with the implementation of the proposed control strategy.
Reasonable Further Progress (RFP) & Milestones	Annual incremental reductions in emissions of relevant air pollutant(s) generally linear to the attainment year.	As shown in Appendix VI-B, baseline VOC emissions result in a shortfall of RFP, but substitution of baseline NOx reductions makes up the shortfall.

[24] https://ww2.arb.ca.gov/resources/documents/2017-baseline-inventory-and-vehicle-miles-traveled-offset-demonstration-2015-70.

TABLE 6-2 (CONTINUED)

REQUIREMENTS AND COMPLIANCE CONCLUSIONS

Requirement	Clean Air Act Title I Part D Definition	Analysis
Contingency Measures and Contingency Measures Associated with Areas Utilizing CAA §182(e)(5)	Additional measure to be implemented if area fails to meet RFP milestones or attainment date based on one-year's worth of reductions. Must be fully adopted and ready to implement. If relied on §182(e)(5), commitments to develop and adopt contingency measures three years prior to attainment.	Attainment contingency measures rely on §182(e)(5). More details can be found in Chapter 4.
General Conformity	Federal action should not cause or contribute to any new violation of a standard, increase the frequency or severity of any existing violation, or delay the timely attainment of the air quality standards.	General conformity budgets are eliminated and rulemaking will be initiated to develop a process to accommodate projects using mechanisms other than the current set-aside account~~emissions subject to the general conformity requirement will be evaluated on a case-by-case basis~~. More details can be found in control measure ~~Appendix IV~~ EGM-02.
Transportation Conformity	Transportation plans and programs should not cause or contribute to any new violation of a standard, increase the frequency or severity of any existing violation, or delay the timely attainment of the air quality standards.	Motor vehicle emissions budgets have been established for the purpose of ensuring the conformity of transportation plans and programs. The budgets can be found in Appendix VI.
Vehicle Miles Traveled (VMT) Offset	Requires offset of emission increases due to VMT. U.S. EPA allows vehicle technology improvements, motor vehicle fuels, and other transportation-related strategies to offset VMT.	A 2020 SIP submittal demonstrates that emission increases from VMT growth is adequately offset by technology improvements and transportation strategies.
New Source Review (NSR)	A permitting requirement for new and modified major stationary sources.	A 2021 SIP submittal demonstrates South Coast AQMD's NSR program complies with ozone non-attainment requirements.
Emissions Statements	Owner or operator of each stationary source of NOx or VOCs provides statement for classes or categories of sources, showing the actual emissions of NOx and VOCs from that source.	A 2020 SIP submittal demonstrates that South Coast AQMD satisfies this requirement through the approved South Coast AQMD Rule 301 paragraph (e)(2) that requires

		emission reporting from all major stationary sources of NOx and VOCs greater than or equal to four tons per year.

TABLE 6-2 (CONTINUED)

REQUIREMENTS AND COMPLIANCE CONCLUSIONS

Requirement	Clean Air Act Title I Part D Definition	Analysis
Vehicle Inspection/Maintenance (I/M) Program	The I/M regulations establish minimum performance standards for "basic" and "enhanced" I/M programs as well as various testing requirements.	Under California law, the Bureau of Automotive Repair (BAR) is responsible for developing and implementing the smog check program. On July 1, 2010, EPA approved California's inspection and maintenance program as meeting the requirements of the CAA (75 FR 38023). Details about proposed control measure of the smog check program can be found in Appendix IV-B.
Clean Fuels Fleet Program	Under Clean-Fuel Fleet (CFF) program, a specified percentage of vehicles purchased by fleet operators for covered fleets shall be clean-fuel vehicles and shall use clean alternative fuels when operating in the covered area.	CARB submitted its Low Emission Vehicle (LEV) program with enhancements as part of its 1994 ozone SIP on November 15, 1994. EPA approved the substitution of the LEV program for a Clean Fuel Fleet program into the California SIP on August 27, 1999 (64 FR 46849).
Clean Fuels for Boilers	Each new, modified, and existing electric utility and industrial and commercial boiler that emits more than 25 tons per year (tpy) of NOX to either burn as its primary fuel natural gas, methanol, or ethanol (or a comparably low polluting fuel), or use advanced control technology (such as catalytic control technology or other comparably effective control methods).	A 2021 SIP submittal[25] demonstrates South Coast AQMD Rule 1146 and South Coast AQMD NOx RECLAIM program (Rules 2002 and 2004) satisfy the requirements of CAA section 182(e)(3). Under South Coast AQMD Rule 1303, new or modified boiler emitting at least 10 tpy of NOx or VOCs is required to employ Best Available Control Technology, which must be at least as stringent as the Lowest Achievable Emissions Rate (LAER) as defined in CAA section 171(3).
Transportation Control Measures during Heavy Traffic Hours	Provisions establishing traffic control measures applicable during heavy traffic hours to reduce the use of high polluting vehicles or heavy-duty vehicles.	This is optional. Control measures regarding transportation control measure can be found in Appendix IV-C.

[25] http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-june4-033.pdf?sfvrsn=2.

TABLE 6-2 (CONCLUDED)

REQUIREMENTS AND COMPLIANCE CONCLUSIONS

Requirement	Clean Air Act Title I Part D Definition	Analysis
Transportation Controls	Submit a demonstration as to whether current aggregate vehicle mileage, aggregate vehicle emissions, congestion levels, and other relevant parameters are consistent with those used for the area's demonstration of attainment.	Transportation controls can be found in Appendix IV-B and Appendix IV-C. Transportation conformity can be found in Appendix VI.
Enhanced (Ambient) Monitoring	Enhanced monitoring of ozone, oxides of nitrogen, and volatile organic compounds.	The South Coast AQMD's 2021 Annual Air Quality Monitoring Network Plan describes the steps taken to address the requirements of section 182(c)(1). It includes descriptions of the Photochemical Assessment Monitoring stations (PAMS) program. Monitoring data used for attainment demonstration and air quality modeling can be found in Chapter 2 and Appendix II.
NOx Requirements	Major stationary sources of NOx are subject to the provisions in Subpart 2 §182 (c), (d) & (e).	Emission inventory and control strategy for major stationary sources of NOx can be found in Appendix III and Appendix IV, respectively. Other requirements such as RACM~~/BACM~~ demonstration and NSR can be found in Appendix VI.
Penalty Fee Program Requirements	Section 185 requires each major stationary source of VOCs and NOx to pay an annual fee for emissions in excess of 80 percent of the emissions baseline if an area fails to attain the ozone standards by its applicable attainment date.	To be determined

California Clean Air Act Requirements

The Basin is designated as nonattainment with the State ambient air quality standards for PM10, PM2.5 and ozone, while the Coachella Valley is designated as nonattainment with the State air quality standards for PM10 and ozone. The CCAA requires that a plan for attaining the ozone standard be reviewed, and revised as necessary, every three years (Health & Safety Code § 40925).[26] This triennial update requirement will be satisfied in the 2022 AQMP. The CCAA established a number of legal mandates to facilitate achieving health-based state air quality standards at the earliest practicable date. The following CCAA requirements are directed at ozone as described in the remainder of this chapter:

(1) Attainment by the earliest practicable date (Health & Safety Code § 40913);

(2) Reduce each nonattainment pollutant or its precursors at a rate of 5 percent per year, or include all feasible measures and an expeditious adoption schedule (Health & Safety Code § 40914);

(3) Reduce population exposure to "severe" nonattainment pollutants according to a prescribed schedule (Health & Safety Code § 40920(c)); and

(4) Rank control measures by cost-effectiveness (Health & Safety Code § 40922).

Plan Effectiveness

Beginning in 1994 the CCAA requires that ~~the~~ South Coast AQMD assess its progress toward attainment of the State Ambient Air Quality Standards [Health & Safety Code § 40924(b)] and that this assessment be incorporated into ~~the~~ South Coast AQMD's triennial plan revision. To demonstrate the effectiveness of ~~the~~ South Coast AQMD's program, ozone air quality trends since 1991 depicting the California Ambient Air Quality Standards (C~~C~~AAQS) 1-hour and 8-hour ozone designation values are provided for the South Coast Air Basin and the Coachella Valley in Figures 6-5 and 6-6, respectively. NAAQS attainment strategy assists the Coachella Valley to progress toward meeting the CAAQS as shown in Figure 6-6.

In both the South Coast Air Basin and the Coachella Valley, 8-hour and 1-hour ozone State designation values have decreased significantly from values recorded in the 1990s and 2000s, but have remained relatively constant in the past decade.

[26] https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=40925.&lawCode=HSC.

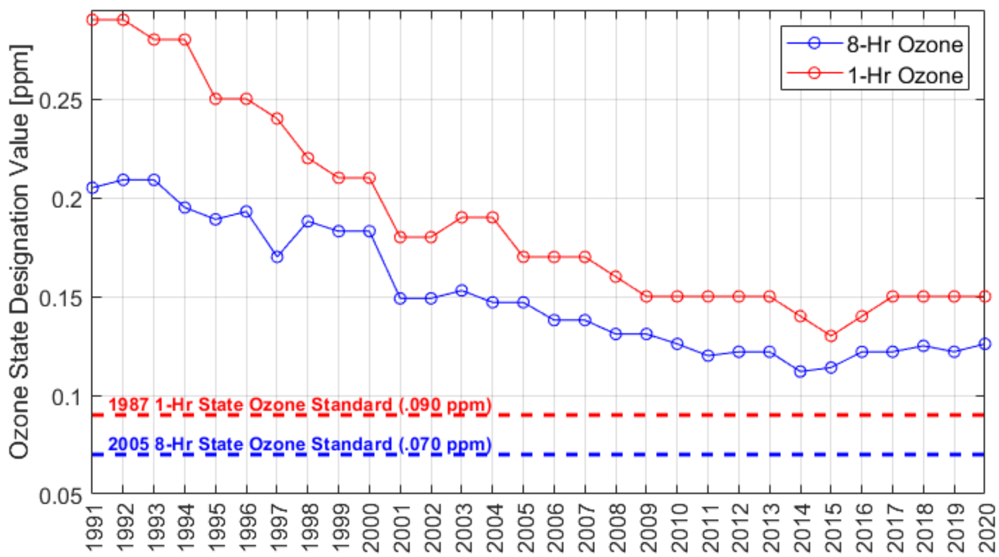


FIGURE 6-5
OZONE STATE DESIGNATION VALUES FOR THE SOUTH COAST AIR BASIN

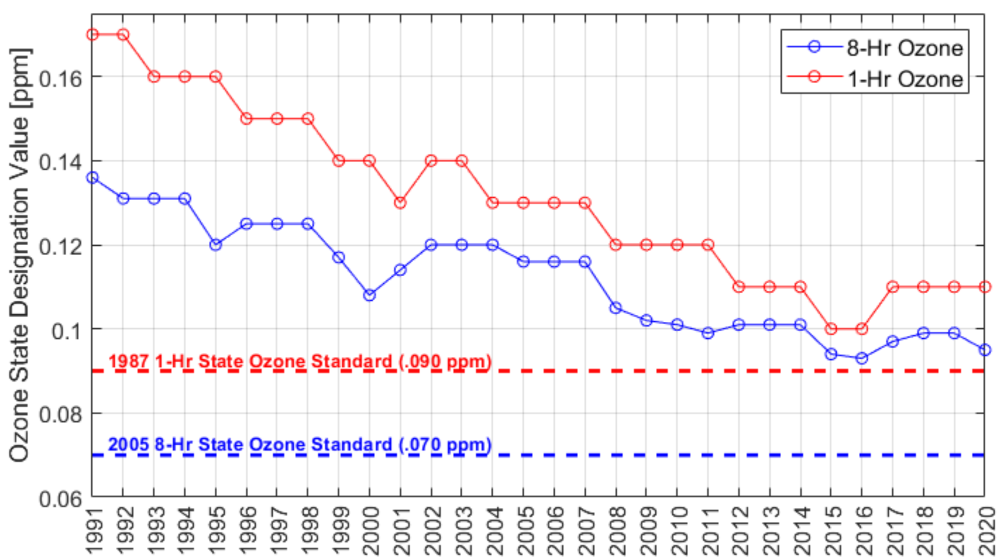


FIGURE 6-6
OZONE STATE DESIGNATION VALUES FOR THE COACHELLA VALLEY

Nitrogen Dioxide (NO_2) and Carbon Monoxide (CO) air quality have also improved substantially since 1990. NO_2 and CO metrics are not shown here since the Basin currently meets all state and federal NO_2 and CO standards. A comprehensive discussion of air quality trends was discussed in Chapter 2 and also can be found in Appendix II – Current Air Quality.

Attainment by the Earliest Practicable Date

~~California Ambient Air Quality Standards (~~CAAQS~~)~~ are distinct from NAAQS. The current 8-hour and 1-hour ozone CAAQS are 70 ppb and 90 ppb, respectively. CAAQS are based on designation values, while NAAQS are based on design values. Due to the stringency of the CAAQS designation values, attainment is not anticipated in 2037 for either the state 8-hour or 1-hour standard. Further emission reductions and additional time will be required to attain the CAAQS. A detailed analysis is presented in Appendix V.

Emission Reductions

The CCAA requires that each district plan be designed to achieve 5 percent or more cumulative emission reductions per year in each separate nonattainment area – the Basin and Coachella Valley – for each covered nonattainment pollutant or its precursors, averaged every consecutive three-year period (Health & Safety Code § 40914). If this cannot be achieved, a plan may instead show that it has implemented all feasible measures as expeditiously as possible (Health & Safety Code § 40914(b)).

The baseline NOx emissions meet the 5 percent averaged every consecutive 3~~three~~ year average reductions up to 2026 (see Appendix III for emission inventory values). As the NOx reduction strategy is being implemented, corresponding VOC emissions are also expected to be reduced. As discussed in the RACM/RACT analysis in Appendix VI, this Plan implements all available feasible measures as expeditiously as possible.

Population Exposure

The CCAA also requires a reduction in overall population exposure to criteria pollutants. Reductions are to be calculated based on per-capita exposure and the severity of the exceedances. For the Basin and Coachella Valley, this provision is applicable to ozone [Health & Safety Code § 40920(c)]. The definition of exposure is the number of persons exposed to a specific pollutant concentration level above the state standard times the number of hours exposed. The per-capita exposure is the population exposure (units of parts per hundred million (pphm)-person-hours) divided by the total population. This requirement for the specific milestone years listed in the CCAA has been shown to have already been satisfied in previous AQMPs.

Cost-Effectiveness Ranking

The CCAA requires that each plan revision include an assessment of the cost-effectiveness of available and proposed control measures and contain a list which ranks the control measures from the most cost-effective to the least cost-effective (Health & Safety Code § 40922). Tables 6-3 and 6-4 provide lists of ~~the~~ South Coast AQMD stationary source and mobile source control measures, respectively, for the 2015 ozone standard ranked by ~~a preliminary analysis of~~ cost-effectiveness presented in the Appendix IV-A of the AQMP and the Socioeconomic Report for the AQMP.~~, and~~ Table 6-5 ranks CARB strategy measures. ~~These preliminary figures will be updated as additional socioeconomic analysis is conducted for the 2022 AQMP.~~ In developing an adoption and implementation schedule for a specific control measure, a district shall consider the relative cost-effectiveness of the measure as well as other factors including, but not limited to, technological feasibility, total emission reduction potential, the rate of reduction, public acceptability, and enforceability (Health & Safety Code § 40922). The ozone control strategy and implementation schedule are provided in Chapter 4.

TABLE 6-3

COST-EFFECTIVENESS RANKING OF STATIONARY SOURCE CONTROL MEASURES FOR OZONE

Measure Number	Description	Dollars/Ton[a,b,c,d,e]	Ranking by Cost-Effectiveness
L-CMB-09	Incineration	$1,500	**1**
L-CMB-01	NOx RECLAIM	$19,000	**2**
CTS-01	Further Emission Reduction from Coatings, Solvents, Adhesives, and Sealants	$27,600	**3**
FUG-01	Improved Leak Detection and Repair	$50,400	**4**
L-CMB-07	Petroleum Refining	$70,000	**5**
L-CMB-10	Miscellaneous Combustion	$84,800	**6**
L-CMB-08	Landfills and POTWs	$126,400	**7**
C-CMB-05	Miscellaneous Small Commercial Combustion Equipment (Non-permitted)	$176,100	**8**
R-CMB-03	Residential Cooking	$217,500	**9**
R-CMB-04	Residential Other Combustion	$357,100	**10**
L-CMB-03	Large Internal Combustion Prime Engines	$606,700	**11**
C-CMB-04	Small Internal Combustion Engines (Non-permitted)	$744,000	**12**
L-CMB-04	Large Internal Combustion Emergency Standby Engines	$1,027,200	**13**
C-CMB-03	Commercial Cooking	$1,116,400	**14**
L-CMB-05	Large Turbines	$1,158,300	**15**
L-CMB-02	Large Boilers and Process Heaters	$2,078,800	**16**
L-CMB-06	Electric Generating Facilities	$2,420,100	**17**
ECC-03	Additional Enhancements In Reducing Existing Residential Building Energy Use	TBD	**18**

TABLE 6-3 (CONTINUED)

COST-EFFECTIVENESS RANKING OF STATIONARY SOURCE CONTROL MEASURES FOR OZONE

Measure Number	Description	Dollars/Ton[a,b,c,d,e]	Ranking by Cost-Effectiveness
FUG-02	Emissions Reductions from Industrial Cooling Towers [VOC]	TBD	**18~~17~~**
FLX-02	Stationary Source VOC Incentives [VOC]	TBD	**18~~17~~**
BIO-01	Assessing Emissions from Urban Vegetation [VOC]	TBD	**18~~17~~**
MCS-01	Application of All Feasible Measures [All Pollutants]	TBD	**18~~17~~**
MCS-02	Wildfire Prevention [NOx, PM]	TBD	**18~~17~~**
ECC-01	Co-Benefits From Existing and Future Greenhouse Gas Programs, Policies, and Incentives [NOx]	N/A	**24~~28~~**
ECC-02	Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures [NOx, VOCs]	N/A	**24~~28~~**
FLX-01	Improved Education and Public Outreach [All Pollutants]	N/A	**24~~28~~**

[a] Where a range exists, the ranking was done based on the high end of the range

[b] TBD – emission reductions and costs to be determined once the inventory and control approach are identified

[c] N/A – emission reductions and costs cannot be quantified due to the nature of the measure (e.g., outreach) or the early stage in development

[d] Emission reductions and costs ~~may be~~ updated ~~as~~ based on additional socioeconomic analysis ~~is~~ conducted for the 2022 AQMP; see Socioeconomic Report for more details.

[~~a~~e] Cost-Effectiveness is determined using the Modified Levelized Cash Flow Method (2021$/ton): annual average amortized costs, divided by annual average emission reductions over the period of 2023-2037.

~~TABLE 6-3~~

~~COST-EFFECTIVENESS RANKING OF STATIONARY SOURCE CONTROL MEASURES FOR OZONE~~

~~Measure Number~~	~~Description~~	~~Dollars/Ton[a, b, c, d]~~	~~Ranking by Cost-Effectiveness~~
~~**L-CMB-09**~~	~~NOx Reductions from Incinerators [NOx]~~	~~$2,500/ton~~	~~**1**~~
~~**L-CMB-01**~~	~~NOx Reductions for RECLAIM Facilities [NOx]~~	~~$11,900/ton~~	~~**2**~~
~~**FUG-01**~~	~~Improved Leak Detection and Repair [VOCs]~~	~~$18,600/ton~~	~~**3**~~

~~**L-CMB-08**~~	~~NOx Emission Reductions from Combustion Equipment at Landfills and Publicly Owned Treatment Works [NOx]~~	~~$20,000/ton~~	~~**4**~~
~~**L-CMB-10**~~	~~NOx Reductions from Miscellaneous Permitted Equipment [NOx]~~	~~$5,600–$49,000/ton~~	~~**5**~~
~~**L-CMB-07**~~	~~Emission Reductions from Petroleum Refineries [NOx]~~	~~$50,300/ton~~	~~**6**~~
~~**C-CMB-02**~~	~~Emissions Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Space Heating [NOx]~~	~~$0–$56,000/ton~~	~~**7**~~
~~**L-CMB-02**~~	~~Reductions from Boilers and Process Heaters (Permitted) [NOx]~~	~~$19,000–$88,000/ton~~	~~**8**~~
~~**C-CMB-01**~~	~~Emissions Reductions from Replacement with Zero Emission or Low NOx Appliances – Commercial Water Heating [NOx]~~	~~$0–$105,000/ton~~	~~**9**~~
~~**C-CMB-05**~~	~~NOx Reductions from Small Miscellaneous Commercial Combustion Equipment (Non-Permitted) [NOx]~~	~~$196,000/ton~~	~~**10**~~
~~**R-CMB-02**~~	~~Emissions Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Space Heating [NOX]~~	~~$0–$200,000/ton~~	~~**11**~~
~~**R-CMB-01**~~	~~Emissions Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Water Heating [NOx]~~	~~$0–$230,000/ton~~	~~**12**~~
~~**C-CMB-03**~~	~~Emissions Reductions from Commercial Cooking Devices [NOx]~~	~~$0–$290,000/ton~~	~~**13**~~
~~**L-CMB-05**~~	~~NOx Emission Reductions from Large Turbines [NOx]~~	~~$368,000/ton~~	~~**14**~~
~~**L-CMB-06**~~	~~NOx Emission Reductions from Electricity Generating Facilities [NOx]~~	~~$722,000/ton~~	~~**15**~~

~~**TABLE 6-3 (CONTINUED)**~~

~~**COST-EFFECTIVENESS RANKING OF STATIONARY SOURCE CONTROL MEASURES FOR OZONE**~~

~~**Measure Number**~~	~~**Description**~~	~~**Dollars/Ton[a, b, c]**~~	~~**Ranking by Cost-Effectiveness**~~
~~**R-CMB-03**~~	~~Emissions Reductions from Residential Cooking Devices [NOx]~~	~~$0–$937,000/ton~~	~~**16**~~

~~**R-CMB-04**~~	~~Emission Reductions from Replacement with Zero Emission or Low NOx Appliances – Residential Other Combustion Sources [NOx]~~	~~TBD~~	~~**17**~~
~~**C-CMB-04**~~	~~Emission Reductions from Small Internal Combustion Engines [NOx]~~	~~TBD~~	~~**17**~~
~~**L-CMB-03**~~	~~NOx Reductions from Permitted Non-Emergency Internal Combustion Engines [NOx]~~	~~TBD~~	~~**17**~~
~~**L-CMB-04**~~	~~Emission Reductions from Emergency Standby Engines [NOx, VOCs]~~	~~TBD~~	~~**17**~~
~~**ECC-03**~~	~~Additional Enhancements In Reducing Existing Residential Building Energy Use [NOx, VOCs]~~	~~TBD~~	~~**17**~~
~~**FUG-02**~~	~~Emissions Reductions from Industrial Cooling Towers [VOCs]~~	~~TBD~~	~~**17**~~
~~**CTS-01**~~	~~Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants [VOCs]~~	~~TBD~~	~~**17**~~
~~**FLX-02**~~	~~Stationary Source VOC Incentives [VOCs]~~	~~TBD~~	~~**17**~~
~~**BIO-01**~~	~~Assessing Emissions from Urban Vegetation [VOCs]~~	~~TBD~~	~~**17**~~
~~**MCS-01**~~	~~Application of All Feasible Measures [All Pollutants]~~	~~TBD~~	~~**17**~~
~~**MCS-02**~~	~~Wildfire Prevention [NOx, PM]~~	~~TBD~~	~~**17**~~
~~**ECC-01**~~	~~Co-Benefits From Existing and Future Greenhouse Gas Programs, Policies, and Incentives [NOx]~~	~~N/A~~	~~**28**~~
~~**ECC-02**~~	~~Co-Benefits from Existing and Future Residential and Commercial Building Energy Efficiency Measures [NOx, VOCs]~~	~~N/A~~	~~**28**~~
~~**FLX-01**~~	~~Improved Education and Public Outreach [All Pollutants]~~	~~N/A~~	~~**28**~~

~~[a] Where a range exists, the ranking was done based on the high end of the range~~

~~[b] TBD – emission reductions and costs to be determined once the inventory and control approach are identified~~

~~[c] N/A – emission reductions and costs cannot be quantified due to the nature of the measure (e.g., outreach) or the early stage in development~~

~~[d] Emission reductions and costs may be updated as additional socioeconomic analysis is conducted for the 2022 AQMP~~

TABLE 6-4

COST-EFFECTIVENESS RANKING OF MOBILE SOURCE CONTROL MEASURES FOR OZONE

Measure Number	Description	Dollars/Ton [a, b,c,d]	Ranking by Cost-Effectiveness
MOB-11	Emission Reductions from Incentive Programs [NOx, PM]	$87,000~~33,000 $500,000/ton [c,d]~~	1
MOB-05	Accelerated Retirement of Older Light-Duty abd Medium Duty Vehicles [NOx, VOCs, CO, PM]	$334,300~~TBD~~	2
MOB-01	Emission Reductions at Commercial Marine Ports [NOx, SOx, PM]	TBD	~~2~~3
MOB-02A	Emission Reductions at New Rail Yards and Intermodal Facilities [NOx, PM]	TBD	~~2~~3
MOB-02B	Emission Reductions at Existing Rail Yards and Intermodal Facilities [NOx, PM]	TBD	~~2~~3
MOB-03	Emission Reductions at Warehouse Distribution Centers [NOx]	TBD	~~2~~3
MOB-04	Emissions Reductions at Commercial Airports [All Pollutants]	TBD	~~2~~3
~~**MOB-05**~~	~~Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles [NOx, VOCs, COPM]~~	~~TBD~~	~~2~~
MOB-06	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	TBD	~~2~~3
MOB-07	On-Road Mobile Source Emission Reduction Credit Generation Program [NOx, PM]	TBD	~~2~~3
MOB-08	Small Off-Road Engine Equipment Exchange Program [NOx, VOCs, ~~CO~~PM]	TBD	~~2~~3
MOB-09	Future Emission Reductions from Passenger Locomotives [NOx, PM]	TBD	~~2~~3
MOB-10	Off-Road Mobile Source Emission Reduction Credit Generation Program [NOx, PM]	TBD	~~2~~3
MOB-12	Pacific Rim Initiative for Maritime Emission Reductions [NOx]	TBD	~~2~~3
MOB-13	Fugitive VOC Emissions from Tanker Vessels [VOCs]	TBD	~~2~~3
MOB-14	Rule 2202- On-Road Motor Vehicle Mitigation Options [NOx, VOCs, CO]	TBD	~~2~~3
MOB-15	Zero Emission Infrastructure for Mobile Sources [All Pollutants]	TBD	~~2~~3
EGM-01	Emission Growth Management from New Development and Redevelopment [All Pollutants]	TBD	~~2~~3
EGM-02	Emission Reductions from Projects Subject to General Conformity Requirements [All Pollutants]	TBD	~~2~~3
EGM-03	Emission Reductions from Clean Construction Policy [All Pollutants]	TBD	~~2~~3

[a] TBD – emission reductions and costs to be determined once the inventory and control approach are identified

[b] Emission reductions and costs may be updated as additional socioeconomic analysis is conducted for the 2022 AQMP

[c] Cost-Effectiveness is determined using the Modified Levelized Cash Flow Method (MLCF) in ~~(~~2021$/ton~~)~~: annual average amortized costs, divided by annual average emission reductions over the period of 2023-2037. Coest-Effectiveness values using the MLCF are consistent with the MLCF values provided in Appendix IV-A. ~~is a weighted average calculated as NOx + VOCs + 20 x PM; Cost-effectiveness varies depending on the programs used to fund individual projects. Cost-effectiveness limits will be mainly based on the latest Carl Moyer Program Guidelines, currently set at $33,000 per weighted ton for~~

~~conventional technology projects; $109,000 per weighted ton for optional advanced technology; $300,000 per weighted ton for school buses; up to $200,000 per weighted ton for on-road optional advanced technology; up to $500,000 per weighted ton for on-road optional zero emission technology~~

[d] Emission reductions and costs will be determined after projects are identified and implemented. See Appendix IV-A for information for specific measures

TABLE 6-5

COST-EFFECTIVENESS RANKING OF CARB MOBILE SOURCE CONTROL MEASURES FOR OZONE

CARB's Measure Description	Dollars/Ton [a,b,c]	Ranking by Cost-Effectiveness [a]
Clean Miles Standard	-$2,590,000	1
Consumer Products Standards	$6,200	2
On-Road Heavy-Duty Vehicle Low- NOx Engine Standards	$8,200	3
Spark-Ignition Marine Engine Standards	$14,200	4
Tier 5 Off-Road Vehicles and Equipment	$30,600	5
Off-Road Equipment Tier 5 Standard for Preempted Engines	$34,300	6
In-Use Locomotive Regulation	$47,600	7
On-Road Motorcycle New Emissions Standards	$51,500	8
Commercial Harbor Craft Amendments	$52,700	9
Transport Refrigeration Unit Regulation Part 2	$77,300	10
Off-Road Equipment Zero- Emission Standards Where Feasible	$77,300	11
Cleaner Fuel and Visit Requirements for Aviation	$84,200	12
Airport Aviation Emissions Cap	$84,200	13
More Stringent NOx and PM Standards for Ocean-Going Vessels	$84,200	14
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	$87,900	15
Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels	$95,900	16
Advanced Clean Fleets Regulation	$194,800	17
Zero- Emissions Trucks Measure	$194,800	18
Zero- Emission Standard for Space and Water Heaters	$496,600	19
Cargo Handling Equipment Amendments	$621,800	20
Address Unlimited Locomotives Remanufacturing ~~Loophole~~	TBD	21
Clean Off-Road Fleet Recognition Program	TBD	21
Enhanced Regional Emission Analysis in State Implementation Plans	TBD	21
Future Measures for Aviation Emissions Reductions	TBD	21

TABLE 6-5 (CONTINUED)

COST-EFFECTIVENESS RANKING OF CARB MOBILE SOURCE CONTROL MEASURES FOR OZONE

CARB's Measure Description	Dollars/Ton [a,b,c]	Ranking by Cost-Effectiveness [a]
Future Measures for Ocean-Going Vessel Emissions Reductions	TBD	21
More Stringent Aviation Engine Standards	TBD	21
More Stringent National Locomotive Emission Standards	TBD	21
Off-Road Zero Emission Targeted Manufacturer Rule	TBD	21
On-Road Heavy-Duty Vehicle Zero Emission Requirements	TBD	21
Pesticides: 1,3-Dichloropropene Health Risk Mitigation	TBD	21
Zero Emission On-Ground Operation Requirements at Airports	TBD	21
Zero Emission Standards for ~~Switch~~ Locomotives	TBD	21

[a] Negative number denotes cost savings

[b] Cost-Effectiveness is determined using the Modified Levelized Cash Flow Method (2021$/ton): annual average amortized costs, divided by annual average emission reductions over the period of 2023-2037.

[c] TBD – emission reductions and costs to be determined once the inventory and control approach are identified

~~**TABLE 6-5**~~

~~**COST-EFFECTIVENESS RANKING OF CARB MOBILE SOURCE CONTROL MEASURES FOR OZONE**~~

~~CARB's Measure Description~~	~~Dollars/Ton [a]~~	~~Ranking by Cost-Effectiveness [a]~~
~~Advanced Clean Fleets Regulation~~	~~TBD[a]~~	~~N/A~~
~~Zero Emissions Trucks Measure~~	~~TBD[a]~~	~~N/A~~
~~On-Road Motorcycle New Emissions Standards~~	~~TBD[a]~~	~~N/A~~
~~Clean Miles Standard~~	~~TBD[a]~~	~~N/A~~
~~Tier 5 Off-Road Vehicles and Equipment~~	~~TBD[a]~~	~~N/A~~
~~Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation~~	~~TBD[a]~~	~~N/A~~
~~Transport Refrigeration Unit Regulation~~	~~TBD[a]~~	~~N/A~~
~~Commercial Harbor Craft Amendments~~	~~TBD[a]~~	~~N/A~~
~~Cargo Handling Equipment Amendments~~	~~TBD[a]~~	~~N/A~~
~~Off-Road Zero Emission Targeted Manufacturer Rule~~	~~TBD[a]~~	~~N/A~~
~~Clean Off-Road Fleet Recognition Program~~	~~TBD[a]~~	~~N/A~~
~~Spark-Ignition Marine Engine Standards~~	~~TBD[a]~~	~~N/A~~
~~Consumer Products Standards~~	~~TBD[a]~~	~~N/A~~
~~Zero Emission Standard for Space and Water Heaters~~	~~TBD[a]~~	~~N/A~~

~~Enhanced Regional Emission Analysis in State Implementation Plans~~	~~TBD[a]~~	~~N/A~~
~~In-Use Locomotive Regulation~~	~~TBD[a]~~	~~N/A~~
~~Future Measures for Aviation Emission Reductions~~	~~TBD[a]~~	~~N/A~~
~~Future Measures for Ocean-Going Vessel Emissions Reductions~~	~~TBD[a]~~	~~N/A~~
~~On-Road Heavy-Duty Vehicle Low NOx Engine Standards~~	~~TBD[a]~~	~~N/A~~
~~On-Road Heavy-Duty Vehicle Zero Emission Requirements~~	~~TBD[a]~~	~~N/A~~
~~Off-Road Equipment Tier 5 Standard for Preempted Engines~~	~~TBD[a]~~	~~N/A~~
~~Off-Road Equipment Zero Emission Standards Where Feasible~~	~~TBD[a]~~	~~N/A~~
~~More Stringent Aviation Engine Standards~~	~~TBD[a]~~	~~N/A~~
~~Cleaner Fuel and Visit Requirements for Aviation~~	~~TBD[a]~~	~~N/A~~
~~Zero Emission On-Ground Operation Requirements at Airports~~	~~TBD[a]~~	~~N/A~~
~~More Stringent National Locomotive Emission Standards~~	~~TBD[a]~~	~~N/A~~
~~Zero Emission Standards for Switch Locomotives~~	~~TBD[a]~~	~~N/A~~
~~Address Locomotives Remanufacturing Loophole~~	~~TBD[a]~~	~~N/A~~
~~More Stringent NOx and PM Standards for Ocean-Going Vessels~~	~~TBD[a]~~	~~N/A~~
~~Cleaner Fuel and Vessel Requirements for Ocean-Going Vessels~~	~~TBD[a]~~	~~N/A~~

~~[a] To be updated~~

Conclusion

As provided in Table 6-2, all federal CAA requirements are addressed and demonstrated in the 2022 AQMP with the exception of RFP contingency measures, which will be developed in a par~~e~~allel process. Many of the details showing compliance are provided in Appendix VI of this Plan and are listed in both Tables 6-1 and 6-2.

Chapter 7

Current and Future Air Quality – Desert Nonattainment Areas SIP

- **Coachella Valley has seen a substantial reduction in ozone levels over the past several decades, but does not yet meet federal 8-hour ozone standards.**
- **Coachella Valley is currently classified as a "severe" ozone nonattainment area for the 2015 ozone standard and is required to meet that standard by 2032.**
- **The bulk of the emissions causing high ozone in the Coachella Valley are coming from the South Coast Air Basin.**
- **We project that the Coachella Valley will not attain the 2015 8-hour ozone standard by 2032 without additional control measures.**
- **South Coast AQMD is requesting to reclassify the Coachella Valley as "extreme" non-attainment area with 2037 as the attainment year.**
- **The Coachella Valley is projected to attain the federal 8-hour ozone standards in 2037 with the implementation of the control measures proposed in this AQMP.**

In This Chapter

Introduction

The Coachella Valley Planning Area (Coachella Valley) is defined as the desert portion of Riverside County in the Salton Sea Air Basin (SSAB) and is part of the South Coast Air Quality Management District (South Coast AQMD) jurisdiction. The Coachella Valley is the most populated area in this desert region, which encompasses several communities, including Palm Springs, Desert Hot Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, Coachella, Thermal, and Mecca. Figure 7-1 provides a map of the area and the surrounding topography.

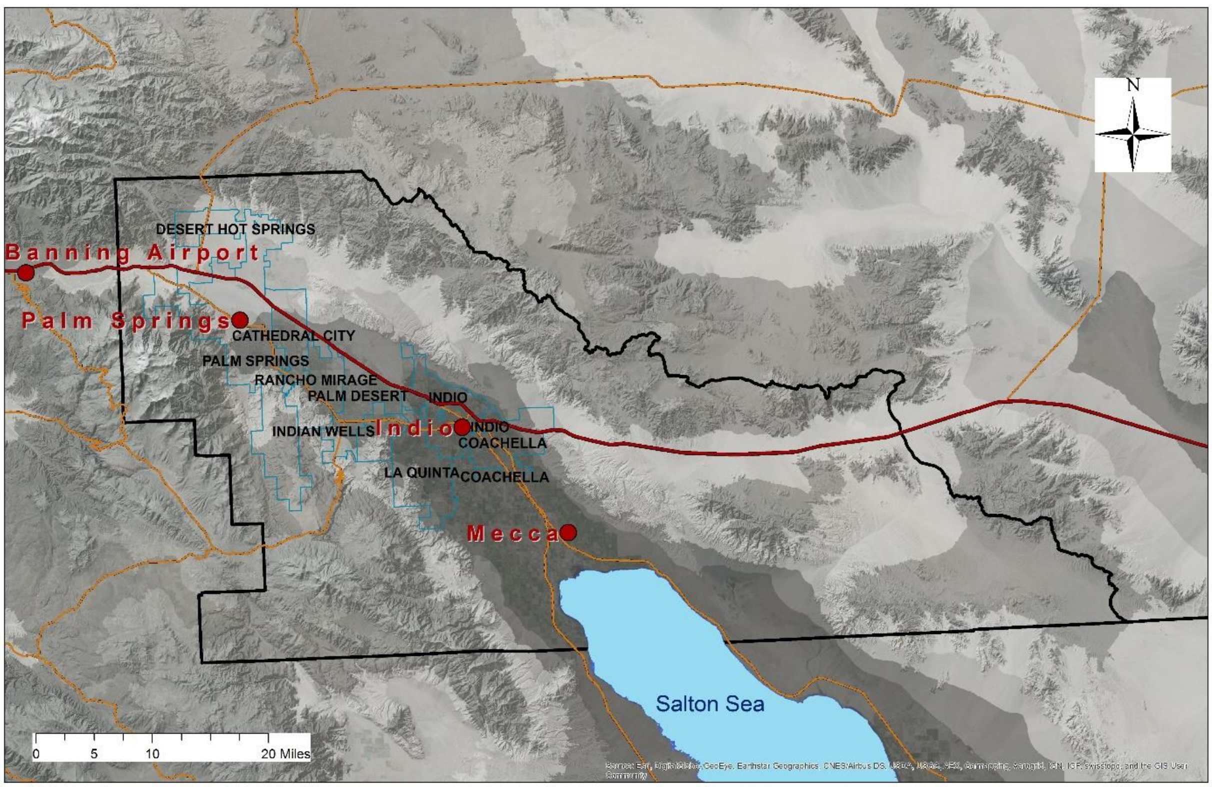


FIGURE 7-1

LOCATION AND TOPOGRAPHY OF THE COACHELLA VALLEY PLANNING AREA

(THE SAN GORGONIO PASS (AKA BANNING PASS) IS THE WEST-EAST PASS BETWEEN THE MOUNTAINS NEAR THE BANNING AIRPORT AIR MONITORING STATION THAT LEADS FROM THE SOUTH COAST AIR BASIN INTO THE COACHELLA VALLEY. THE SOUTH COAST AQMD AIR MONITORING STATIONS AT PALM SPRINGS, INDIO, AND MECCA ARE SHOWN WITHIN THE COACHELLA VALLEY BOUNDARY.)

Similar to the South Coast Air Basin (Basin), the Coachella Valley is a growing area, as shown by the historic and projected populations presented in Table 7-1. By 2045, the population in the Coachella Valley is projected to increase by 48 percent over 2018 levels. On a percentage basis, the Coachella Valley growth is expected to exceed that of the Basin for that time period (48 percent versus 16 percent). This population growth is taken into account in the emission projections for future years, which are used to demonstrate attainment of the air quality standards.

TABLE 7-1

HISTORIC AND PROJECTED POPULATIONS FOR SOUTH COAST AIR BASIN AND COACHELLA VALLEY

Area	Historic Population			Projected Population			
	1990	2000	2010	2018	2030	2035	2045
South Coast Air Basin	13,083,594	14,640,692	15,735,186	16,671,807	17,984,614	18,470,403	19,264,860
Coachella Valley	244,070	325,937	425,404	471,012	568,622	613,096	698,607

Source: Historic populations from Southern California Association of Governments, January 2016 CARB 2013 Almanac of Emissions and Air Quality, 2013 Edition, Appendix C;[1] Population projections from Connect SoCal – The 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (Southern California Association of Governments)

The Coachella Valley experiences high levels of ozone and fails to meet 8-hour federal and State ozone standards, but it officially attained the revoked 1-hour ozone National Ambient Air Quality Standard (NAAQS, 120 ppb (parts per billion)) in 2015. Current classifications of ozone nonattainment for the Coachella Valley are in Table 7-2. The Coachella Valley is also still designated as a nonattainment area for PM10 (particles less than 10 microns in diameter), due to windblown dust events that recur in the area, with a classification of “serious.” The Coachella Valley meets the current federal standards for nitrogen dioxide (NO_2), carbon monoxide (CO), lead, and sulfur dioxide (SO_2).

Previous Air Quality Management Plans (AQMPs) addressed the planning requirements for the 1997 and 2008 ozone standards. This chapter and associated appendices constitute the ozone State Implementation Plan (SIP) for the 2015 8-hour ozone NAAQS, which addresses the current status of ozone air quality and provides the strategy toward future attainment of the federal 8-hour ozone standard in the Coachella Valley, presenting the projections of future ozone levels based on the base year 2018 emissions inventories, growth projections, and control strategies within and outside the Coachella Valley.

[1] http://www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm.

TABLE 7-2

OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ATTAINMENT STATUS IN THE COACHELLA VALLEY

Ozone Standard	Designation[a]	Attainment Date[b]
(1979) **1-Hour** (120 ppb)[c]	Attainment	11/15/2007 (attained 12/31/2013)
(2015) **8-Hour** (70 ppb)[d]	Nonattainment ("severe-15")	8/3/2033
(2008) **8-Hour** (75 ppb)[d]	Nonattainment ("severe-15")[e]	7/20/2027[e]
(1997) **8-Hour** (80 ppb)[d]	Nonattainment ("extreme")	6/15/2024

a) The United States Environmental Protection Agency (U.S. EPA) often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration

c) The 1979 1-hour ozone NAAQS (120 ppb) was revoked, effective 6/15/05; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, had not timely attained this standard by the 11/15/07 "severe-17" deadline, based on 2005-2007 data; on 8/25/14, the U.S. EPA proposed a clean data finding based on 2011-2013 data and a determination of attainment for the former 1-hour ozone NAAQS for the Southeast Desert nonattainment area; this rule was finalized by the U.S. EPA on 4/15/15, effective 5/15/15, and included preliminary 2014 data

d) The 2008 8-hour ozone NAAQS (75 ppb) was revised to 70 ppb, effective 12/28/15 with classifications and implementation goals to be finalized by 10/1/17; the 1997 8-hour ozone NAAQS (80 ppb) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/15; there are continuing obligations under the 1997 and 2008 ozone NAAQS until they are attained. The Coachella Valley was reclassified to "extreme" nonattainment effective 7/10/2019.

~~d)~~e) Due to a change in the model used to estimate on-road mobile source emissions, the emissions estimated from motor vehicles exceed the amount budgeted for the Coachella Valley in the 2016 AQMP. Reclassifying the area to "extreme" ozone nonattainment for the 2008 ozone NAAQS allows the Motor Vehicle Emissions Budget (MVEB) to be updated. A request to reclassify Coachella Valley for the 2008 ozone standard was adopted by the South Coast AQMD's Governing Board on 11/4/22 with a new attainment date of 7/20/32.

Air Quality Setting

Air Quality Summary

~~The~~ South Coast AQMD monitors air quality at four permanent locations in the Coachella Valley - Indio, Palms Springs, Mecca, and the north shore of the Salton Sea. The Palm Springs air monitoring station is located closer to the San Gorgonio Pass (also known as the Banning Pass), predominantly downwind of the densely populated Basin. The Indio station is located further east in the Coachella Valley, on the predominant downwind side of the main population areas of the Coachella Valley. The Mecca station, established in 2013, is closer to the Salton Sea in the southeastern portion of the Coachella Valley. Ozone is routinely measured at the Palm Springs and Indio Stations. PM10 and PM2.5 (particulate matter less than 10 and 2.5 microns in diameter, respectively) are measured at Palm Springs, Indio, and Mecca[2]. Sulfates (from PM10) are measured in Indio and the Palm Springs station measures CO, and NO_2. Hydrogen sulfide (H_2S), a gas emitted naturally from the Salton Sea that can occasionally cause strong odors, is measured in Indio[3], Mecca, and on the north shore of the Salton Sea.

Recent and historic air pollution data collected in the Coachella Valley is summarized in this chapter~~,~~ and is also presented in Chapter 2: Air Quality and Health Effects, along with that of the Basin. Additional details can be found in Appendix II – Current Air Quality. Information on the health effects associated with criteria air pollutants are summarized in Chapter 2 and detailed in Appendix I – Health Effects.

Attainment Status

The Coachella Valley remains a nonattainment area for the 1997 and 2008 8-hour ozone NAAQS, as well as for the 2015 ozone NAAQS. However, the Coachella Valley is in attainment of the former (1979) 1-hour ozone NAAQS. The Coachella Valley is also a nonattainment area for the state 1-hour and 8-hour ozone standards and the federal 24-hour PM10 standard.

The current federal NAAQS attainment designations for the Coachella Valley are presented in Table 7-3. The California Ambient Air Quality Standards (CAAQS) attainment designations are presented in Table 7-4.

[2] Continuous PM2.5 measurements began in 2021 at the Mecca station.

[3] H2S measurements in Indio began in 2021.

TABLE 7-3

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ATTAINMENT STATUS IN THE COACHELLA VALLEY

Criteria Pollutant	Averaging Time	Designation[a]	Attainment Date[b]
Ozone (O_3)	(1979) **1-Hour** (120 ppb)[c]	Attainment	11/15/2007 (attained 12/31/2013)
	(2015) **8-Hour** (70 ppb)[d]	Nonattainment ("severe-15")	8/3/2033
	(2008) **8-Hour** (75 ppb)[d]	Nonattainment ("severe-15")[e]	7/20/2027[e]
	(1997) **8-Hour** (80 ppb)[d]	Nonattainment ("extreme")	6/15/2024
PM2.5[f~~e~~]	(2006) **24-Hour** (35 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
	(2012) **Annual** (12.0 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
	(1997) **Annual** (15.0 µg/m^3)	Unclassifiable/Attainment	N/A (attained)
PM10[g~~f~~]	(1987) **24-hour** (150 µg/m^3)	Nonattainment ("serious")	12/31/2006
Lead (Pb)	(2008) **3-Months Rolling** (0.15 µg/m^3)	Unclassifiable/Attainment	Unclassifiable/ Attainment
CO	(1971) **1-Hour** (35 ppm)	Unclassifiable/Attainment	N/A (attained)
	(1971) **8-Hour** (9 ppm)	Unclassifiable/Attainment	N/A (attained)
NO_2[h~~g~~]	(2010) **1-Hour** (100 ppb)	Unclassifiable/Attainment	N/A (attained)
	(1971) **Annual** (0.053 ppm)	Unclassifiable/Attainment	N/A (attained)
SO_2[i~~h~~]	(2010) **1-Hour** (75 ppb)	Designations Pending	N/A (attained)
	(1971) **24-Hour** (0.14 ppm) (1971) **Annual** (0.03 ppm)	Unclassifiable/Attainment	Unclassifiable/ Attainment

a) The U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for an attainment demonstration

c) The 1979 1-hour ozone NAAQS (120 ppb) was revoked, effective 6/15/05; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, had not timely attained this standard by the 11/15/07 "severe-17" deadline, based on 2005-2007 data; on 8/25/14, U.S. EPA proposed a clean data finding based on 2011-2013 data and a determination of attainment for the former 1-hour ozone NAAQS for the Southeast Desert nonattainment area; this rule was finalized by the U.S. EPA on 4/15/15, effective 5/15/15, and included preliminary 2014 data

d) The 2008 8-hour ozone NAAQS (75 ppb) was revised to 70 ppb, effective 12/28/15 with classifications and implementation goals to be finalized by 10/1/17; the 1997 8-hour ozone NAAQS (80 ppb) was revoked in the 2008 ozone NAAQS implementation rule, effective 4/6/15; there are continuing obligations under the 1997 and 2008 ozone NAAQS until they are attained. The Coachella Valley was reclassified to Extreme nonattainment effective 7/10/2019.

e) Due to a change in the model used to estimate on-road mobile source emissions, the emissions estimated from motor vehicles exceed the amount budgeted for in the Coachella Valley for the 2016 AQMP. Reclassifying the area to "extreme" ozone nonattainment for the 2008 ozone NAAQS allows the Motor Vehicle Emissions Budget (MVEB) to be updated. A request to reclassify Coachella Valley for the 2008 ozone standard was adopted by the South Coast AQMD's Governing Board on 11/4/22 with a new attainment date of 7/20/32.

~~e)~~f) The annual PM2.5 standard was revised on 1/15/13, effective 3/18/13, from 15 to 12 µg/m^3

~~f)~~g) The annual PM10 standard was revoked, effective 12/18/06; the 24-hour PM10 NAAQS attainment deadline was 12/31/2006; the Coachella Valley Attainment Re-designation Request and PM10 Maintenance Plan was postponed by the U.S. EPA pending additional monitoring and analysis in the southeastern Coachella Valley

~~g)~~h) New 1-hour NO_2 NAAQS became effective 8/2/10; attainment designations 1/20/12; annual NO_2 NAAQS retained

~~h)~~i) The 1971 Annual and 24-hour SO_2 NAAQS were revoked, effective 8/23/10.

TABLE 7-4

CALIFORNIA AMBIENT AIR QUALITY STANDARDS (CAAQS) ATTAINMENT STATUS IN THE COACHELLA VALLEY

Pollutant	Averaging Time and Level[a]	Designation[b]
Ozone (O_3)	**1-Hour** (90 ppb)	Nonattainment
	8-Hour (70 ppb)	Nonattainment
PM2.5	**Annual** (12.0 µg/m^3)	Attainment
PM10	**24-Hour** (50 µg/m^3)	Nonattainment
	Annual (20 µg/m^3)	Nonattainment
Lead (Pb)	**30-Day Average** (1.5 µg/m^3)	Attainment
CO	**1-Hour** (20 ppm)	Attainment
	8-Hour (9.0 ppm)	Attainment
NO_2	**1-Hour** (0.18 ppm)	Attainment
	Annual (0.030 ppm)	Attainment
SO_2	**1-Hour** (0.25 ppm)	Attainment
	24-Hour (0.04 ppm)	Attainment
Sulfates	**24-Hour** (25 µg/m^3)	Attainment
H_2S[c]	**1-Hour** (0.03 ppm)	Unclassified[c]

a) State standards, or CAAQS, for ozone, CO, SO_2, NO_2, PM10 and PM2.5 are values not to be exceeded; lead, sulfates, and H_2S standards are values not to be equaled or exceeded; CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

b) CA State designations shown were updated by CARB in 2019, based on the 2016–2018 3-year period; stated designations are based on a 3-year data period after consideration of outliers and exceptional events.[4]

[4] http://www.arb.ca.gov/desig/statedesig.htm#current.

c) South Coast AQMD began monitoring H_2S in the southeastern Coachella Valley in November 2013 due to odor events related to the Salton Sea; this area has not been classified, but nonattainment is anticipated for the H_2S CAAQS in at least part of the Coachella Valley.

The days exceeding air quality standards at the Coachella Valley air monitoring stations in 2020 are shown in Figure 7-2, separated by air quality index category. Figure 7-3 shows the Coachella Valley 3-year (2018–2020) design values, as percentages of the current and revoked federal standards. A design value is a statistic that describes the air quality status of a given area relative to the level and form of the NAAQS and are generally based on a 3-year average.[5] Note that the modeling design values used for the AQMP attainment demonstration are based on a 5-year period, weighted toward the center year, as specified in the U.S. EPA modeling guidelines.[6]

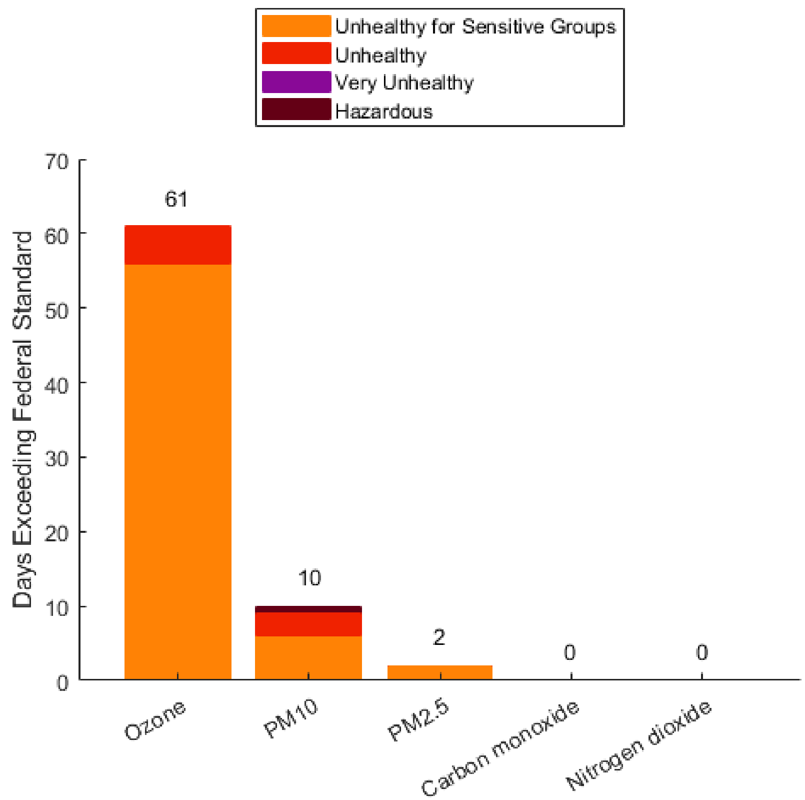


FIGURE 7-2

2020 EXCEEDANCES IN COACHELLA VALLEY BY AIR QUALITY INDEX (AQI) CATEGORY

(DAYS EXCEEDING FEDERAL STANDARD BY MAXIMUM AQI RECORDED IN THE COACHELLA VALLEY. NOTE THAT SULFUR DIOXIDE IS NOT MONITORED AT ANY STATION IN THE COACHELLA VALLEY DUE TO THE ABSENCE OF ANY SIGNIFICANT EMISSION SOURCES.)

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[5] For most criteria pollutants, the design value is a 3-year average and takes into account the form of the short-term standard (e.g., 98th percentile, fourth highest daily maximum 8-hour ozone, etc.). Design values can also be calculated for standards that are exceedance-based (e.g., 1-hour ozone and 24-hour PM10) so that they can be expressed as a concentration instead of an exceedance count, in order to allow a direct comparison to the level of the standard.

[6] Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze, Office of Air Quality Planning and Standards, USEPA, 2018. Available at: https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf.

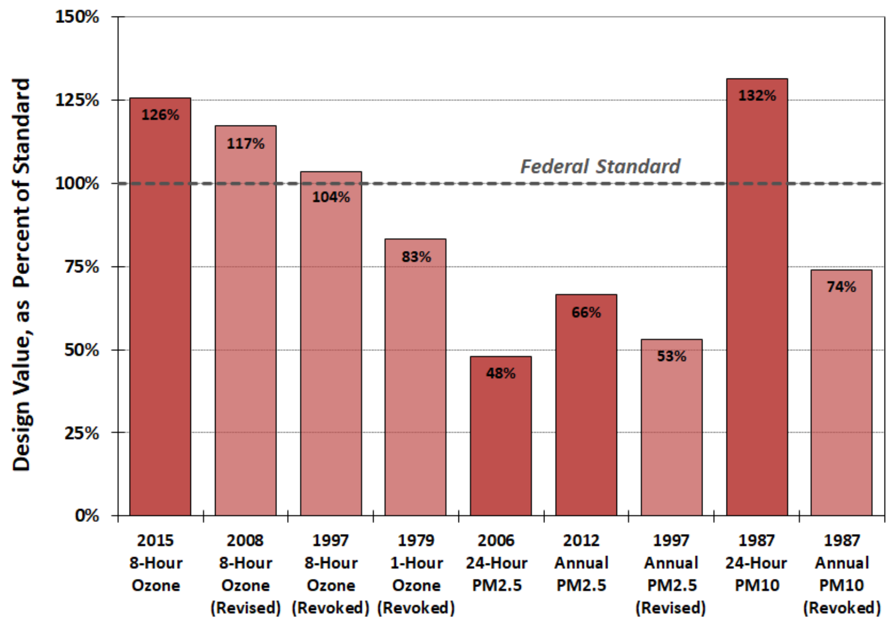

FIGURE 7-3

COACHELLA VALLEY 3-YEAR (2018–2020) DESIGN VALUES AS PERCENT OF FEDERAL STANDARD

(PM10 FLAGGED EXCEPTIONAL EVENTS ARE EXCLUDED BUT SUPPORTING DOCUMENTATION AND U.S. EPA CONCURRENCE ARE STILL NEEDED; NOTE THAT 100 PERCENT OF THE FEDERAL STANDARD IS NOT EXCEEDING THAT STANDARD; DARKER SHADING INDICATES CURRENT, MOST-STRINGENT NAAQS)

Figure 7-4 shows the trend of 3-year design values in the Coachella Valley since 1990, including 1-hour and 8-hour ozone and 24-hour and annual PM2.5, as a percentage of the federal standards (including the former 1979 1-hour ozone NAAQS, the 1997, 2008 and 2015 8-hour ozone NAAQS, the 2006 24-hour PM2.5 NAAQS, and the 2012 annual PM2.5 NAAQS). While recent 8-hour ozone concentrations remain above the NAAQS, the trend shows continued improvement. The PM2.5 design values have remained below the federal standards since the start of these measurements in the Coachella Valley.

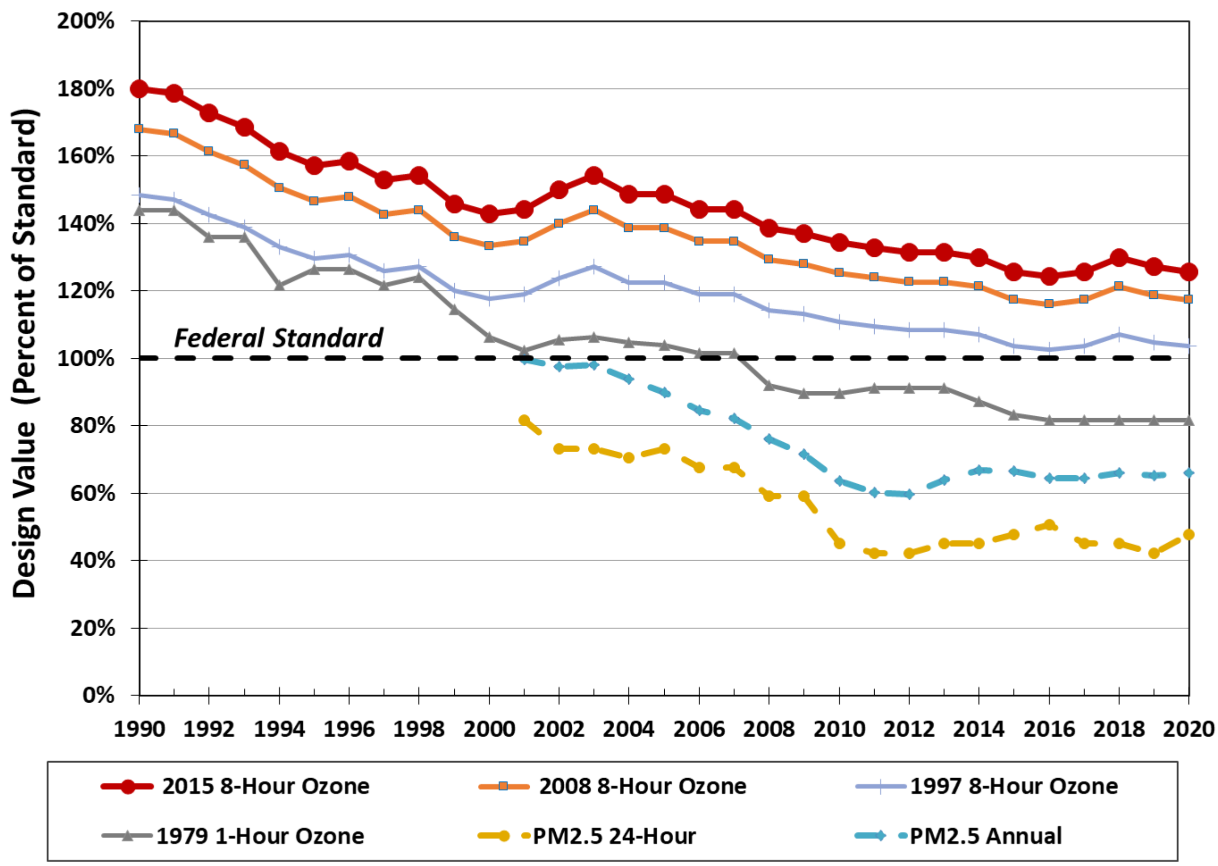

FIGURE 7-4

COACHELLA VALLEY 3-YEAR DESIGN VALUE TRENDS OF OZONE AND PM2.5 AS PERCENT OF THE MOST RECENT FEDERAL STANDARDS, 1990–2015

(PM2.5 MONITORING STARTED IN 1999; THE YEAR PLOTTED IS THE END YEAR OF THE 3-YEAR DESIGN VALUE)

Ozone (O_3)

Most of the emissions forming ozone in the Coachella Valley come~~s~~ from the South Coast Air Basin. Ozone is formed photochemically from Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOCs) emitted upwind and transported from the Basin to the Coachella Valley. The Basin's prevailing sea breeze causes polluted air to be transported inland. As the air is being transported inland, ozone is formed, with high concentrations occurring in the inland valleys of the Basin, extending from eastern San Fernando Valley through the San Gabriel Valley into the Riverside-San Bernardino area and the adjacent mountains. Ozone levels in the Coachella Valley are therefore mostly due to emissions upwind of the area, and not from sources within. ~~The~~ South Coast AQMD monitors ozone continuously at the Palm Springs and Indio air monitoring stations. Ozone concentrations in the Coachella Valley, and the number of days exceeding the federal ozone standards, are greatest in the late spring and summer months, with no exceedances during the winter.

While the Coachella Valley attains the 1-hour federal standard, the area fails to meet 8-hour NAAQS. The Palm Springs station had higher ozone design values and significantly more days above the standards than the Indio station. Table 7-5 shows the maximum concentrations, design values and the number of days exceeding the federal standards in the Coachella Valley in 2020.

TABLE 7-5

OZONE CONCENTRATIONS, DESIGN VALUES, AND EXCEEDANCE DAYS IN THE COACHELLA VALLEY IN 2020

Ozone Metric	Max Concentration	Design Value
1-hour	119 ppb	106 ppb
8-hour	94 ppb	88 ppb

Ozone Standard	Max Concentration as % of Standard	Design Value as % of Standard	Exceedance days
120 ppb (1979)	99%	88%	0
80 ppb (1997)	112%	104%	5
75 ppb (2008)	125%	117%	37
70 ppb (2015)	134%	126%	61

The 1-hour and 8-hour State ozone standards were exceeded on 9 days and 53 days, respectively, in the Coachella Valley in 2020. The 1-hour ozone health advisory level (≥ 150 ppb) has not been exceeded in the Coachella Valley area since 1998. No 1-hour Stage 1 episode levels (≥ 200 ppb) have been recorded in the Coachella Valley area since 1988.

Figure 7-5 shows the trend of the annual number of days exceeding federal and State ozone standards at Coachella Valley monitoring sites for the years 1990–2020. Figure 7-6 shows the 3-year ozone design value trends from 1990 through 2020 (labeled as the end year of each 3-year design value period). As illustrated, the Coachella Valley has experienced a trend of steady ozone improvements over the years and it is possible to meet the 1997 8-hour ozone standard, 80 ppb by 2023. However, additional gains are needed to achieve the current and previous 8-hour ozone standards.

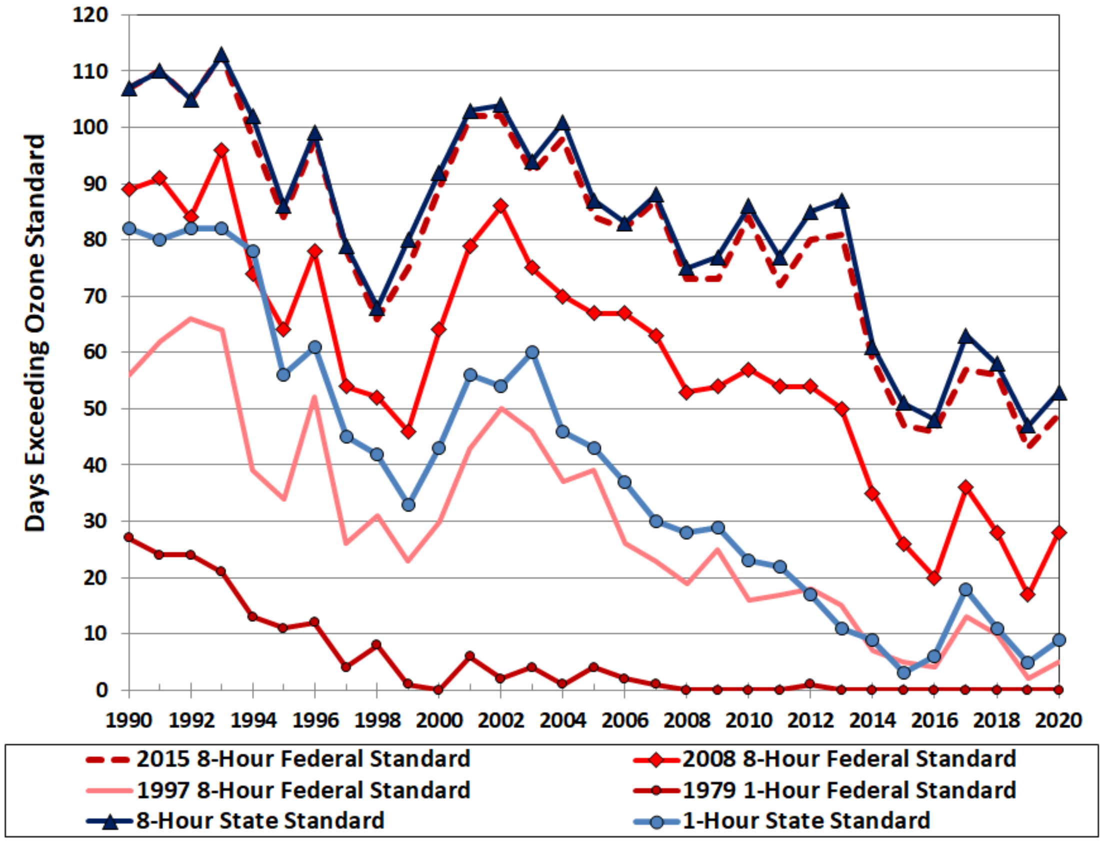

FIGURE 7-5

NUMBER OF DAYS EXCEEDING FEDERAL AND STATE OZONE STANDARDS IN THE COACHELLA VALLEY, 1990–2020

(THE 2015 8-HOUR FEDERAL STANDARD IS THE CURRENT OZONE NAAQS, BUT COMMITMENTS REMAIN TOWARD TIMELY ATTAINMENT OF THE FORMER FEDERAL STANDARDS; THE COACHELLA VALLEY HAS ATTAINED THE FORMER 1979 FEDERAL 1-HOUR OZONE STANDARD)

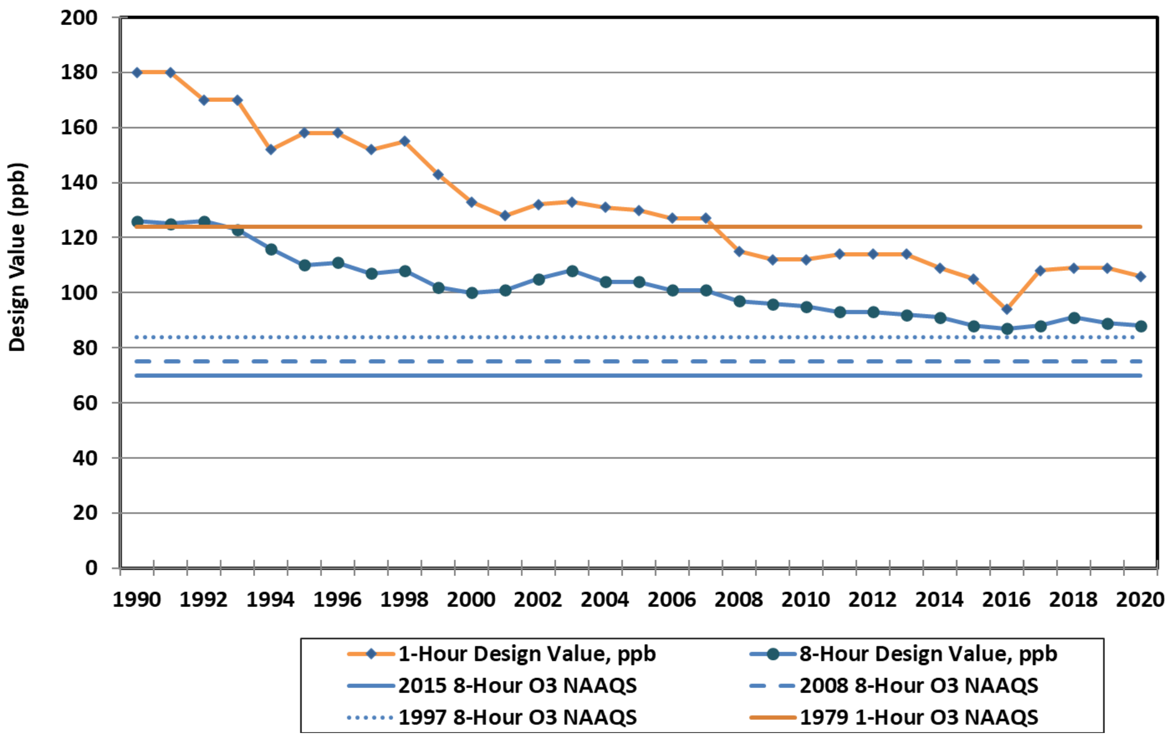

FIGURE 7-6

COACHELLA VALLEY FEDERAL 8-HOUR AND 1-HOUR OZONE 3-YEAR DESIGN VALUE TRENDS, 1990–2020

(DASHED LINES INDICATE THE CURRENT 2015, REVISED 2008, AND REVOKED 1997 8-HOUR NAAQS AND THE REVOKED 1979 1-HOUR OZONE NAAQS (ATTAINED); YEAR PLOTTED IS THE END YEAR OF THE 3-YEAR DESIGN VALUE PERIOD)

Particulate Matter Less than 10 Microns (PM10)

PM10 is measured daily at both Indio and Palm Springs by supplementing the (primary) 1-in-3-day Federal Reference Method (FRM) filter sampling at Indio and the 1-in-6-day FRM sampling at Palm Springs with (secondary) continuous hourly Federal Equivalent Method (FEM) measurements at both stations. In addition, a third station has been operational in the community of Mecca in the southeastern Coachella Valley since 2013, measuring PM10 with a real-time FEM sampler. This monitoring was started at the request of the U.S. EPA Region IX to help evaluate windblown dust in that portion of the Coachella Valley, which is potentially impacted by high-wind natural events, agricultural activities, and fugitive dust from the exposed shoreline of the receding Salton Sea.

Although exceedances of the ozone standard in the Coachella Valley area are primarily due to the transport of ozone and its precursors from the densely populated areas of the upwind Basin to the west, PM10 in the Coachella Valley is largely due to locally generated sources of fugitive dust (e.g., construction activities, re-entrained dust from paved and unpaved road travel, and natural wind-blown sources). The

Coachella Valley is subject to frequent high winds that generate wind-blown sand and dust, leading to high episodic PM10 concentrations, especially from disturbed soil and natural desert blow sand[7] areas. PM10 is the only pollutant which often reaches higher concentrations in the SSAB than in the Basin. All days in recent years that exceeded the 24-hour PM10 NAAQS at the Indio, Palm Springs, or Mecca stations would not have exceeded that standard except for the contribution of windblown dust and sand due to strong winds in the upwind source area. However, not all events would qualify as an exceptional event based on the U.S. EPA guidance.

On some of the Coachella Valley's high PM10 days, long-range transport of wind-generated dust and sand occurs with relatively light winds in the Coachella Valley, when entrained dust from desert thunderstorm outflows is transported to the Coachella Valley from the desert areas of southeastern California, Arizona, Nevada, or northern Mexico. These events are typically seen in the summer months with southeasterly flows and thunderstorm activity related to the North American Monsoon.[8,9] In the more extreme cases seen in the southwestern U.S. deserts, a deep wall of dust entrained by the thunderstorm downdraft and outflow can advance long distances from the origin, creating dust storms that are often referred to as *haboobs*.

On other high PM10 days, local windblown dust and sand is generated from strong winds in the Coachella Valley. Air forced through the San Gorgonio Pass (also referred to as Banning Pass) can create strong northwesterly winds along the centerline of the Coachella Valley. This wind forcing is often related to a marine air mass with a deep marine layer and strong westerly onshore (sea-breeze) flows in the South Coast Air Basin pushing through the San Gorgonio Pass. On other days, storm systems with frontal passages create strong winds through the San Gorgonio Pass and along the Valley. Hourly averaged winds measured near Cathedral City, in the Whitewater River Wash near the centerline of the Coachella Valley, typically exceeded 25 mph for at least one hour on approximately one third of the days in each year.

From 2018 to 2020, 18 24-hour PM10 exceedances at the monitors in Indio, Palm Springs, or Mecca were recorded, all due to high winds. These measurements are summarized in Table 7-6. Concentrations impacted by wind speed in excess of 25 miles per hour is one of the criteria that the U.S. EPA uses to determine if an exceptional event was caused by high winds and thus exceptional event demonstrations for these events would likely be concurred upon by the U.S. EPA with additional supporting information. These "suspected" exceptional events were identified as days when the daily maximum of the five-minute

7 The blowsand process is a natural sand migration caused by the action of winds on the vast areas of sand in the Coachella Valley. The sand is supplied by weather erosion of the surrounding mountains and foothills. Although the sand migration is somewhat disrupted by urban growth in the Valley, the overall region of blowsand activity encompasses approximately 130 square miles, extending from near Cabazon in the San Gorgonio Pass to the Salton Sea.

8 Adams, D.K., and A.C. Comrie. (1979). The North American Monsoon. *Bull. Amer. Meteor. Soc.,* 78, 2197-2213. Available at: https://journals.ametsoc.org/view/journals/bams/78/10/1520-0477_1997_078_2197_tnam_2_0_co_2.xml.

9 NOAA/National Weather Service. (2004). The North American Monsoon. Reports to the Nation on our Changing Planet. Available at: https://www.cpc.ncep.noaa.gov/products/outreach/Report-to-the-Nation-Monsoon_aug04.pdf.

average wind speed measured at Palm Springs Regional Airport or Jacqueline Cochran Regional Airport exceeded 25 miles per hour. Only two exceedances of the 24-hour PM10 NAAQS did not meet the wind speed criteria, however, they were also likely caused by high winds.

The 2018 through 2020 events in the Coachella Valley meeting the 25 mile per hour criteria have been flagged in the U.S. EPA Air Quality System (AQS) database as high-wind exceptional events, in accordance with the U.S. EPA Exceptional Events Rule. South Coast AQMD does not plan to submit exceptional event demonstrations to U.S. EPA for these events as they are not regulatory significant as their removal does not result in an attaining design value. After excluding days with wind speeds exceeding 25 miles per hour in the Coachella Valley, the federal 24-hour and former annual PM10 standards were exceeded at the Mecca monitors but not at Indio or Palm Springs monitors in the period from 2018 to 2020. The fourth highest in three-year 24-hour PM10 concentration-based design value at Mecca (204 Microgram per Cubic Meter, $\mu g/m^3$) was 132~~%~~ percent of the current 24-hour federal PM10 standard.

TABLE 7-6

HIGH-WIND EXCEPTIONAL EVENT DAYS IN THE COACHELLA VALLEY FROM 2018 THROUGH 2020

Date	Indio (2) (µg/m³)	Indio (3) (µg/m³)	Mecca (1) (µg/m³)	Mecca (3) (µg/m³)	Palm Springs (2) (µg/m³)	Palm Springs (3) (µg/m³)	Event Description
2/11/2018	ND	108	ND	**191**	ND	78	High winds
2/19/2018	51	56	ND	**264**	17	21	Wind speed > 25 mph
4/12/2018	ND	120	ND	**194**	ND	45	High winds
4/16/2018	ND	**259**	ND	**179**	ND	43	Wind speed > 25 mph
4/29/2018	57	58	ND	**170**	ND	31	High winds
7/9/2018	ND	**335**	ND	**274**	ND	**421**	Wind speed > 25 mph
7/10/2018	149	146	ND	109	ND	**173**	High winds
10/30/2019	71	80	**204**	**232**	27	31	High winds
1/29/2020	ND	59	ND	**173**	ND	21	Wind speed > 25 mph
5/12/2020	ND	29	ND	**298**	ND	19	Wind speed > 25 mph
5/13/2020	ND	30	ND	**181**	ND	17	Wind speed > 25 mph
5/19/2020	ND	25	ND	**220**	ND	12	Wind speed > 25 mph
5/22/2020	ND	29	ND	**259**	ND	21	Wind speed > 25 mph
6/5/2020	ND	141	ND	**680**	ND	33	Wind speed > 25 mph
6/6/2020	ND	50	ND	**289**	ND	16	Wind speed > 25 mph
6/7/2020	ND	40	ND	**207**	ND	24	Wind speed > 25 mph
10/26/2020	ND	103	ND	**239**	ND	ND	Wind speed > 25 mph
11/7/2020	ND	102	ND	**218**	ND	ND	Wind speed > 25 mph

ND = No Data.

Numbers in parenthesis indicate the parameter occurrence code (POC), which is used to distinguish between multiple monitors at a single monitoring site.

Bold text indicates concentrations in excess of the PM10 NAAQS.

The POC 3 monitors were measurement with continuous FEM Tapered Element Oscillating Microbalance (TEOM) instruments.

When considering the form of the federal PM10 standards, and after excluding the flagged high-wind exceptional events, the 3-year (2018–2020) concentration-based design values for the Coachella Valley are 204 μg/m^3 for the 24-hour average and 38 μg/m^3 for the annual average (former standard). These are 132 and 76 percent of the 24-hour and former annual PM10 federal standards, respectively. The 24-hour average concentration-based design value is 408 percent of the California State 24-hour (50 μg/m^3) PM10 standard and the 2018–2020 high state PM10 annual designation value (39 μg/m^3) is 195 percent of the state annual average PM10 standard (20 μg/m^3). Figure 7-7 shows the trend of the annual average PM10 concentrations in the Coachella Valley for the station showing the highest PM10 measurements from 1990 through 2020, along with the annual PM2.5 trend.

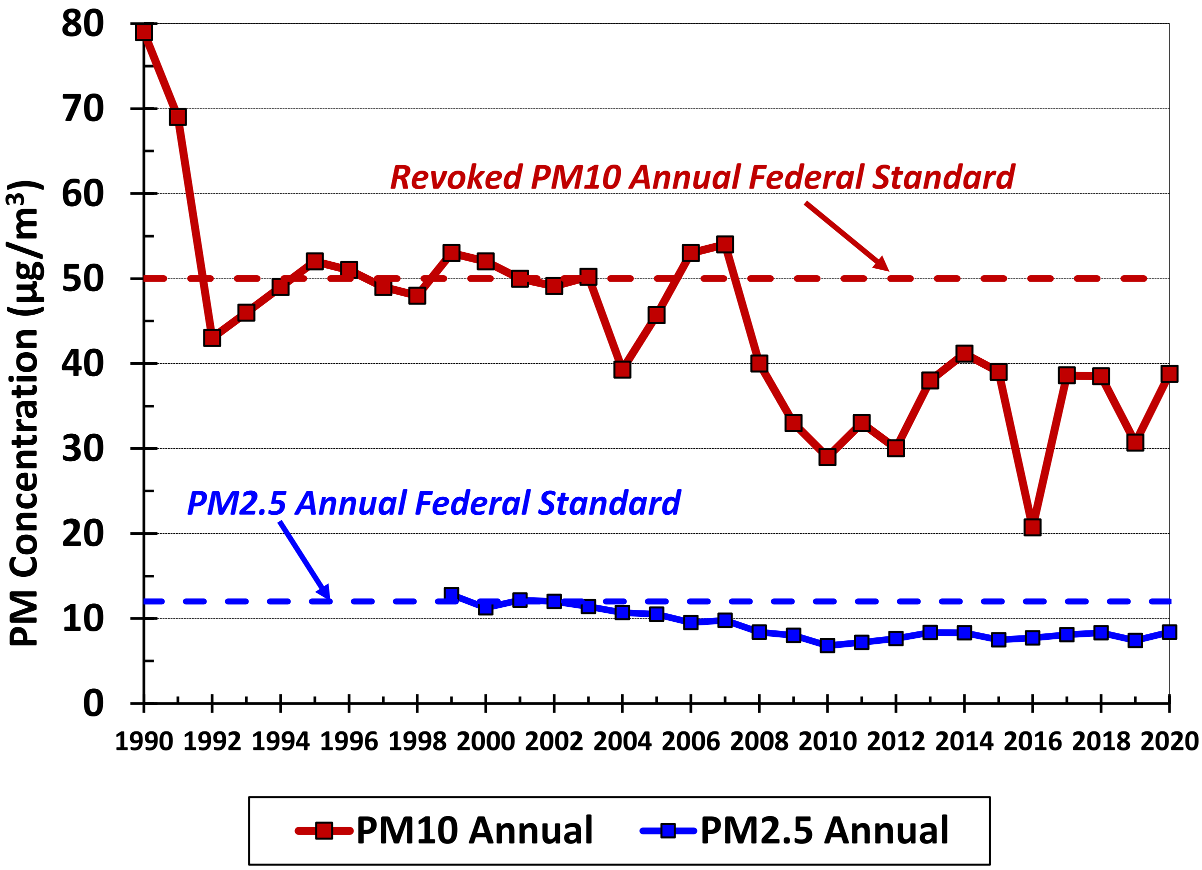

FIGURE 7-7

COACHELLA VALLEY TREND OF ANNUAL AVERAGE PM10 AND PM2.5, 1990–2020

Particulate Matter Less than 2.5 Microns (PM2.5)

~~The~~ South Coast AQMD began PM2.5 fine particulate monitoring in both the Coachella Valley and the Basin in 1999. Two long-term, routine stations (Palm Springs and Indio) measure PM2.5 with 24-hour filter-based FRM measurements every third day, as required by the U.S. EPA monitoring regulations.[10] Another routine station at the Joshua Tree National Park measures PM2.5 with a continuous BAM (Beta attenuation monitoring) monitor, which is maintained by the National Park Service. PM2.5 has remained relatively low, especially when compared to the South Coast Air Basin, due to fewer combustion-related emissions sources and less secondary aerosol formation in the atmosphere. There is also typically increased vertical mixing and horizontal dispersion in the desert areas. When looking at the 3-year design value for the 2018-2020 period, the Coachella Valley PM2.5 24-hour design value (17 $\mu g/m^3$) is 48 percent of the 24-hour NAAQS (35 $\mu g/m^3$) and the annual average design value (8.0 $\mu g/m^3$) is 66 percent of the current (2012) annual NAAQS (12.0 $\mu g/m^3$).

Figure 7-8 shows the trend of 3-year design values for annual average and 24-hour PM2.5 from 2001 through 2020. The monitoring stations in the Coachella Valley have not violated the 3-year design value form of the current standards since monitoring began. The annual average for the first year of measurements (1999) was just slightly above the level of the standard as can be seen in the trend of the annual average PM2.5 concentrations, as shown in Figure 7-8, along with annual trend of PM10.

There are occasionally some individual days that exceeded the level of the 24-hour PM2.5 standard in the Coachella Valley, due to the PM2.5 fine particulate portion of windblown dust during very high PM10 events caused by high winds. Even though the PM2.5 standard can be exceeded during these exceptional events, the PM2.5 mass is a very small fraction of the total PM10 mass. These events are extreme and can be flagged as exceptional events, but they do not occur frequently enough to violate the 98th percentile form of the 24-hour PM2.5 standard.

The 2020 Coachella Valley maximum 24-hour average and the highest annual average concentrations (20.2 $\mu g/m^3$ and 8.4 $\mu g/m^3$, respectively, both at Indio) were 57 percent and 70 percent of the current federal 24-hour and annual standards. The annual PM2.5 State standard (12.0 $\mu g/m^3$), which is the same level as the federal annual standard, but with different rounding requirements, is also not exceeded in the Coachella Valley.

[10] Additional continuous instruments at Indio and Mecca were installed in 2021.

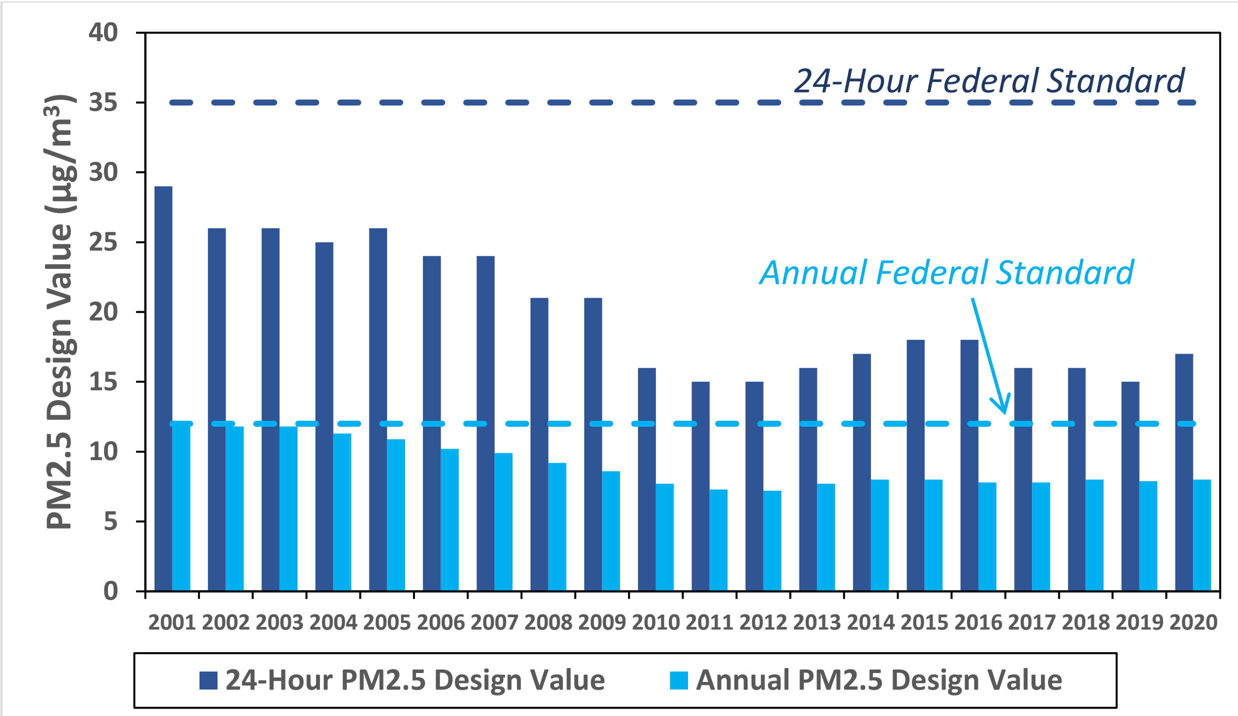

FIGURE 7-8

COACHELLA VALLEY TREND OF 24-HOUR AND ANNUAL AVERAGE PM2.5 DESIGN VALUES, 2001–2020

Carbon Monoxide (CO)

Carbon monoxide was measured at one Coachella Valley air monitoring station (Palm Springs) in 2020. Neither the federal nor State standards were exceeded. The maximum 8-hour average CO concentration recorded in 2015 (0.5 ppm) was less than 6 percent of both the federal (9 ppm) and State (9.0 ppm) 8-hour standards. The maximum 1-hour CO concentration (0.8 ppm) was 2 percent of the federal (35 ppm) and 4 percent of the State (20 ppm) 1-hour CO standards. Historical carbon monoxide air quality data show that the Coachella Valley area has not exceeded the federal CO standards in nearly three decades.

For the 3-year period 2018–2020, the 1-hour and 8-hour design values were 0.8 ppm and 0.5, 2 and 6 percent, respectively, of the federal standards (4 percent of the State 1-hour standard and 6 percent of the State 8-hour standard).

Nitrogen Dioxide (NO_2)

Nitrogen dioxide was measured at one station (Palm Springs) in the Coachella Valley in 2020. The maximum 1-hour average NO_2 concentration (47.4 ppb) was 47 percent of the 2010 federal 1-hour standard (100 ppb) and 26 percent of the State 1-hour standard (180 ppb). The maximum annual average NO_2 concentration (0.0066 ppm) was approximately 12 percent of the federal annual standard (0.0534 ppm) and 22 percent of the State annual standard (0.030 ppm).

For the 3-year period from 2018–2020, the NO_2 design values for the Coachella Valley were 34 ppb for the 1-hour average and 0.007 ppm for the annual average, 34 percent and 13 percent of those NAAQS, respectively.

Sulfur Dioxide (SO_2)

Sulfur dioxide was not measured in the Coachella Valley in 2020. Historic analyses have shown SO_2 concentrations to be well below the State and federal standards and there are no significant emissions sources of SO_2 in the Coachella Valley.

Sulfates (SO_4^{2-})

Sulfate, from FRM PM10 filters, was measured at two stations (Palm Springs and Indio) in the Coachella Valley in 2020. The 2020 maximum 24-hour average sulfate concentration was 2.7 $\mu g/m^3$ and the 3-year maximum State designation value was 2.6 $\mu g/m^3$ (10 percent of the 25 $\mu g/m^3$ State sulfate standard).

Lead (Pb)

Lead concentrations were not measured in the Coachella Valley in 2020. Historic analyses have shown concentrations to be less than the State and federal standards and no major sources of lead emissions are located in the Coachella Valley.

Hydrogen Sulfide (H_2S)

A significant H_2S odor event occurred in September 2012, bringing sulfur or rotten-egg odors and widespread attention to this issue of H_2S odors from the Salton Sea. This event affected people in communities throughout the Coachella Valley, across many areas of the South Coast Air Basin, and into portions of the Mojave Desert Air Basin to the north. Over 235 complaints were registered with South Coast AQMD during this event, from as far west as the San Fernando Valley in Los Angeles County.

South Coast AQMD started measuring H_2S near the Salton Sea at two locations in November 2013, in order to better understand odor events related to the Salton Sea and to better communicate these events to the community. One of the H_2S monitoring stations is located on Torres-Martinez tribal land that is close to the shore, in a sparsely populated area. The second monitor is located at the South Coast AQMD Mecca air monitoring station site (Saul Martinez Elementary School), a more populated community approximately four miles north of the Salton Sea.

The H_2S produced in the Salton Sea is a product of anaerobic organic decay that is particularly active in the summer months, especially at the bottom of the shallow Sea with the abundant desert sunlight and heat. The 2012 event occurred during a period of moist southeasterly "monsoonal" flows in desert areas of southeastern California, along with desert thunderstorms. Strong outflow winds from thunderstorms to the south crossed the Salton Sea, causing mixing in the water layers that released and transported significant amounts of H_2S gas and the associated odors.

While strong events like that of September 2012 are uncommon, less extreme releases of H_2S can frequently cause odors in areas close to the Salton Sea. These events are more prevalent during the hot summer months, especially when the southeasterly "monsoonal" flow events occur, but they sometimes occur at other times of the year. Elevated H_2S concentrations are typically measured near the Salton Sea during wind shifts that bring flows from the south or east directions. These shifts occur most often in the early morning or the late afternoon/early evening hours in this area. The Salton Sea's receding shorelines and shallower waters may affect the number or severity of these odor events in the future.

While there is no federal standard for H_2S, the State of California has set a standard of 30 parts per billion (ppb), averaged over one hour as a level not to be reached or exceeded. The State standard was adopted in 1969, based on the thresholds for annoyance and unpleasant odors, with the purpose of decreasing odor annoyances.[11] Humans can detect H_2S odors at extremely low concentrations, down to a few ppb. Above the State standard, most individuals can smell the offensive odor and many may experience temporary symptoms such as headaches and nausea due to unpleasant odors. The CAAQS for H_2S was reviewed in 1984 and retained without change.

Figure 7-9 shows annual totals of days with at least one hour that exceeded the 1-hour state H_2S standard at near-shore (Torres-Martinez) and Mecca stations from 2014 to 2020. During this period, H_2S concentrations at the Torres-Martinez site near the Salton Sea shoreline exceeded the 1-hour state standard an average of 38.3 days per year, with a range of 22 to 68 days. Of the 268 exceeding days during this period, 121 days (45%) had H_2S exceedances that lasted longer than one hour (2-20 hours). Most exceedances occurred during summer months (June – September), with exceedances peaking in either August or September each year.

Further north from the Salton Sea in Mecca, H_2S concentrations exceeded the state standard an average of 6.6 days per year from 2014-2020, with a range of 2 to 14 exceeding days. Multi-hour (2-7 hours) exceedances were recorded on half of the 46 exceeding days from 2014-2020. Nearly all exceedances recorded at Mecca occurred during summer months and most frequently occurred in August or September.

[11] Collins, J., and D. Lewis. (2000). Hydrogen Sulfide: Evaluation of Current California Air Quality Standards with Respect to Children. California Office of Environmental Health Hazard Assessment document prepared for CARB. Available at: http://www.arb.ca.gov/ch/ceh/001207/h2s_oehha.pdf.

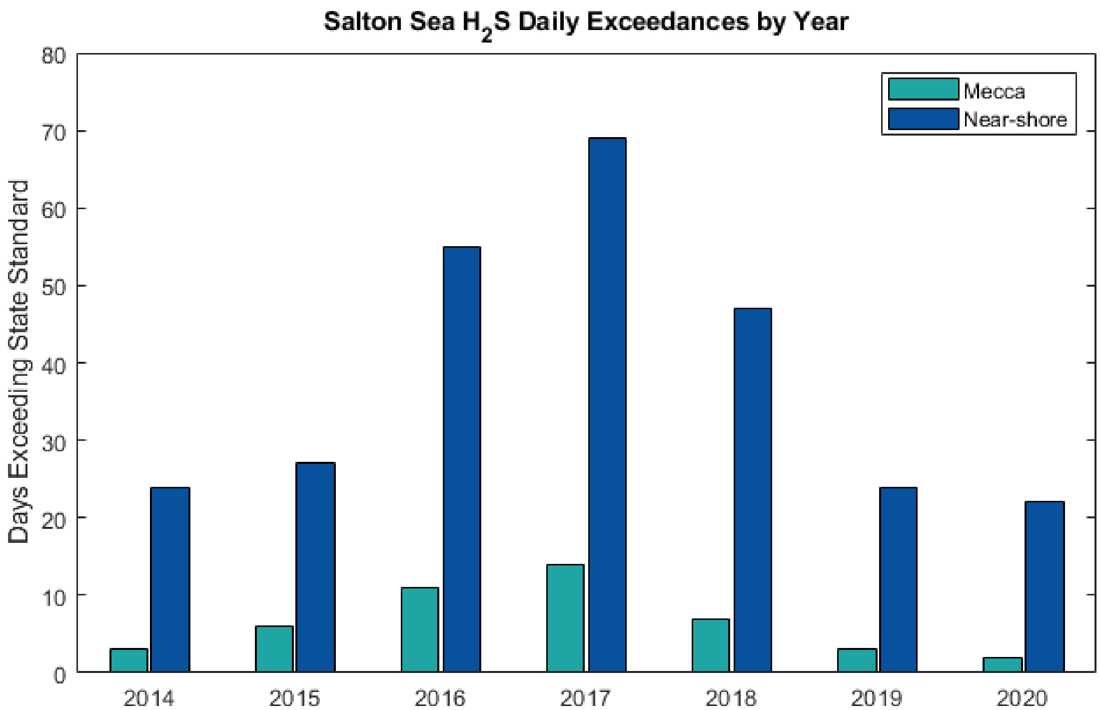

FIGURE 7-9

NUMBER OF DAYS IN EACH YEAR WITH 1-HOUR HYDROGEN SULFIDE (H_2S) OVER THE STATE STANDARD FROM 2014 TO 2020 FOR COACHELLA VALLEY MONITORING STATIONS

Pollutant Transport

Ozone in the Coachella Valley is both directly transported from the Basin and formed photochemically from precursors emitted upwind and within the Coachella Valley. Pollutant transport from the South Coast Air Basin to the SSAB occurs through the San Gorgonio Pass to the Coachella Valley.[12] The transport pathway to the Coachella Valley has been well documented and studied in the past. An experiment in the early 1970s concluded that the South Coast Air Basin was the source of the observed high ozone levels in the Coachella Valley.[13] Transport from Anaheim to Palm Springs was directly identified with an inert sulfur hexafluoride tracer release.[14] A comprehensive study of transport from the South Coast Air Basin to the SSAB also confirmed the ozone transport pathway to the Coachella Valley.[15]

Looking at averaged ozone concentrations by time of day for various stations along the corridor from Los Angeles County into Riverside County and into the Coachella Valley also shows this transportation of pollution. Figure 7-10 shows averaged 1-hour ozone concentrations for the May–October smog season, by hour, for the 2018–2020 period. At stations near where the majority of ozone precursor emissions are emitted (source region), ozone peaks occur just after mid-day on average. This peak corresponds to the peak of incoming solar radiation and therefore the peak of ozone production. Ozone peaks near the emissions source region are not as high as those further downwind, due to the time required for ozone to form. Downwind of the source region, ozone peaks occur later in the day and at generally higher concentrations as ozone and ozone precursors are transported downwind and the reactions forming ozone continue. At Palm Springs, ozone concentration peaks occur in the late afternoon or early evening. If this peak were predominately locally generated, it would be occurring closer to near mid-day, as is seen in the major source areas of the South Coast Air Basin, and not in the late afternoon or early evening, as is seen at Palm Springs.

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12 Keith, R.W. (1980). A Climatological Air Quality Profile: California's South Coast Air Basin. Staff Report, South Coast Air Quality Management District.

13 Kauper, E.K. (1971). Coachella Valley Air Quality Study. Final Report, Pollution Res. & Control Corp., Riverside County Contract & U.S. Public Health Service Grant No. 69-A-0610 RI.

14 Drivas, P.J., and F.H. Shair. (1974). A Tracer Study of Pollutant Transport in the Los Angeles Area. *Atmos. Environ*. 8, 1155-1163.

15 Smith, T.B., et al. (1983). The Impact of Transport from the South Coast Air Basin on Ozone Levels in the Southeast Desert Air Basin. CARB Research Library Report No. ARB-R-83-183. CARB Contract to MRI/Caltech. Available at: http://www.arb.ca.gov/research/single-project.php?row_id=64953.

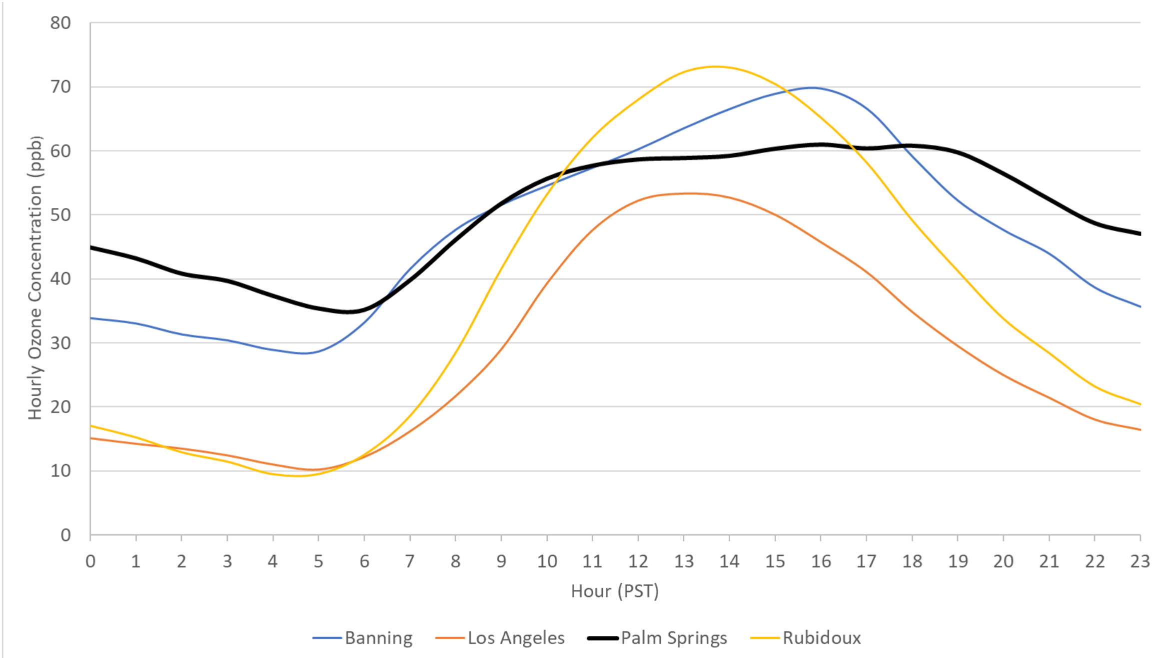

FIGURE 7-10
DIURNAL PROFILE OF 3-YEAR (2018–2020) HOURLY OZONE CONCENTRATIONS ALONG THE TRANSPORT ROUTE INTO THE COACHELLA VALLEY
(HOURS IN PACIFIC STANDARD TIME (PST); AVERAGED FOR THE MAY-OCTOBER OZONE SEASON BY HOUR)

Palm Springs also shows higher morning ozone concentrations, when compared to the concentrations in the morning in the South Coast Air Basin closer to the main emissions source areas (i.e., Los Angeles and Rubidoux). The stations in the South Coast have more local NOx emissions (mostly from mobile sources) that help scavenge[16] ozone during nighttime. The Coachella Valley has limited local NOx emissions to help scavenge the ozone at night. This elevated overnight ozone contributes to an early morning start to the daily ozone increase in Coachella Valley, starting after sunrise (5-6 a.m. Pacific Standard Time during ozone season), with the ample sunlight and strong overnight temperature inversions in the desert. Ozone concentrations observed on high ozone days in the Coachella Valley can reach an initial peak before noon and then drop slightly with increased mixing in the early afternoon, before climbing to the daily peak, typically between 4 and 6 p.m., as the typical onshore flow reaches the Coachella Valley through the San Gorgonio Pass, transporting new ozone from the South Coast Air Basin.

[16] Freshly emitted NOx includes NO, which destroys ozone through a fast reaction colloquially termed 'scavenging'.

Future Air Quality

Emissions Inventories

Table 7-7 shows base year (2018) and future-year emission inventories for the Coachella Valley, based on the ~~draft~~ 2022 AQMP inventory methodology as described in Appendix III – Base and Future Year Emission Inventory. Emissions, in tons per day, of VOC, NOx, CO, SOx, PM10, PM2.5, and Ammonia (NH_3) are shown. The corresponding inventories for the South Coast Air Basin are shown for comparison in Table 7-8. The Basin emissions are far greater than emissions generated in the Coachella Valley. Depending on the pollutant, emissions in the Basin are 5 to 50 times greater than emissions in the Coachella Valley. Future increases in some of the pollutant emissions within the Coachella Valley are largely due to projected increases in population, Vehicle Mile Travel (VMT), and construction activity. Improved air quality in the Coachella Valley depends on reduced emissions in the Basin. This is further illustrated by continued improvement in ozone air quality in the Coachella Valley, as described earlier.

TABLE 7-7

COACHELLA VALLEY SUMMER PLANNING EMISSIONS FOR BASE YEAR (2018) AND FUTURE YEARS, WITHOUT FURTHER CONTROLS

Coachella Valley Emissions (Tons per Day)							
YEAR	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**NH_3**
2018	13.~~8~~34	~~19.3~~18.92	~~66.1~~59.60	0.~~3~~29	~~56.1~~28.55	4.~~4~~41	2.~~5~~50
~~2024~~2023	~~13.2~~12.58	~~14.7~~13.32	~~62.8~~54.61	0.~~3~~31	~~62.2~~31.04	4.~~7~~56	2.~~8~~77
~~2027~~2026	~~13.4~~12.28	~~14.1~~11.02	~~64.0~~50.45	0.~~3~~30	~~64.4~~32.19	4.~~8~~69	2.~~9~~87
~~2030~~2029	~~13.6~~11.97	~~13.8~~10.50	~~65.3~~45.91	0.~~3~~28	~~66.0~~33.03	4.~~9~~79	~~3.0~~2.97
2032	~~13.7~~11.81	~~13.7~~10.20	~~66.7~~41.15	0.~~3~~27	~~67.1~~33.79	~~5.0~~4.89	3.~~1~~06
~~2033~~2035	~~13.8~~11.67	~~13.6~~9.78	~~67.2~~37.36	0.~~3~~27	~~67.5~~34.36	~~5.0~~4.94	3.~~1~~14
~~2036~~2037	~~14.0~~11.68	~~13.0~~9.23	~~69.3~~36.03	0.~~3~~28	~~68.7~~34.82	5.~~0~~00	3.~~2~~20
~~2037~~	~~14.2~~	~~12.7~~	~~70.4~~	~~0.3~~	~~69.2~~	~~5.1~~	~~3.2~~

TABLE 7-8

SOUTH COAST AIR BASIN SUMMER PLANNING EMISSIONS FOR BASE YEAR (2018) AND FUTURE YEARS BASELINE EMISSIONS

South Coast Air Basin Emissions (Tons per Day)							
Year	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**NH_3**
2018	~~416.8~~405.9	~~347.1~~350.8	~~1845~~1657.5	14.~~4~~6	~~310.7~~179.8	59.~~3~~1	77.~~3~~0
~~2024~~2023	~~388.3~~378.5	~~252.9~~249.5	~~1688.8~~1485.1	15.0	~~318.1~~181.4	~~58.6~~57.8	79.~~8~~3
~~2027~~	~~386.3~~	~~239.8~~	~~1669.1~~	~~15.2~~	~~321.8~~	~~58.3~~	~~81.3~~
~~2030~~2026	~~385~~365.5	~~232.5~~219.6	~~1663.6~~1353.0	~~15.4~~14.7	~~325.3~~183.5	~~59~~58.0	~~82.4~~80.9
~~2032~~2029	~~385~~352.8	~~230.3~~206.6	~~1671.7~~1213.1	~~15.5~~14.9	~~326.6~~185.2	58.~~6~~1	~~83.3~~82.1
~~2033~~2032	~~386.1~~344.9	~~228.6~~198.9	~~1675.3~~1066.9	15.~~5~~0	~~328.5~~186.2	~~59.3~~58.1	83.~~4~~1
~~2036~~2035	~~388~~340.2	~~221.9~~192.3	~~1692.6~~969.5	15.~~6~~1	~~332.4~~187.9	~~59.6~~58.4	84.~~4~~1
2037	~~389.3~~338.7	~~219.6~~184.4	~~1699.8~~923.2	15.~~7~~2	~~333.8~~189.3	~~59.7~~58.6	84.~~9~~7

Reasonable Further Progress

The federal CAA requires SIPs for most nonattainment areas to demonstrate Reasonable Further Progress (RFP) toward attainment through emission reductions phased in from the time of the SIP submission until the attainment date time frame under CAA section 172(c)(2). The RFP requirements in the CAA are intended to ensure that ozone nonattainment areas reduce emissions over time in order to attain the ozone NAAQS. The U.S. EPA has determined that the plan should rely only on emission reductions achieved from sources within the nonattainment area.

Subpart 2 sections 182(b)(1) and 182(c)(2)(B) contain specific emission reduction targets to ensure that ozone nonattainment areas provide for sufficient precursor emission reductions to attain the ozone national ambient air quality standard. Section 182(b)(1)(A) requires that "moderate" or above areas provide for VOC reductions of at least 15 percent from baseline emissions within six years after November 15, 1990. The U.S. EPA final rule of "*Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements*" (83 FR 62998) states that if an area has already met the 15 percent requirement for VOC under either the 1-hour ozone NAAQS or the 1997 8-hour ozone NAAQS, such requirement under 182(b)(1) would not have to be fulfilled again.

Instead, such areas would need to meet the CAA requirements under Section 182(c)(2)(B), which requires that "serious" and above areas provide VOC and/or NOx reductions (CAA, Section 182(c)(2)(C)) of 18 percent over the first six years after the baseline year for the 2015 8-hour ozone NAAQS, and an additional 3 percent per year averaged over each consecutive three-year period until the attainment date.

For the 182(c)(2)(B) RFP requirement for Serious and higher areas, U.S. EPA guidance allows for NOx emission reductions to substitute for VOC emission reductions to demonstrate the annual 3 percent reductions of ozone precursors if that substitution yields equivalent ozone reductions.[17] Additional U.S. EPA guidance states that certain conditions are needed to use NOx substitution in an RFP demonstration.[18] First, an equivalency demonstration must show that cumulative RFP emission reductions are consistent with the NOx and VOC emission reductions determined in the ozone attainment demonstration. Second, the reductions in NOx and VOC emissions should be consistent with the continuous RFP emission reduction requirement. The guidance states that "Any combination of VOC (ROG) and NOx emission reductions which totals 3 percent per year and meet other SIP consistency requirements described in this document are allowed." Photochemical modeling included in the attainment demonstration in this Chapter shows that NOx reductions are critical for the Coachella Valley to reach attainment.

Tables 7-9 and 7-10 summarize the RFP calculations. The emissions inventory used in the RFP demonstration is the baseline emissions shown in Table 7-7~~ and the benefits of two regulations adopted by CARB in December 2021: (1) Heavy-Duty Inspection and Maintenance Plan (HD I&M)[19] and (2) Small Off-Road Engines (SORE)[20] regulation.~~. The RFP demonstration was extended to 2037, which is the attainment date for Extreme nonattainment areas. The rationale to request the redesignation of the Coachella Valley from Severe to Extreme non-attainment area ("bump-up" request) and the demonstration of attainment as an Extreme non-attainment area are provided later ~~of~~ in this chapter.

Figure 7-11 depicts the target level and projected baseline RFP demonstration for VOC. For each of the milestone years, the required progress is met on the basis of reductions from the existing control program using a combination of VOC and NOx reductions within the Coachella Valley portion of the SSAB alone. No additional reductions from the proposed control measures in this AQMP are needed for progress purposes. Projected VOC baseline emissions are not sufficient to meet the CAA requirements as the baseline VOC emission levels are above the target levels of each milestone year. Therefore, projected NOx baseline emission reductions are needed to show compliance with the targeted RFP levels. The CAA Section 182(c)(2)(C) provides for NOx reductions to substitute for RFP reductions not achieved for VOC emissions. The demonstration in Tables 7-9 and 7-10 show compliance with RFP requirements. Figure 7-12 illustrates how the cumulative reductions in VOC and NOx combined surpass the required reduction in

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[17] Guidance on the Post-1996 Rate-of-Progress Plan and the Attainment Demonstration. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/P1001E8Z.PDF?Dockey=P1001E8Z.PDF

[18] https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19931201_oaqps_nox_substitution_guidance.pdf

~~[19] https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/hdim2021/isor.pdf.~~

~~[20] https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/sore21/isor.pdf.~~

VOC, thus showing compliance with RFP requirements. The contingency measure requirement for the RFP demonstration is summarized in Chapter 4 of the 2022 AQMP.

While the Coachella Valley is expected to meet the RFP requirements for ozone precursor emissions using the emissions originated from the Valley, attainment of the 2015 ozone standard relies on the emission reductions not only within the Coachella Valley but also in upwind areas. As mentioned previously, poor ozone air quality in the Coachella Valley is primarily due to transport of ozone and its precursors from the upwind sources and attainment in Coachella Valley is only possible with substantial emission reductions in the Basin. Accordingly, the proposed control strategy consists of two components: 1) an aggressive control strategy for NOx emission sources in the Basin; and 2) control of locally generated emissions via proposed state-wide or nationally applied control measures implemented by state and federal actions.

TABLE 7-9

SUMMARY OF REASONABLE FURTHER PROGRESS CALCULATIONS – VOC

Row	Calculation Step[a]	2017[b]	2023	2026	2029	2032	2035	2037
1	RFP Baseline VOC ~~Emissions[c]~~Emissions (tons/day)	~~412.59~~13.47	~~377.59~~12.58	~~364.61~~12.28	~~351.94~~11.97	~~344.05~~11.81	~~339.32~~11.67	~~337.87~~11.68
2	Required Percent Change Since Previous Milestone Year (%)	-	18	27	36	45	54	60
3	Target VOC Level (tons/day)	-	~~338.33~~11.05	~~301.19~~9.83	~~264.06~~8.62	~~226.93~~7.41	~~189.79~~6.20	~~165.04~~5.39
4	Cumulative Milestone Year Shortfall (tons/day)	-	~~39.26~~1.53	~~63.42~~2.45	~~87.88~~3.35	~~117.12~~4.40	~~149.53~~5.47	~~172.83~~6.29
5	Cumulative Shortfall in VOC (%)	-	~~9.5~~11.4	~~15.4~~18.2	~~21.3~~24.9	~~28.4~~32.7	~~36.2~~40.6	~~41.9~~46.7
6	Incremental Milestone Year Shortfall (%)	-	~~9.5~~11.4	~~5.9~~6.8	~~5.9~~6.7	7.~~1~~8	7.~~8~~9	~~5.7~~6.0

[a] Units are in tons per day (tons/day), based on the summer planning inventory unless otherwise noted.
[b] Base Year (2017).
~~[c] RFP Baseline VOC Emissions reflect emission reduction benefits from CARB's Heavy-Duty Inspection and Maintenance Plan (HD I&M) and Small Off-Road Engines (SORE) regulations adopted in December 2021; used in RFP demonstration.~~

Row Description:

ROW 1: RFP baseline emissions used for RFP demonstration; Baseline and Future Emission Inventory taking into account existing rules and projected growth~~, and CARBS's HD I&M and SORE regulations~~.

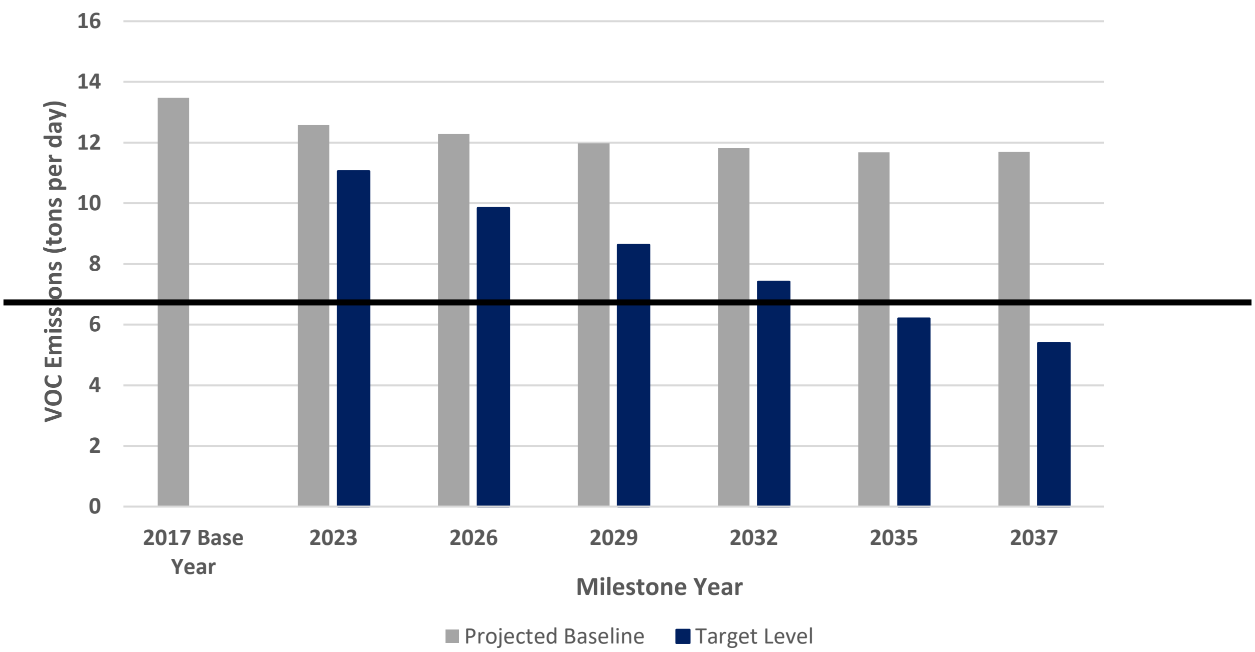
ROW 2: Required 18% reduction 6 years after Base Year; future milestone years are every 3 years until attainment year; and required reductions are 3% per year for each milestone year (e.g., for every 3 years, required 9% reduction).

ROW 3: [(2017 Base Year Row 1) x (1-Row 2)]

ROW 4: [(Row 1) – (Row 3)] or (Baseline – Target) – negative number meets target level and positive number is shortfall of target level.

ROW 5: [(Row 4) / (Row 1 Base Year) x 100] (e.g., for 2029, cumulative shortfall is 3.35/13.~~48~~47 = 24.~~8~~9.

ROW 6: Negative (Row 5) is zero shortfall; positive number is a shortfall. Incremental milestone year shortfall is determined by subtracting the previous year's cumulative shortfall from the current cumulative shortfall (e.g., for 2029, cumulative shortfall of 24.~~8~~9% – previous 2026 shortfall of 18.~~1~~2% = 6.7%).



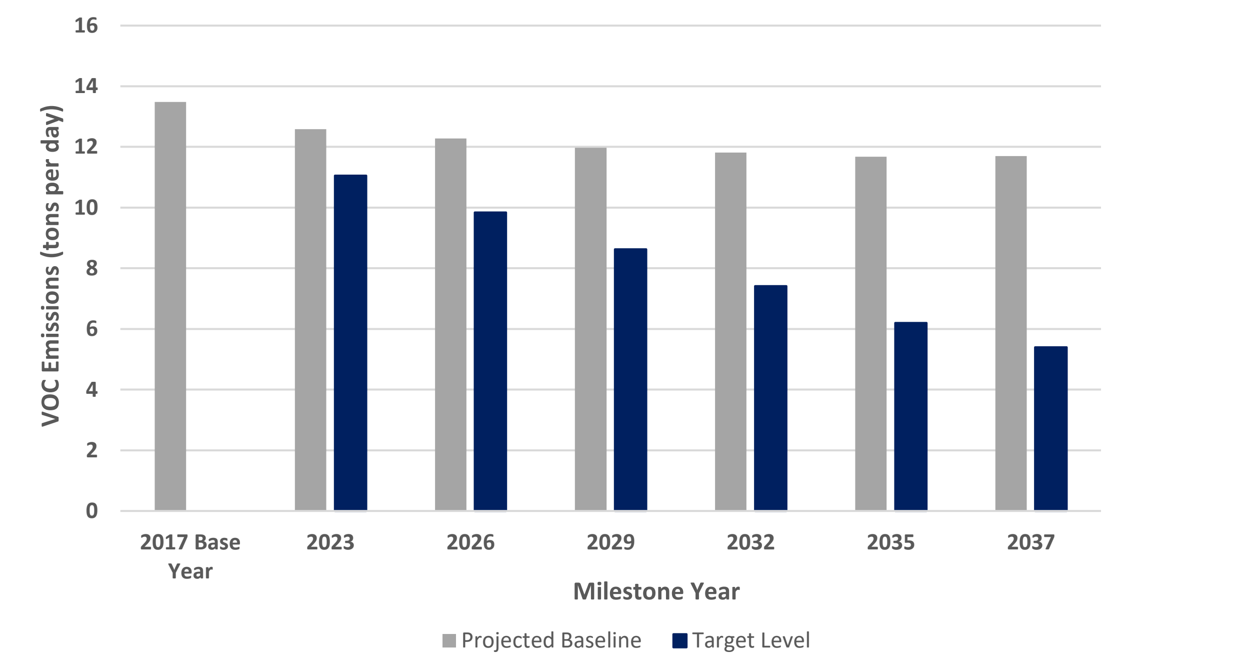


FIGURE 7-11

REASONABLE FURTHER PROGRESS – VOC

~~[RFP BASELINE EMISSIONS REFLECT EMISSION REDUCTION BENEFITS FROM CARB'S HEAVY-DUTY INSPECTION AND MAINTENANCE PLAN (HD I&M) AND SMALL OFF-ROAD ENGINES (SORE) REGULATIONS ADOPTED IN DECEMBER 2021; USED IN RFP DEMONSTRATION]~~

TABLE 7-10

SUMMARY OF REASONABLE FURTHER PROGRESS CALCULATIONS – NOx

Row	Calculation Step[a]	2017[b]	2023	2026	2029	2032	2035	2037
1	RFP Baseline NOx Emissions (tons/day)~~[c]~~	19.~~42~~43	13.32	11.02	10.50	10.~~21~~20	9.78	9.~~24~~23
2	Reductions in NOx Emissions since Base Year (tons/day)	-	6.~~10~~11	8.~~40~~41	8.~~92~~93	9.~~22~~23	9.~~64~~65	10.~~19~~20
3	Percent Reductions in NOx Emissions since Base Year (%)	-	31.4	43.3	~~45.9~~46.0	47.5	49.~~6~~7	52.5
4	Cumulative Shortfall in VOC (%)	-	11.~~3~~4	18.~~1~~2	24.~~8~~9	32.~~6~~7	40.~~7~~6	46.~~8~~7
5	Percent Surplus Reduction (%)	-	20.1	25.1	21.1	14.8	9.0	5.~~7~~8
6	RFP Compliance	-	Yes	Yes	Yes	Yes	Yes	Yes

[a] Units are in tons per day (tons/day), based on the summer planning inventory unless otherwise noted.
[b] Base Year (2017).
~~[c] Baseline Emissions reflect emission reduction benefits from CARB's Heavy-Duty Inspection and Maintenance Plan (HD I&M) and Small Off-Road Engines (SORE) regulations adopted in December 2021; used in RFP demonstration.~~

Row Description:

ROW 1: RFP baseline emissions used for RFP demonstration; Baseline and Future Emission Inventory taking into account existing rules and projected growth, and CARBS's HD I&M and SORE regulations.

ROW 2: Reductions achieved in Baseline: [(Row 1 Base Year) – (Row 1 Milestone Year)]; e.g., for 2026: 19.~~42~~43 tons/day – 11.02 tons/day = 8.~~40~~41 tons/day.

ROW 3: % Reductions achieved since Base Year: [(Row 2) / (Row 1 Base Year)] x 100; e.g., for 2026: (8.~~40~~41/19.~~42~~43) x 100 = 43.3%.

ROW 4: Cumulative VOC shortfall from Table 7-~~7~~9.

ROW 5: Surplus reductions achieved [(Row 3) – (Row 4)].

ROW 6: Positive number in Row 5 is percent surplus for each milestone year, thus meeting RFP target levels.

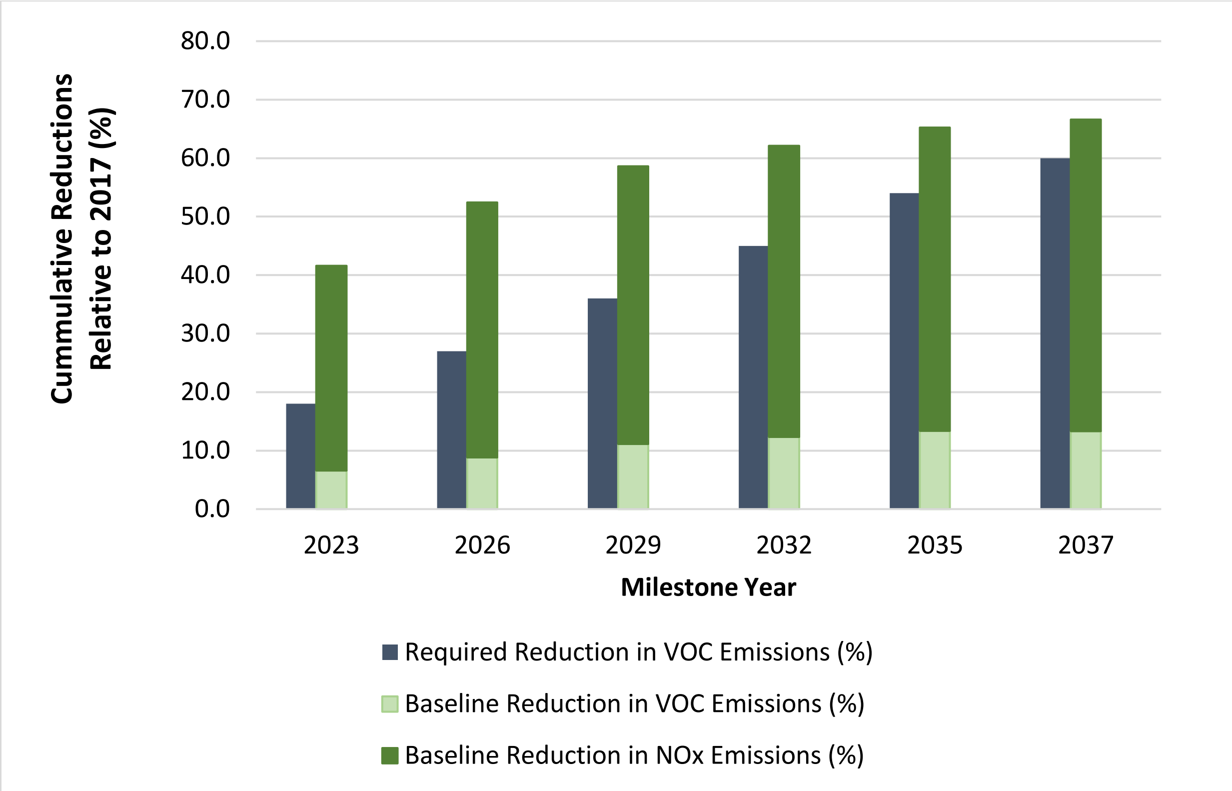


FIGURE 7-12
REASONABLE FURTHER PROGRESS WITH VOC AND NOx REDUCTIONS

Transportation Conformity Budget

The California Air Resources Board (CARB) has prepared the Motor Vehicle Emissions Budget (MVEB)[21] for the 70 parts per billion (ppb) 2015 8-hr ozone National Ambient Air Quality Standard (NAAQS). The MVEB is the maximum allowable emissions from motor vehicles within an air basin and is used for determining whether transportation plans and projects conform to the applicable State Implementation Plan (SIP).

Transportation conformity is the federal regulatory procedure for linking and coordinating the transportation and air quality planning processes through the MVEB established in the SIP. Under section 176(c) of the Clean Air Act (Act), federal agencies may not approve or fund transportation plans and projects unless they are consistent with the regional SIP. In addition, conformity with the SIP requires that transportation activities do not (1) cause or contribute to new air quality violations, (2) increase the frequency or severity of any existing violation, or (3) delay timely attainment of NAAQS. Therefore,

[21] Federal transportation conformity regulations are found in 40 CFR Part 51, subpart T – Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 U.S.C. of the Federal Transit Laws. Part 93, subpart A of this chapter was revised by the EPA in the August 15, 1997 Federal Register.

quantifying on-road motor vehicle emissions and comparing those emissions with a budget established in the SIP determine transportation conformity between air quality and transportation planning.

The MVEBs are set for each criteria pollutant or its precursors for each milestone year and the attainment year of the SIP. Subsequent transportation plans and programs produced by transportation planning agencies must demonstrate that the emissions from the proposed plan, program, or project do not exceed the MVEBs established in the applicable SIP. The MVEBs established in this SIP apply as a "ceiling" or limit on transportation emissions for the Southern California Association of Governments for the years in which they are defined and for all subsequent years until another year for which a different budget is specified, or until a SIP revision modifies the budget. For the Coachella Valley 70 ppb 8-hr ozone SIP, the milestone years and the attainment year of the SIP (also referred to as the plan analysis years) are 2023, 2026, 2029, 2032, 2035, and 2037.

Methodology

The MVEB for the 70 ppb ozone SIP is established based on guidance from the U.S. EPA on the motor vehicle emission categories and precursors that must be considered in transportation conformity determinations as found in the transportation conformity regulation and final rules as described below.

The MVEB must be clearly identified and precisely quantified, and consistent with applicable CAA requirements for reasonable further progress and attainment toward meeting NAAQS. Further, it should be consistent with the emission inventory and control measures in the SIP.

The 70 ppb 8-hr ozone SIP establishes budgets for VOC and NOx emissions, which are ozone precursors, using emission rates from California's motor vehicle emission model, EMFAC2017 (V.1.0.3)[22], using activity data (vehicle miles traveled [VMT] and speed distributions) from the Southern California Association of Governments' (SCAG) latest regional transportation plan, which is the 2020 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS).[23]

On August 15, 2019, the U.S. EPA approved EMFAC2017 for use in SIPs and to demonstrate transportation conformity.[24] The EMFAC model estimates emissions from two combustion processes (start and running) and four evaporative processes (hot soak, running loss, diurnal, and resting loss). In addition, the emissions output from the EMFAC2017 model was adjusted to account for the impacts of recently adopted regulations and regulations currently under development that are not reflected in the EMFAC2017 model using off-model adjustments.[25] The regulations incorporated in this way are the Heavy-Duty Warranty Phase 1, Innovative Clean Transit (ICT), Amendments to the Heavy-Duty Vehicle

[22] More information on data sources can be found in the EMFAC technical support documentation at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-documentation.

[23] SCAG Connect SoCal 2020 RTP/SCS.

https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal-plan_0.pdf?1606001176.

[24] U.S. EPA approval of EMFAC2017 can be found at 84 FR 41717 https://www.federalregister.gov/d/2019-17476.

[25] Off-Model Adjustment Factors to Account for Recently Adopted Regulations in EMFAC2017 Model https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory.

Inspection Program (HDVIP), Periodic Smoke Inspection Program (PSIP), Advanced Clean Trucks (ACT), Heavy-Duty (HD) Low NOx Omnibus, Heavy-Duty Inspection and Maintenance, Advanced Clean Cars II (ACC II), and Advanced Clean Fleets (ACF).

The MVEB for this SIP was developed to be consistent with the on-road emissions inventory[26] and attainment demonstration, using the following method:

1) Used the EMFAC2017 model to produce an initial/preliminary calculation of the on-road motor vehicle emissions totals (average summer day) for the appropriate pollutants (VOC and NOx) using 2020 RTP/SCS activity data.
2) Applied the off-model adjustments to account for recently adopted regulations. On-Road mobile source emissions accounting for steps 1 and 2 are consistent with the emissions presented in Chapter 3 and Appendix III of this Plan.
3) Subtracted expected emission reductions from ACC II and ACF to be consistent with the on-road control measures in the California's State Implementation Plan Strategy.[27]
4) Rounded the totals for both VOC and NOx to the nearest tenth ton.

Motor Vehicle Emissions Budget

The MVEB in Table 1 was established according to the methodology outlined above and in inter agency consultation[28] - the South Coast Air Quality Management District, California Air Resources Board, the Southern California Association of Governments, U.S. EPA, Federal Highway Administration (FHWA), and Federal Transit Administration (FTA). The MVEB is consistent with the emission inventories and control measures in the 70 ppb 8-hr ozone SIP. These budgets will be effective once U.S. EPA determines it is adequate.

Table 7-11 contains detailed MVEBs for each milestone and attainment year for the Coachella Valley regions. In addition, it provides emissions from the EMFAC 2017 model, recently adopted regulations, and regulations currently under development using off-model adjustments for both VOC and NOx emissions. The final MVEB is rounded upwards to the nearest ton.

[26] More information about the on-road motor vehicle emission budgets can be found in Chapter 3 and Appendix III of the plan.

[27] 2022 State Strategy for the State Implementation Plan https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy.

[28] To satisfy the requirements established in 40 CFR Part 93, Section 118(e)(4)(ii).

TABLE 7-11

MOTOR VEHICLE EMISSIONS BUDGETS FOR THE 70 PPB OZONE STANDARD (SUMMER SEASON)

Coachella Valley Totals (Tons/Day)	2023		2026		2029	
-	VOC	NOx	VOC	NOx	VOC	NOx
Vehicular Exhaust	2.65	5.98	2.41	5.79	2.26	5.71
Reductions from recently adopted regulations using off-model adjustments[a]	0.0001	0.2599	0.0013	2.2561	0.0045	2.7522
Reductions from developing regulations using off-model adjustments[b]	-	-	-	-	-	-
Total[c]	2.65	5.72	2.41	3.54	2.26	2.96
Motor Vehicle Emission Budget[d]	2.7	5.8	2.5	3.6	2.3	3

Coachella Valley Totals (Tons/Day)	2032		2035		2037	
-	VOC	NOx	VOC	NOx	VOC	NOx
Vehicular Exhaust	2.11	5.71	1.92	5.84	1.88	6.01
Reductions from recently adopted regulations using off-model adjustments[a]	0.0101	3.0465	0.0161	3.3464	0.0204	3.5502
Reductions from developing regulations using off-model adjustments[b]	-	-	-	-	0.23	0.89
Total[c]	2.10	2.66	1.90	2.49	1.63	1.56
Motor Vehicle Emission Budget[d]	2.2	2.7	2	2.5	1.7	1.6

[a] This reflects the adjustment factor for Heavy-Duty Vehicle Warranty Phase 1, ICT, HDVIP/PSIP, ACT, HD I/M, and HD Low NOx Omnibus regulations.

[b] This reflects the on-road commitments for ACCII and ACF from the draft 2022 State SIP Strategy.

[c] Values from EMFAC2017 v1.03 may not add up due to rounding.

[d] Motor vehicle emission budgets calculated are rounded up to the nearest tenth of a ton per day.

Source: EMFAC2017 v1.03

Other Federal Clean Air Act Requirements.

The VMT Offset demonstration required for the 2015 ozone standard was submitted to the U.S. EPA in 2020.[29] The Reasonably Available Control Measures demonstration and the Motor Vehicle Emissions Budgets are included in Appendix VI.

Ozone Attainment Demonstration and Projections

Design Values

For modeling purposes, the U.S. EPA's guidance requires the use of a 5-year weighted average design value to calculate future air quality using Relative Response Factors (RRF). Ozone design values in the Coachella Valley experienced an overall decline with respect to the design values used in the 2016 AQMP. Figure 7-~~12~~13 shows the 5-year weighted design value trends from the period 2010-2014 included in the 2016 AQMP through the period 2015-2019 used in this AQMP. Palm Springs remains the design monitoring site for Coachella Valley, and its design value decreased from 91.7 ppb to 89.3 ppb. Indio's design value decreased initially but it went back up during the last two 5-year period to the exact same design value of 84.3 ppb as in the 2016 AQMP (2010-2014 period).

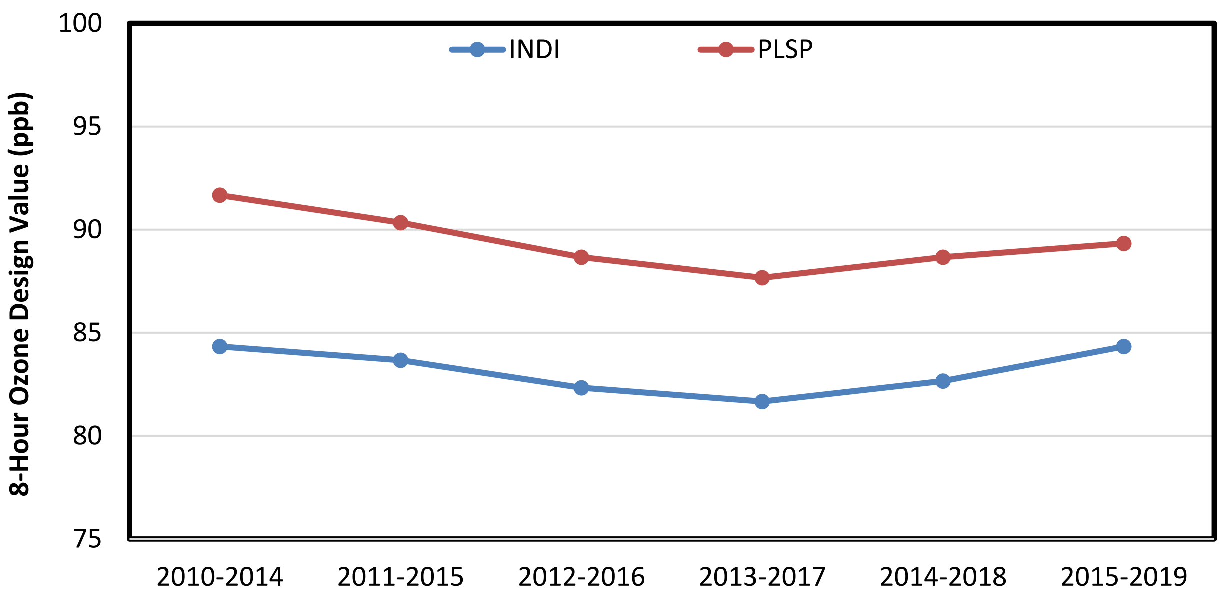


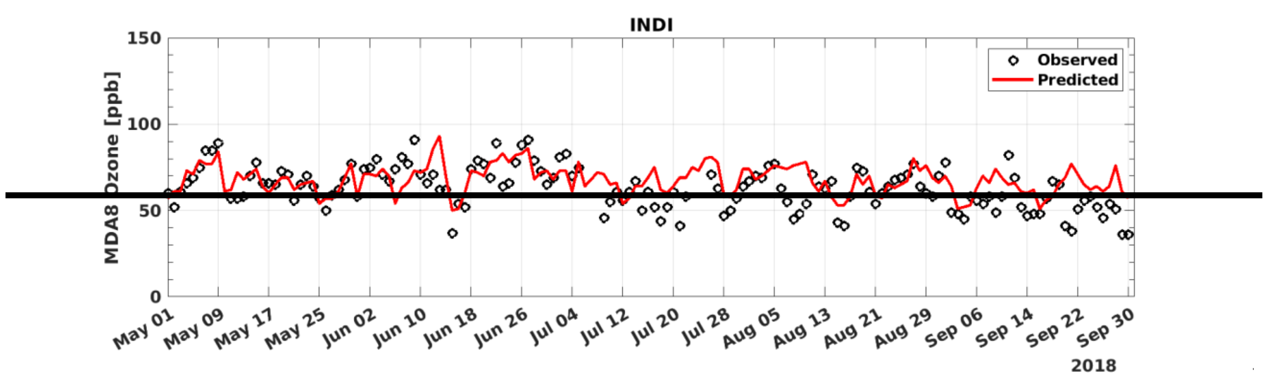
FIGURE 7-~~12~~13

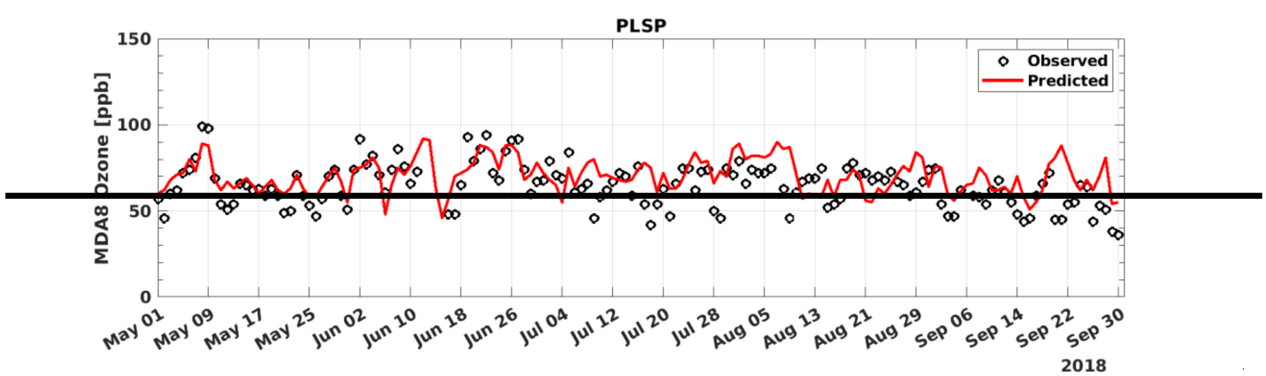
5-YEAR WEIGHTED 8-HOUR OZONE DESIGN VALUES IN THE COACHELLA VALLEY MONITORING STATIONS OF PALM SPRINGS (PLSP) AND INDIO (INDI)

[29] https://ww2.arb.ca.gov/resources/documents/2017-baseline-inventory-and-vehicle-miles-traveled-offset-demonstration-2015-70.

2015 8-Hour Ozone NAAQS Attainment Demonstration

The Coachella Valley is classified as “severe-15” ozone nonattainment area for the 2015 8-hour ozone standard with 2032 as the attainment year. Air quality modeling simulations for the attainment demonstration in the Coachella Valley use the same modeling framework and modeling domain as in the attainment demonstration for the Basin consistent with that presented in Chapter 5 and Appendix V of this AQMP. Briefly, future projected air quality for the Coachella Valley was developed using CMAQ simulations and Relative Response Factors (RRFs), focusing on the 10 highest ozone days for the Coachella Valley stations during the five-month period encompassing the peak of the ozone season (May through September of 2018; 153 days). RRFs were calculated by comparing 2018 and future emission scenario simulations. Figure 7-~~13~~14 depicts the modeled and measured 8-hour ozone concentrations at Indio (INDI) and Palm Springs (PLSP) in the Coachella Valley during the 2018 ozone season. These data demonstrate that the model captures high ozone episodes, which suggests reasonable model performance especially for the top 10 days that are used in the RRF. A comprehensive model performance evaluation is presented in Appendix V.





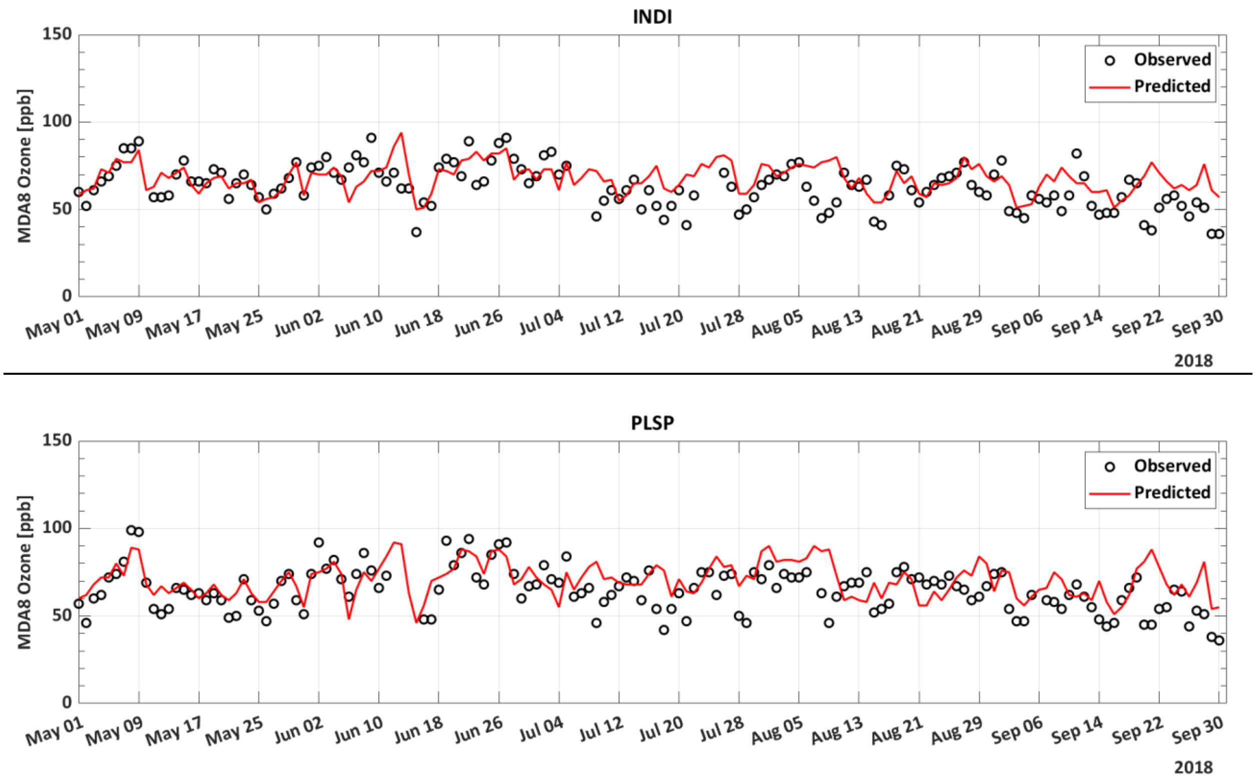


FIGURE 7-~~13~~14

MODELED AND OBSERVED INDIO (TOP) AND PALM SPRINGS (BOTTOM) DAILY MAXIMUM 8-HOUR (MDA8) AVERAGE OZONE CONCENTRATIONS: MAY 1 THROUGH SEPT 30, 2018.

Isopleth plots generated using the AQMP modeling framework are developed to understand the overall level of emission reductions for the South Coast Air Basin required to attain ozone standards in the Coachella Valley. Since the transport of ozone and its precursors from the Basin is the main cause of the ozone pollution in the Coachella Valley, the emission reductions in the Basin is the key to attain federal ozone standards. The ozone isopleths were therefore illustrated as a function of the Basin's total emissions. Figure 7-~~14~~15 shows the isopleth plots for Palm Springs and Indio. The plots suggest that Indio will have higher ozone levels in 2037 than Palm Springs. ~~For the Coachella Valley to attain~~Attainment of the 2015 8-hour ozone standard of 70 ppb[30] in the Coachella Valley requires a carrying capacity of ~~100~~ 70 tons per day of NOx in the Basin. This corresponds to a ~~57~~65 percent decrease in NOx in the Basin ~~and Coachella Valley~~ beyond 2032 baseline emissions.

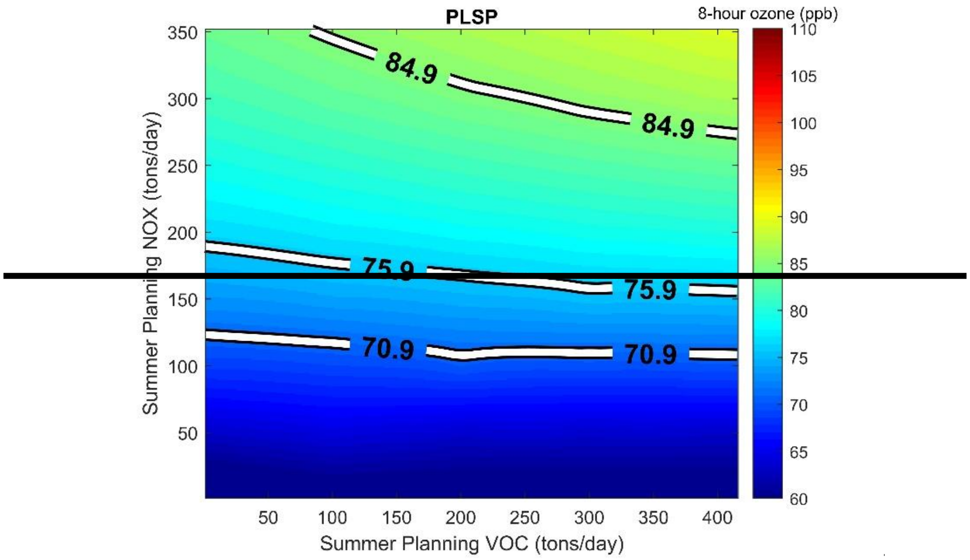
While isopleth plots provide a general understanding on how ozone responds to overall reductions of emissions in the modeling domain, attainment demonstration requires modeling of source specific

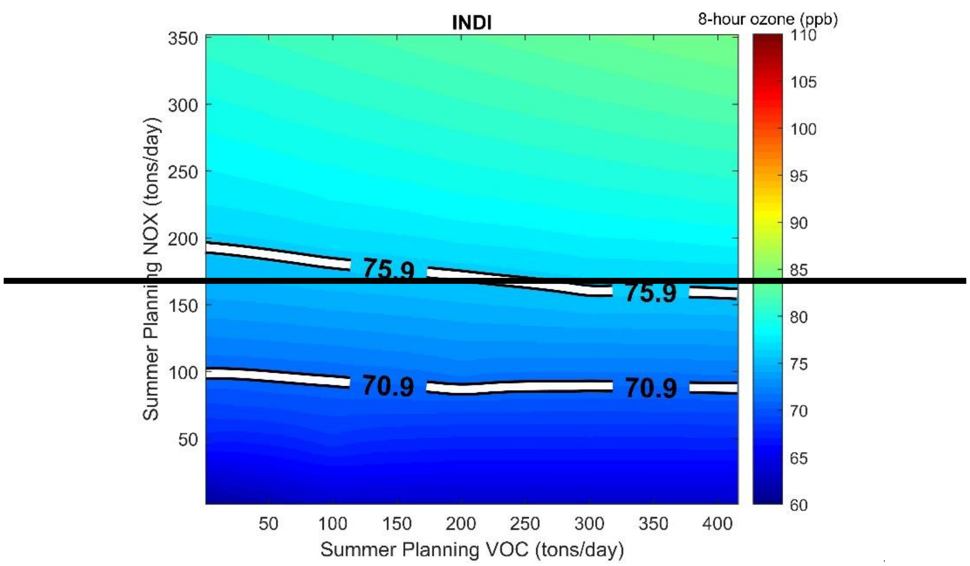
[30] From the U.S. EPA's Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5 and Regional Haze, 2018: "Design values for the 0.070 ppm NAAQS are truncated to the 3rd decimal digit. Therefore, 0.0709 ppm (70.9 ppb) is considered attainment and 0.0710 (71.0 ppb) is considered nonattainment. The same rounding/truncation procedures should be applied in the modeled attainment test."

emission reductions based on specific proposed regulations. Figure 7-~~15~~16 shows the remaining NOx emissions in the Coachella Valley and the Basin in the 2018, 2032 and 2037 baselines, and the attainment demonstration scenarios in 2032 and 2037. Figure 7-~~16~~17 shows the future ozone design values in the Coachella Valley monitoring stations resulting from the emission scenarios shown in Figure 7-~~15~~16. The 2032 ~~Draft~~ Progress scenario assumed linear progress for South Coast AQMD's stationary source measures from 2022 to 2037. Year specific control factors for mobile sources were provided based on the draft 2022 SIP Strategy by CARB. Detailed emissions reductions for 2032 scenario are provided in Table 7-~~11~~12. Simulation of baseline 2032 and baseline 2037 show progress on ozone based on current regulations but fail to demonstrate attainment. This indicates that for the Coachella Valley to meet the 2015 8-hour ozone standard, additional emission reductions beyond current regulations are needed.

Additional control scenarios are simulated to show potential pathways towards attainment in the Coachella Valley. Baseline and attainment scenarios for the Coachella Valley include parallel emission reductions in the Basin. As measurements and simulations suggest, transport from the Basin contribute substantially to ozone concentrations in the Coachella Valley, and emission controls in the Basin are necessary to be able to attain the federal 8-hour ozone standards. The ~~Draft~~ Progress scenario for 2032 includes partial fulfillment of the proposed control measures by CARB and South Coast AQMD that target the ozone attainment in the Basin by 2037. In particular, the progress of the control measures by 2032 is shown in Table 7-~~11~~12. With this level of emission reductions, results show that the Coachella Valley would fail to attain the ozone standards by 2032, with a design value of 71.7 ppb in Indio. ~~5 ppb in Indio. In addition, some emission reductions included in the 2032 attainment scenario would be considered as reductions from 182(e)(5) measures ("black box" measures). However, because the Coachella Valley is designated as Severe-15 nonattainment area, "black box" measures are not allowed to be used to demonstrate attainment.~~

In contrast, the 2037 attainment demonstration scenario for the Basin shows that the monitoring stations in the Coachella Valley would have design values well below the 2015 8-hour ozone federal standard. All monitoring stations in the Coachella Valley are expected to meet the 2015 ozone NAAQS in 2037 with the control strategy to attain the standard in the South Coast Air Basin.


PLSP
8-hour ozone (ppb)
84.9
84.9
75.9
75.9
70.9
70.9
Summer Planning NOX (tons/day)
Summer Planning VOC (tons/day)
350
300
250
200
150
100
50
50
100
150
200
250
300
350
400
110
105
100
95
90
85
80
75
70
65
60


INDI
8-hour ozone (ppb)
75.9
75.9
70.9
70.9
Summer Planning NOX (tons/day)
Summer Planning VOC (tons/day)
350
300
250
200
150
100
50
50
100
150
200
250
300
350
400
110
105
100
95
90
85
80
75
70
65
60

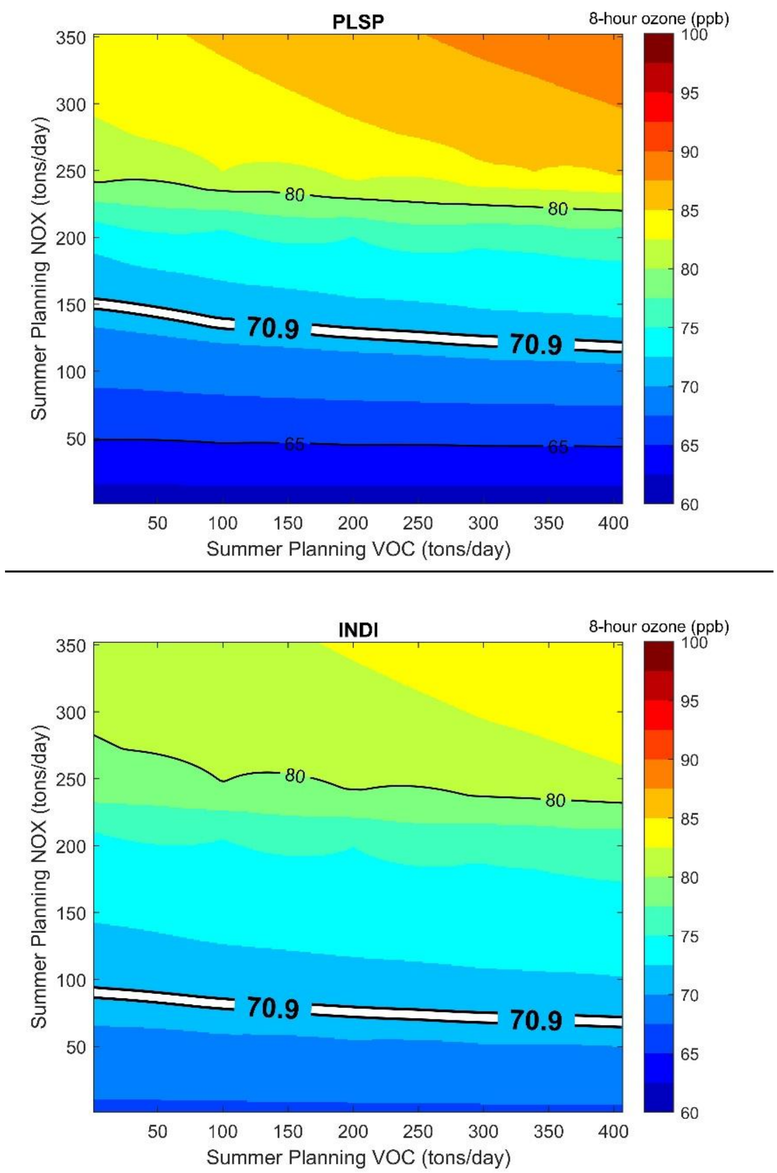


FIGURE 7-~~14~~15

ISOPLETH PLOTS OF THE 8-HOUR OZONE DESIGN VALUES IN THE COACHELLA VALLEY MONITORING STATIONS OF PALM SPRINGS (PLSP, TOP) AND INDIO (INDI, BOTTOM)

TABLE 7-~~11~~12

SUMMARY OF CATEGORY-SPECIFIC NOx EMISSION REDUCTIONS (TONS PER DAY) FROM CARB AND SOUTH COAST CONTROL MEASURES IN 2032

Control Measure	NOx Baseline	NOx Reduction	Category Remaining NOx
South Coast AQMD stationary measures	~~41~~42.1	2.~~7~~6	~~38.4~~39.5
CARB Passenger Vehicles/Motorcycles measures	~~14.8~~17.0	2.~~4~~6	~~12~~14.4
CARB Medium-Duty Vehicles measures	2.~~5~~3	0.~~1~~0	2.~~4~~3
CARB Heavy-Duty Vehicles measures	~~48.6~~23.9	~~32.3~~10.0	~~16.4~~14.0
CARB Locomotive measures	17.~~7~~8	~~11.5~~10.0	~~6.2~~7.8
CARB Off-Road Equipment measures	~~40.0~~27.6	~~16.7~~8.9	~~23.2~~18.7
CARB Commercial Harbor Craft measures	5.6~~.1~~	~~3~~2.6	3.~~1~~0
CARB Recreational Boast measures	3.4	0.~~0~~1	3.~~4~~3
Total CARB and South Coast AQMD Measures	**~~174.3~~139.7**	**~~68.7~~36.8**	**~~105.6~~102.9**
South Coast AQMD MOB-05 incentive program[1]	N/A	0.2	N/A
South Coast AQMD MOB-11 incentive program[2]	N/A	~~10.~~7.1	N/A
Aircraft[3]	25.~~7~~9	0	25.~~7~~9
Ocean-Going Vessels (OGV)[4]	~~30.4~~33.2	0	~~30.4~~33.2
Total (All Measures)[5]	**~~230.2~~198.9**	**~~79.5~~44.1**	**~~150.7~~154.8**

[1]Estimated reductions from Accelerated Retirement of Older Light-Duty and Medium-Duty Vehicles.
[2]Estimated reductions from mobile sources with emission reductions from Incentive Programs.
[3]No reduction assumed for aircraft emission in the 2032 control scenario.
[4]No reduction assumed for OGV emission in the 2032 control scenario, area quantified as “server” non-attainment cannot rely on emission reduction from sources from 182(e)(5).
[5]Sum may not add up to due to rounding.

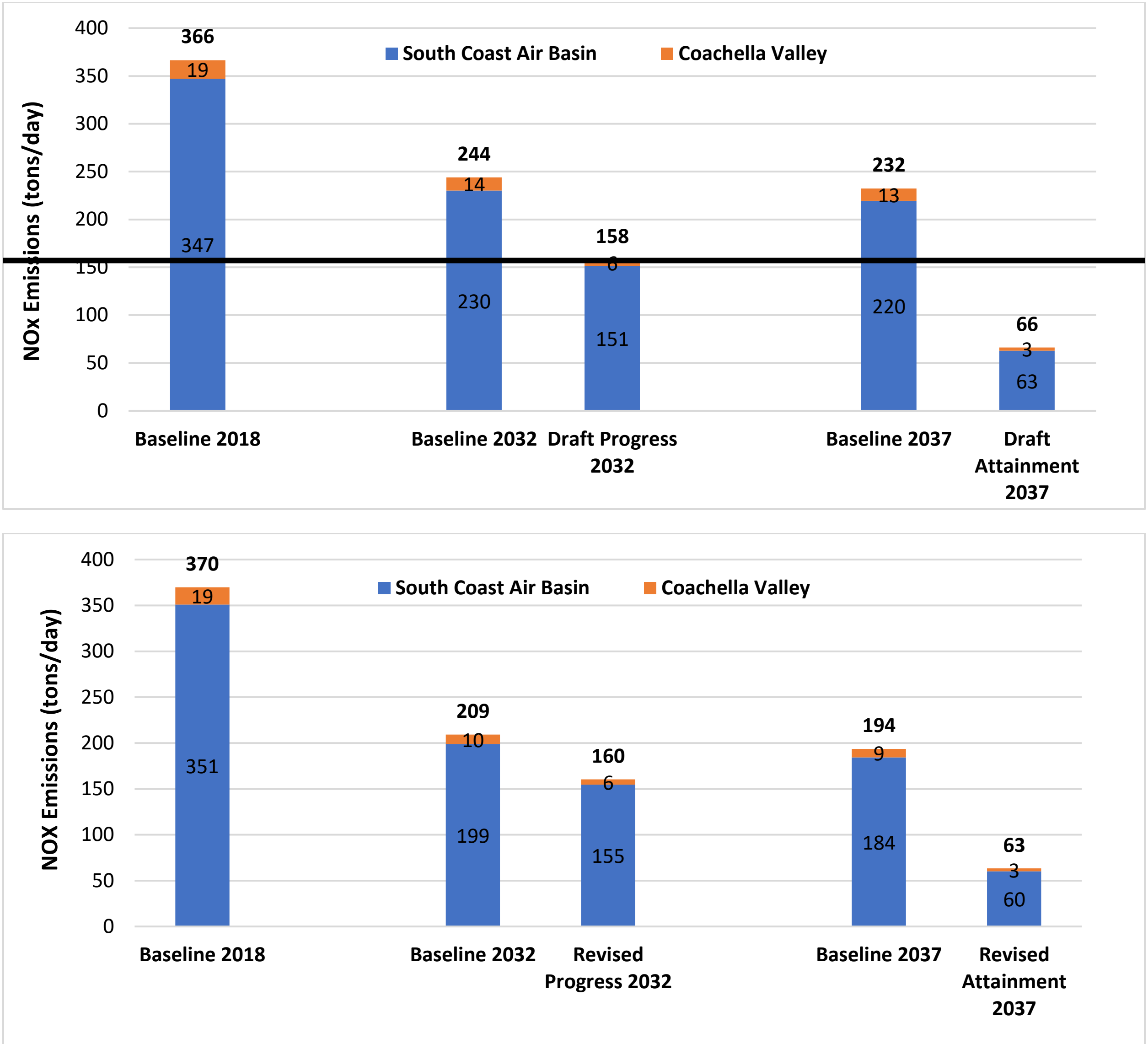


FIGURE 7-~~15~~16

SUMMARY OF NOX EMISSIONS IN THE ATTAINMENT DEMONSTRATION FOR THE COACHELLA VALLEY.

(*EMISSIONS FROM THE BASIN AND COACHELLA VALLEY ARE SHOWN. TOTALS REFLECT THE SUM OF EMISSIONS IN THE BASIN AND THE COACHELLA VALLEY AND ARE SHOWN IN BOLD AT THE TOP OF EACH BAR.*)

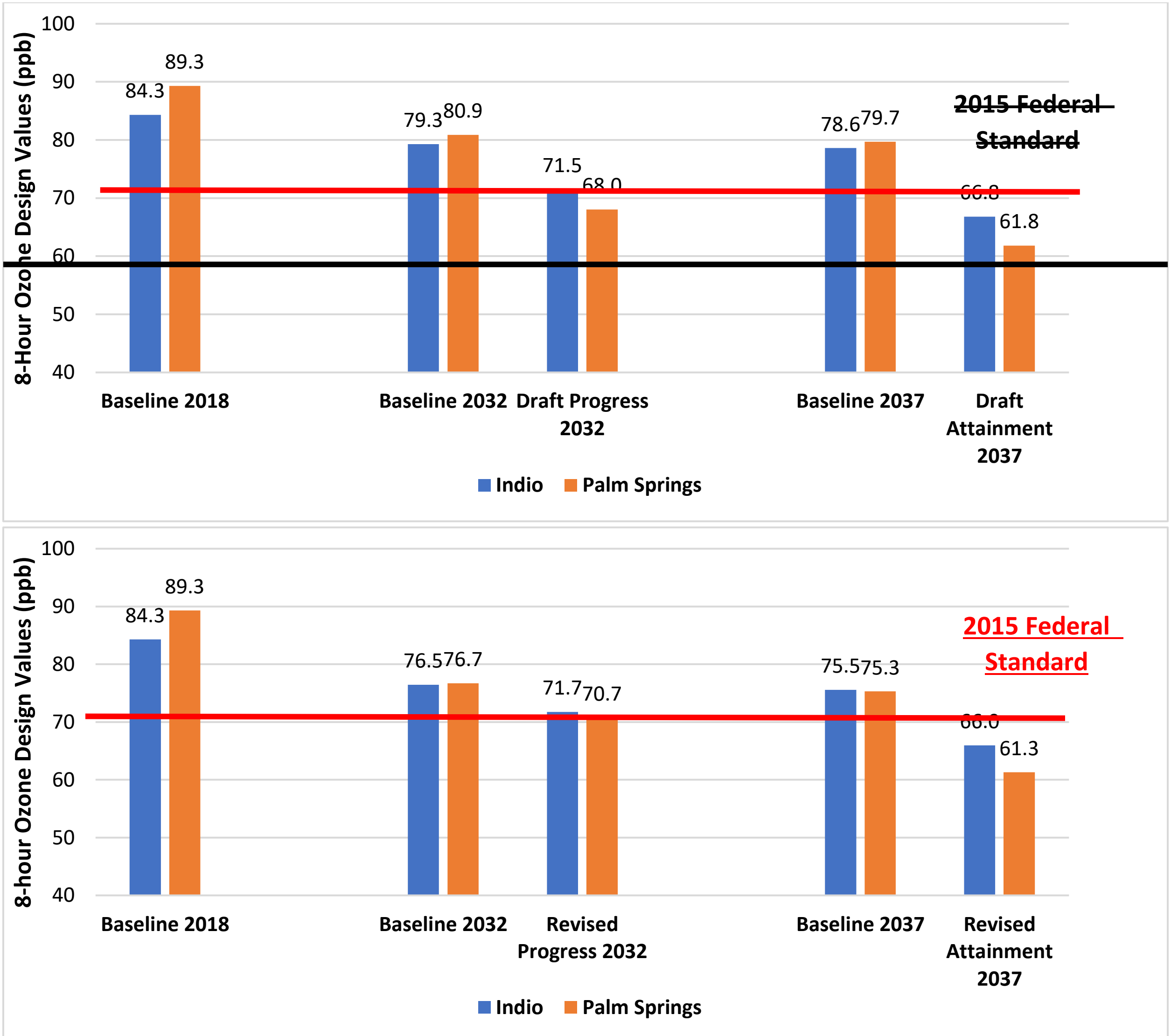


FIGURE 7-~~16~~17
FUTURE OZONE DESIGN VALUES IN THE COACHELLA VALLEY IN COMPARISON WITH FEDERAL STANDARD

Impracticability Demonstration

The high levels of ozone experienced in the Coachella Valley are mostly due to ozone and emissions transported from the South Coast Air Basin. Attainment of the 2015 ozone standard in Coachella Valley without substantial emissions reductions in the Basin is not possible. Namely, the Coachella Valley is unable to attain the ozone standards by 2032 even with undefined "black box" emission reduction measures implanted in the Basin to attain the 2015 8-hour ozone standard by the 2037 deadline. Therefore,~~ the~~ South Coast AQMD seeks a voluntary bump up in classification to Extreme nonattainment for the 2015 8-hour ozone standard for the Coachella Valley Planning Area. To do so,~~ the~~ South Coast AQMD must demonstrate that meeting the standard by the 2032 deadline is impractical. This section provides the impracticability demonstration and a request to reclassify the Coachella Valley as Extreme nonattainment ("bump-up" request) and the attainment demonstration in 2037.

Table 7-~~12~~13 shows that the ongoing emission reductions from already adopted regulations and programs (baseline) did improve the 8-hour ozone in 2032 but fell short of demonstrating attainment. The 2032 baseline design value is projected to be ~~80.9~~76.7 ppb at Palm Springs, the highest ozone level in the Coachella Valley with the 2032 baseline scenario. The 2032 Progress Scenario, which reflects emission reductions specified in Table 7-~~11~~12, is still short of attainment. The 2032 Progress Scenario yielded a design value of 71.~~5~~7 ppb at Indio, above the 2015 ozone standard. Coachella Valley will therefore not attain the standard by the deadline and will require an extension until further emission reductions can be achieved.

TABLE 7-~~12~~13

BASELINE AND FUTURE PROJECTED DESIGN VALUES IN COACHELLA VALLEY

Station	2018 5-Year Weighted Design Value (ppb)	2032 Baseline Design Value (ppb)	2032 ~~Draft Progress~~ Control Scenario (ppb)
Palm Springs	89.3	~~80.9~~76.7	~~68.0~~70.7
Indio	84.3	~~79.3~~76.5	71.~~5~~7

Request to Redesignate the Coachella Valley as Extreme Nonattainment

Under the CAA, the U.S. EPA shall grant requests to reclassify nonattainment areas to higher ozone nonattainment classifications.[31] The voluntarily request for reclassification to a more severe classification is commonly referred to as a "bump-up."

Through this AQMP and accompanying Resolution of the Governing Board adopting the 2022 AQMP, the South Coast AQMD is formally requesting CARB to submit a request to the U.S. EPA for a voluntary reclassification of the Coachella Valley Portion of the Salton Sea Air Basin from "severe-15" to "extreme"

[31] CAA sect 181(b)(3).

nonattainment for the 2015 8-hour ozone standard and that the EPA Administrator grant such request upon receipt. Through this request, the South Coast AQMD is also seeking an extension of the ozone attainment date from ~~June 15~~August 3, 2033 to ~~June 15~~August 3, 2038.

Reclassification from Severe to Extreme nonattainment area implies that requirements for Extreme nonattainment areas would apply in the Coachella Valley. These requirements include but are not limited to the use of clean fuels or advanced control technology for boilers as described at CAA section 182(e)(3) and the lower threshold for Major Sources (10 tons per year). Because the Coachella Valley was reclassified as Extreme nonattainment area for the 1997 8-hour ozone standard in 2019, the implications of a bump-up were already addressed during the development of the Coachella Valley Extreme Area Plan finalized in December of 2020. Other requirements such as RFP determination and attainment demonstration are addressed in this chapter.

2015 8-Hour Ozone NAAQS Attainment Demonstration

The Basin is currently classified as an Extreme nonattainment area for the 2015 8-hour ozone NAAQS with an attainment year of 2037. Since emission reductions in the Basin are critical for attainment in Coachella Valley, and Coachella Valley cannot attain with baseline reductions, attainment can only be demonstrated by employing the control strategy presented in Chapter 4 of this AQMP. The control strategy includes measures identified as 182(e)(5) "black box" measures which will be permitted once U.S. EPA approves the reclassification of Coachella Valley as an Extreme nonattainment area.

Table 7-~~13~~14 summarizes the results of the ozone simulations, displaying both the 2037 baseline and attainment scenarios. The 2037 baseline emissions inventory does not contain additional reductions beyond already adopted measures. As expected, this scenario does not lead to attainment and the control strategy outlined in Chapter 4 of this AQMP must be implemented to achieve attainment. The reductions from the control strategy will ensure attainment of the 2015 federal 8-hour standard by 2037 at all stations, with a design value of 66.40 ppb in Indio.

TABLE 7-~~13~~14

MODEL-PREDICTED 8-HOUR OZONE DESIGN VALUES (PPB)

Station	2037 Baseline	2037 Controlled
Palm Springs	~~80.2~~75.3	~~62~~61.3
Indio	~~78.8~~75.5	66.40

Conclusions

The Coachella Valley is designated as "severe-15" nonattainment for the 2015 8-hour ozone NAAQS[32], which required the attainment date to be 2032. With the current emission controls in place in the Basin and the Coachella Valley, ozone levels are not expected to meet the 2015 8-hour ozone standard by 2032. As air quality modeling simulation results suggest, the Coachella Valley will not be able to attain the 2015 8-hour ozone standards with non-182(e)(5) controlled measures by the deadline of 2032. Thus, the South Coast AQMD is requesting a voluntary reclassification of the Coachella Valley Portion of the Salton Sea Air Basin from "severe-15" to "extreme" nonattainment for the 2015 8-hour ozone standard, with an extension of the ozone attainment date from ~~June 15~~August 3, 2033 to ~~June 15~~August 3, 2038. The Coachella Valley is anticipated to meet the 2015 8-hour ozone NAAQS in 2037 with the emissions reduction commitment proposed to attain the 2015 ozone NAAQS in the South Coast Air Basin. The detailed emission reduction commitment is provided in Chapter 4, ~~and~~ Appendix IV and Appendix VII of this AQMP.

[32] 83 FR 25776.

Chapter 8

Environmental Justice Communities

- **The impacts of air pollution are not distributed equitably throughout the South Coast AQMD jurisdiction, with some communities bearing much higher air pollution burdens.**
- **The 2022 AQMP includes control measures to reduce the levels of ozone – a regional pollutant. The South Coast AQMD, however, addresses disproportionate impacts of local air pollution in disadvantaged communities through the AB 617 program.**
- **While Environmental Justice (EJ) communities typically experience the same or lower levels of ozone than other parts of the region, these communities see higher PM2.5 levels and higher cancer risks from air toxics.**
- **Measures associated with the 2022 AQMP will help reduce air pollution in disproportionately impacted areas.**
- **In the implementation of both existing and future incentive programs, the South Coast AQMD will continue to prioritize EJ areas to address the issues of the most disadvantaged communities.**

In This Chapter

Introduction

Environmental Justice (EJ) communities are disproportionately impacted by various types of pollution and experience health, social, and economic inequities. These inequities can also make residents of EJ communities more vulnerable to the effects of environmental pollution. These communities are often located near multiple air pollution sources including both mobile sources and commercial and industrial facilities. For example, communities adjacent to ports, rail yards and warehouses are exposed to higher levels of emissions from the associated ships, trains, and trucks, including diesel particulate matter, a carcinogen. Communities near refineries and other industries can also suffer from higher levels of air pollution.

The California Office of Environmental Health Hazard Assessment (OEHHA) developed the California Communities Environmental Health Screening Tool (CalEnviroScreen) to identify disadvantaged communities across California based on pollution exposure and population characteristics. This information can be used to advise and assist South Coast Air Quality Management District (South Coast AQMD) in protecting and improving public health in the most impacted communities through the reduction and prevention of air pollution. While there is no universal definition for what constitutes an EJ community, one that is commonly used is the Senate Bill (SB) 535 definition of disadvantaged communities (DACs).[1] These are defined as:

1. Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen 4.0 (1,984 tracts).
2. Census tracts lacking overall scores in CalEnviroScreen 4.0 due to data gaps, but receiving the highest 5 percent of CalEnviroScreen 4.0 cumulative pollution burden scores (19 tracts).
3. Census tracts identified in the 2017 DAC designation as disadvantaged, regardless of their scores in CalEnviroScreen 4.0 (307 tracts).
4. Lands under the control of federally recognized Tribes.

All calculations and maps in this chapter that refer to EJ communities are consistent with this definition. ~~"25% highest scoring census tracts in CalEnviroScreen" along with "22 census tracts that score in the highest 5% of CalEnviroScreen's Pollution Burden, but do not have an overall CalEnviroScreen score because of unreliable socioeconomic or health data."[2] At the time the analysis was conducted for this chapter, CalEnviroScreen 4.0 results were available, but the final SB535 designated areas based on CalEnviroScreen 4.0 data were not yet available. In order to use the most recent CalEnviroScreen analysis, EJ communities were defined as the 25% highest scoring census tracts based on CalEnviroScreen 4.0~~The map of disadvantaged communities that are within the Basin and the Coachella Valley is presented in Figure 8-1.

[1] https://oehha.ca.gov/calenviroscreen/sb535.

~~[2] https://oehha.ca.gov/calenviroscreen/sb535.~~

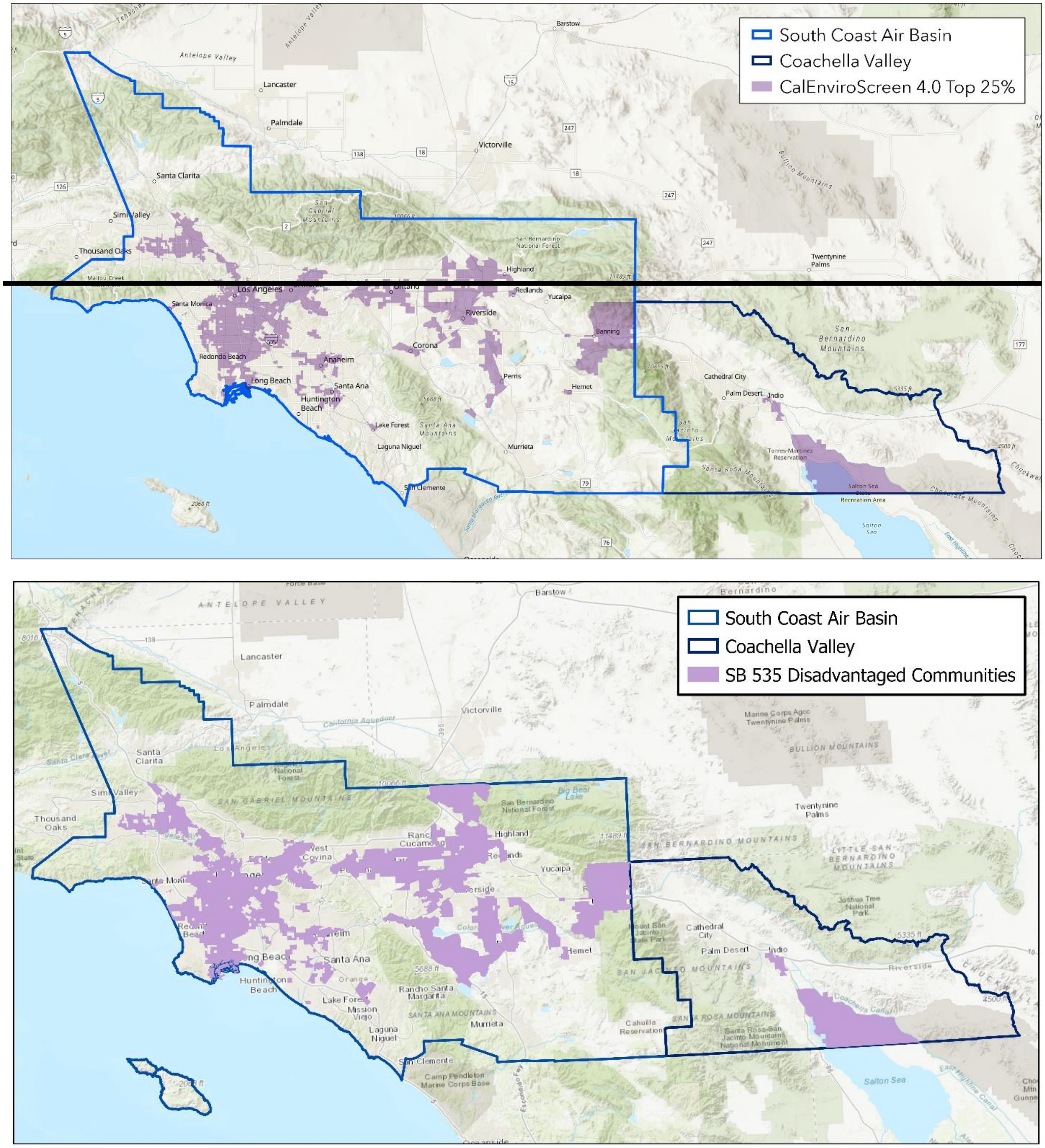


FIGURE 8-1

MAP OF ~~CALENVIROSCREEN 4.0 TOP 25% TRACTS~~SB 535 DISADVANTAGED COMMUNITIES WITHIN THE SOUTH COAST AIR BASIN AND COACHELLA VALLEY.

The 2022 Air Quality Management Plan (AQMP) is a plan focused on steps needed to attain the 2015 8-hour ozone standard. Ozone is a regional pollutant, meaning that it is formed by emissions from sources on a regional level, and the highest levels of ozone are typically measured downwind of emission sources.

As further described in this chapter, environmental justice communities typically experience similar or even lower levels of ozone than other areas in the South Coast Air Basin (Basin). This is because they are mostly located upwind of areas where we see peak levels of ozone formation. However, efforts to achieve the Nitrogen Oxides (NOx) emission reductions will reduce ozone and fine particulate matter (PM2.5) levels, benefiting EJ communities. Transitioning to zero emission technologies where feasible and the cleanest available technologies where zero emission technologies are not feasible, will substantially reduce emissions of diesel particulate matter, a powerful cancer-causing pollutant, and other mobile source pollutants. As shown in Figure 8-2 below, the highest levels of air toxics risk are around our ports, rail yards, and major transportation corridors, where many of our EJ communities are located. About 88% of those risks are from pollutants associated with mobile sources, with diesel particulate matter alone accounting for about half of those risks. Cleaning up emissions from truck, ship, locomotive, and aircraft fleets will therefore substantially reduce health risks from air pollution in impacted communities, while also putting the region on a path to meet federal air quality standards.

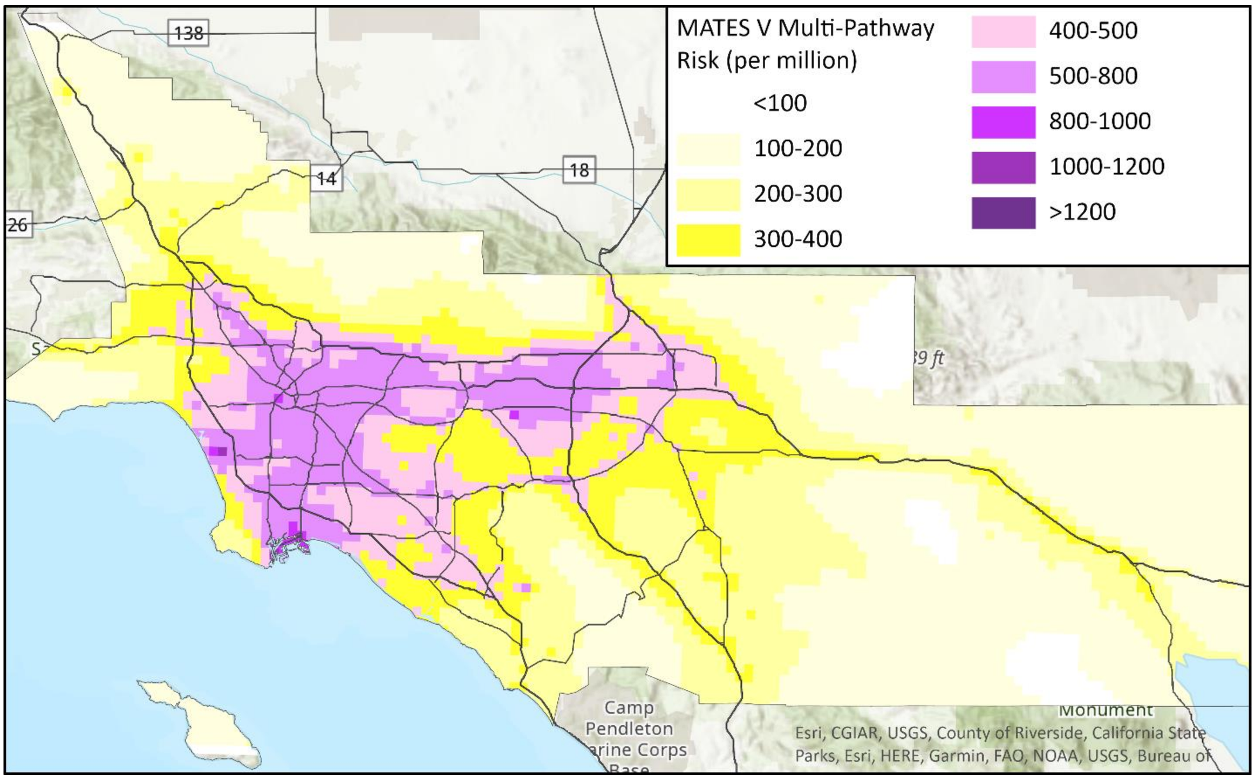


FIGURE 8-2
MODELED MULTI-PATHWAY AIR TOXICS CANCER RISK FROM MATES V (2018 BASE YEAR)[3]

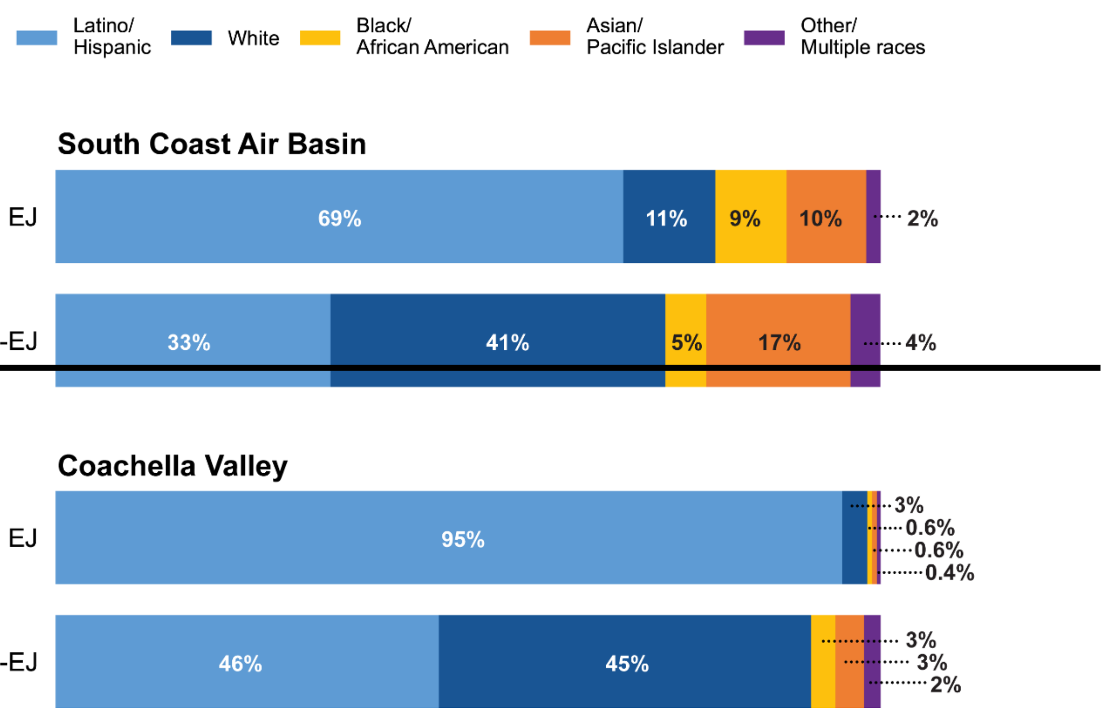
The purpose of this chapter is to describe air quality impacts experienced in EJ communities and outline some of the steps South Coast ~~Air Quality Management District (South Coast~~ AQMD~~)~~ is taking to address localized impacts. While the work described in this chapter will help reduce localized impacts, we know that this work is ongoing, and much more will need to be done to address historic environmental injustice.

[3] http://www.aqmd.gov/docs/default-source/planning/mates-v/mates-v-final-report-9-24-21.pdf?sfvrsn=6.

We are committed to continuing our work with impacted communities, listening to their concerns, and to the greatest extent possible, addressing their concerns.

Environmental Justice Communities

Environmental Justice, or "EJ" has been defined by South Coast AQMD as "equitable environmental policymaking and enforcement to protect the health of all residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status, or geographic location, from the health effects of air pollution." While there are many approaches for identifying EJ communities, throughout this AQMP, we use the ~~top 25% highest scoring census tracts in CalEnviroScreen 4.0.~~definition of disadvantaged communities defined under SB 535. By that definition, approximately ~~37~~42 percent of South Coast Air Basin residents and ~~8~~11 percent of Coachella Valley residents live in EJ communities in ~~the~~ South Coast AQMD jurisdiction. Race and ethnicity are not included in the CalEnviroScreen population indicators, but as discussed in the OEHHA Analysis of Race/Ethnicity and CalEnviroScreen results,[4] people of color disproportionately reside in highly impacted communities in California. These disparities are also clear in both the South Coast Air Basin and Coachella Valley, reflecting the impact of institutional and structural racism that has created unequal pollution burdens and health impacts for different groups (Figure 8-3).



[4] Available online at: https://oehha.ca.gov/media/downloads/calenviroscreen/document/calenviroscreen40raceanalysisf2021.pdf.

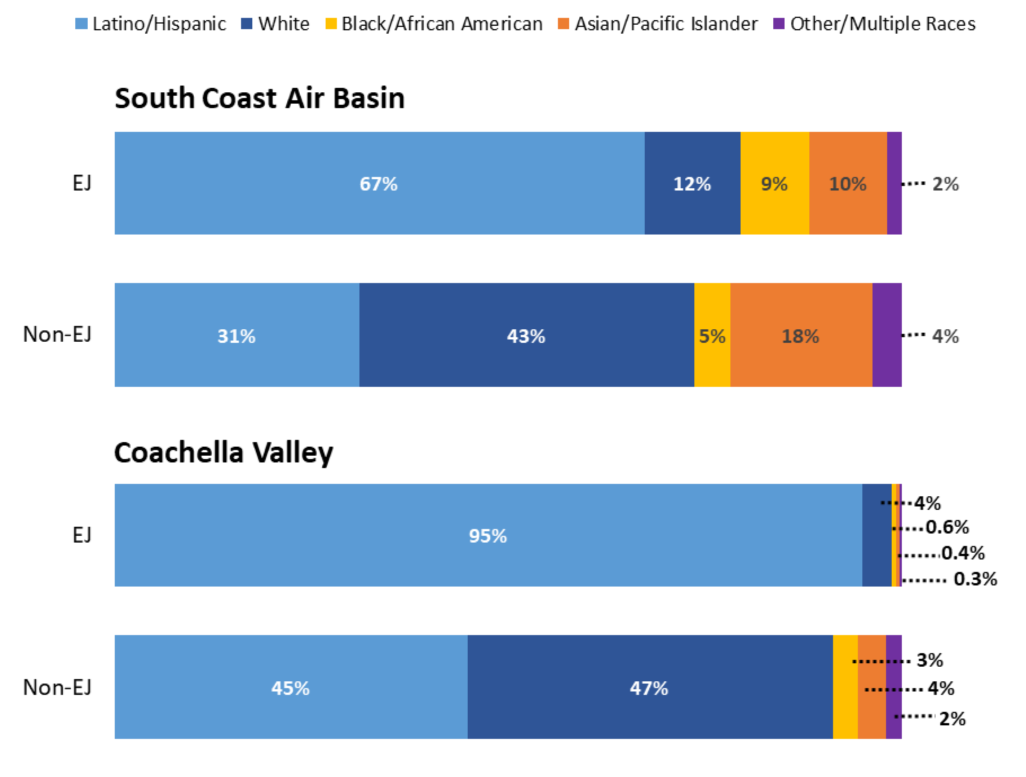


FIGURE 8-3

RACIAL MAKEUP OF EJ AND NON-EJ COMMUNITIES IN THE SOUTH COAST AIR BASIN AND COACHELLA VALLEY.

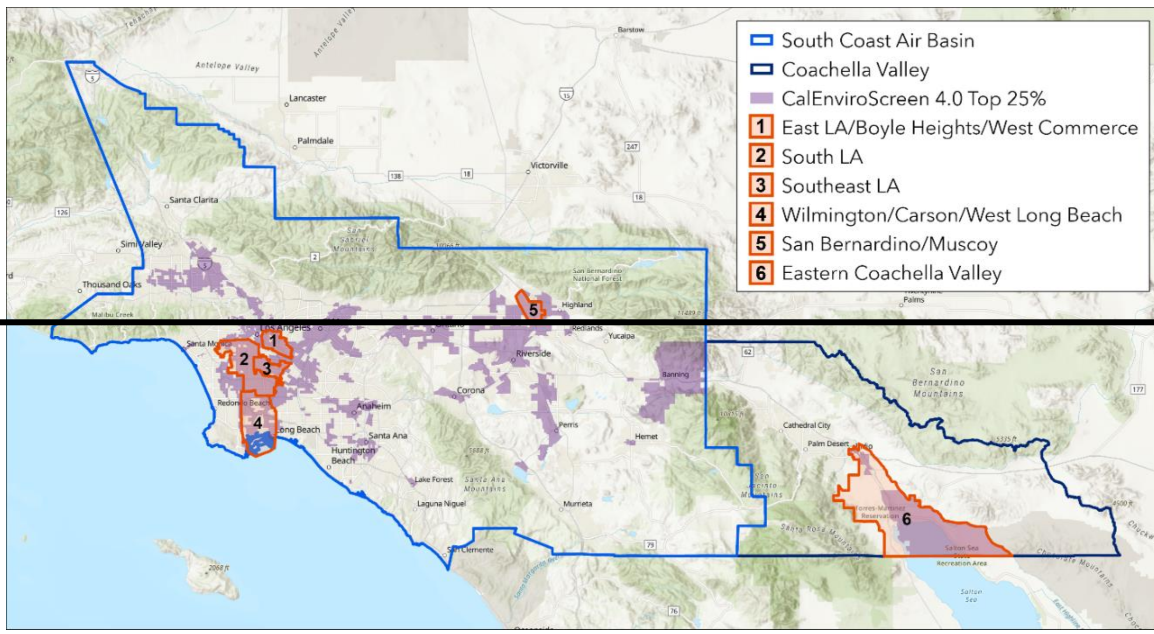
(RACE/ETHNICITY DATA IS FROM CALENVIROSCREEN 4.0 BASED ON 2015-2019 AMERICAN COMMUNITY SURVEY 5-YEAR ESTIMATES FROM THE U.S. CENSUS BUREAU)

Assembly Bill 617

The 2022 AQMP is designed to address regional air pollution, however, ~~the~~ South Coast AQMD recognizes there is still much work to be done to reduce local exposures within EJ communities. Statewide and ~~the~~ South Coast AQMD environmental justice efforts, such as the Assembly Bill 617 (AB 617)[5] program, seek to collaboratively address environmental challenges in communities that are disproportionately impacted by pollution and more vulnerable to the health effects of pollution. AB 617 was signed into California law on July 26, 2017, and focused on addressing disproportionate impacts of local air pollution in EJ communities. The AB 617 program requires local air districts and California Air Resources Board (CARB) to reduce air pollution in disproportionately burdened communities, improve accountability and transparency, and promote collaborative partnerships with community stakeholders. AB 617 communities are designated by CARB, and they specify the plan(s) for the community as either an emissions reduction program, air monitoring program, or both. To meet the emissions reduction program

[5] California Health and Safety Code, § 44391.2.

requirements, ~~the~~ South Coast AQMD works with the communities to develop and implement Community Emission Reduction Plans (CERPs). CERPs are specific to each AB 617 community and are intended to address air quality related impacts in those communities. Similarly, for the air monitoring program requirements, ~~the~~ South Coast AQMD works with the communities to develop and deploy Community Air Monitoring Plans (CAMPs). Both the measures associated with the 2022 AQMP and the elements of AB 617 CERPs will help reduce air pollution in disproportionately impacted areas. More detail on the AB 617 program can be found on~~at the~~ South Coast AQMD's AB 617 Community Air Initiatives webpage.[6] To date, there are six designated AB 617 communities in the South Coast AQMD jurisdiction, as shown by Figure 8-4. The East Los Angeles/Boyle Heights/West Commerce community (ELABHWC), San Bernardino/Muscoy community (SBM) and Wilmington/Carson/West Long Beach community (WCWLB) were designated in 2018; the Eastern Coachella Valley community (ECV) and Southeast Los Angeles community (SELA) were designated in 2019; and the South Los Angeles community (SLA) was designated in 2020.



6 http://www.aqmd.gov/nav/about/initiatives/environmental-justice/ab617-134.

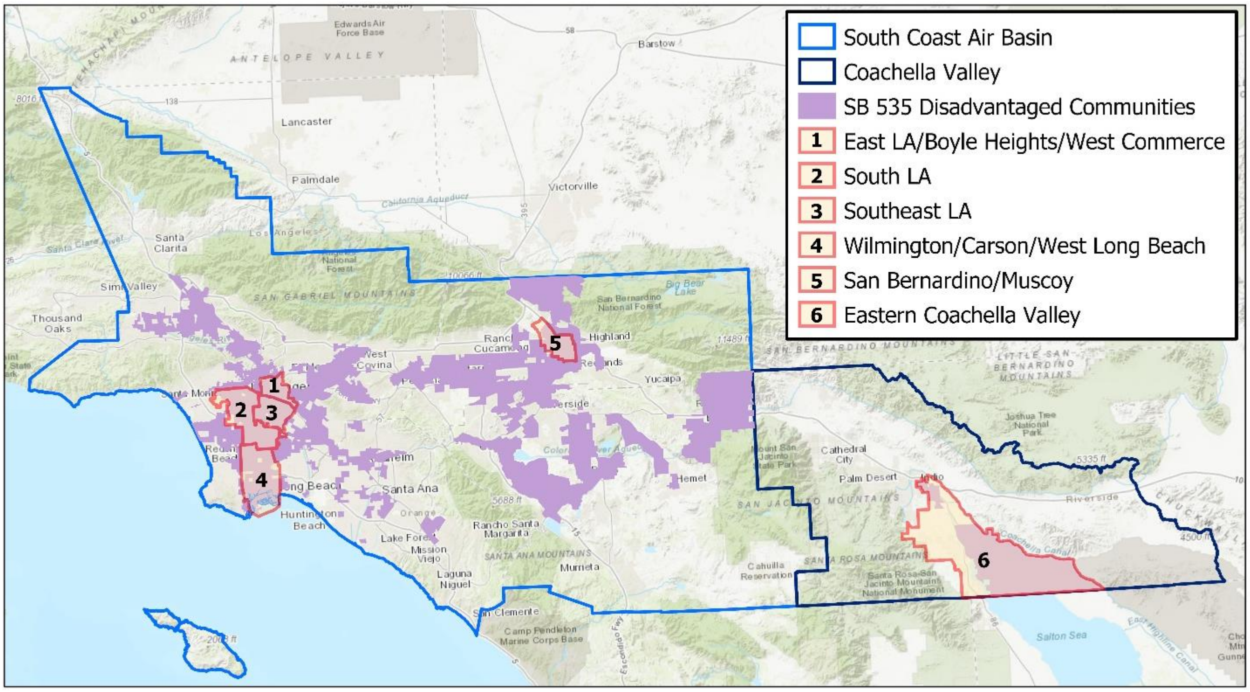


FIGURE 8-4
MAP OF ~~CALENVIROSCREEN 4.0 TOP 25% TRACTS~~SB 535 DISADVANTAGED COMMUNITIES AND AB 617 COMMUNITIES WITHIN THE SOUTH COAST AIR BASIN AND COACHELLA VALLEY

Emissions in Environmental Justice Communities

As part of the AB 617 program, the South Coast AQMD has developed base and future milestone years emission inventories (EIs) of criteria air pollutants (CAPs) and toxic air contaminants (TACs) and provided source attribution reports for each community. The base year for each EI is one year prior to the year that a community was designated for the AB 617 program and future milestone years are five and ten years after expected adoption of the CERP. For more details on EI development and for AB 617 communities refer to the technical report.[7]

EIs are constantly under improvement to incorporate the latest information on emission sources and EIs are developed for each AB 617 community using the most up-to-date information at the time. For instance, EIs developed for the 2018-designated communities relied on data from the 2016 AQMP, whereas EIs developed for 2019-designated communities incorporated new updates that were consistent with revisions to ~~the~~ South Coast AQMD PM2.5 Plan for the 2006 PM2.5 standard. The EI developed for the 2020-designated community is consistent with the latest data used in the Draft Final 2022 AQMP.[8]

[7] Source Attribution Methodology Report. Available at: http://www.aqmd.gov/docs/default-source/ab-617-ab-134/technical-advisory-group/source-attribution-methodology.pdf.

[8] Direct comparison of the EIs included in the CERPs for the various AB 617 communities may lead to distorted conclusions due to the different underlying data used in each EI and because baseline and future milestone years vary amongst communities.

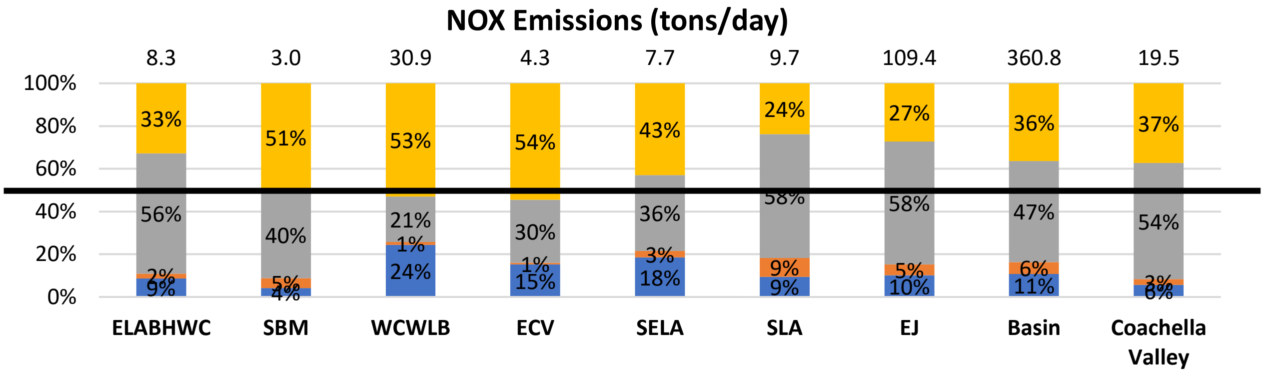
This section reevaluates the criteria pollutant emissions for all six AB 617 communities using the most recent data from the Draft Final 2022 AQMP for the base year 2018 and for the future year 2037.

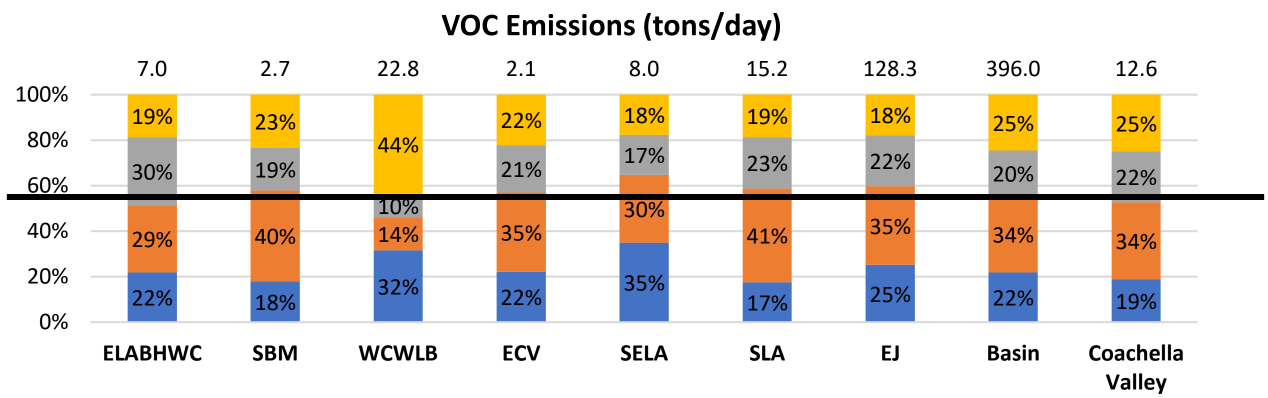
Baseline 2018 Emissions

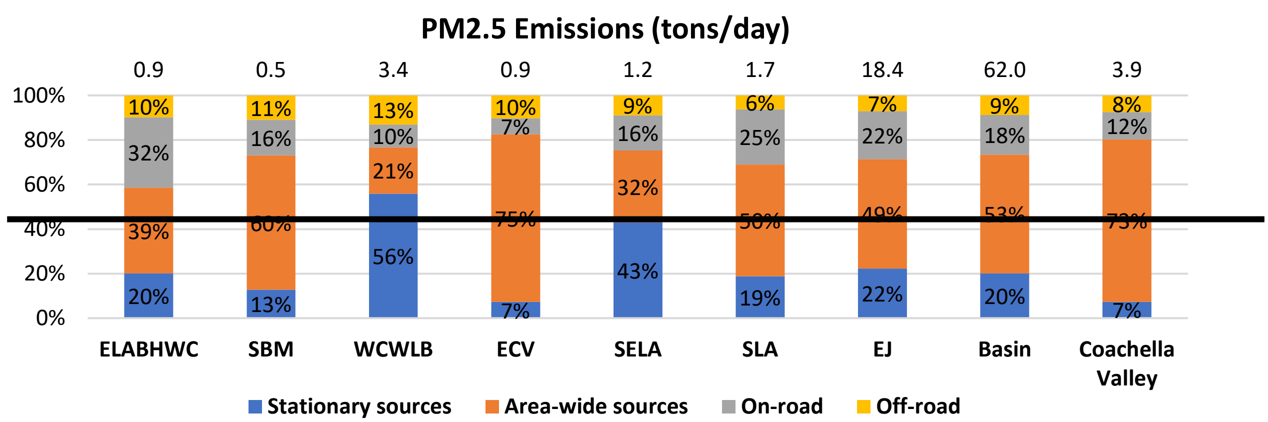
Figure 8-5 shows the NOx, VOC (Volatile Organic Compounds) and PM2.5 emissions levels and contributions from stationary, areawide, on-road mobile, and off-road mobile sources in the six AB 617 and EJ communities for the base year 2018. ~~Note that emissions presented in this figure are annual average emissions.~~ Because each community varies widely in size and makeup of emission sources, total emissions also vary widely. The emissions shown in this section illustrates the relative contribution of different source categories in each community. The overwhelming majority of NOx emissions in 2018 are from mobile sources throughout the Basin and Coachella Valley. In comparison with the basin average, the communities of ELABHWC and SLA have a higher contribution from on-road sources, and in particular, from heavy-duty trucks. This is because both those communities have multiple major freeways crossing their boundaries. Meanwhile, the communities of SBM, WCWLB, ECV and SELA show higher contribution from off-road sources due to large contributions from trains, and industrial and commercial off-road equipment and for WCWLB, ships. SELA and WCWLB include many industrial facilities, and WCWLB also includes large oil and gas, and petrochemical facilities, which leads to a higher contribution from stationary sources in these communities. Disadvantaged communities tend to concentrate along heavy-duty transport corridors, and as a result, the contribution from on-road NOx in EJ communities is larger than the overall contribution in the Basin.

For 2018 VOC emissions, the largest contributor in the basin is area-wide sources, which are largely composed of emissions from consumer products such as hair sprays and cleaning products. Other significant sources include gasoline-powered on-road and off-road vehicles, and various industrial processing involving petroleum and solvent products. Most communities have a composition of VOC sources that is similar to the overall distribution in the basin. In WCWLB, there is a significant source of VOCs from ships and commercial harbor craft in the off-road category, and there are also large refineries that contribute a much larger percentage from stationary sources. In SELA there are also petrochemical industries that contribute to an overall higher percentage of VOC emissions from stationary sources compared to the overall breakdown in the Basin.

For 2018 PM2.5 emissions, the largest contributor in the basin is from area-wide sources. In particular, road dust and commercial cooking are the largest contributors. SLA has a similar distribution of sources as in the basin. In the communities of WCWLB and SELA, there are many industrial facilities, which leads to stationary sources contributing a large fraction of total PM2.5 emissions. The community of ELABHWC is crossed by major freeways, which results in a larger contribution from on-road sources. The community of SBM has slightly higher contribution from road dust than the overall basin average, whereas the community of ECV and the whole Coachella Valley have a significant source of PM2.5 from construction and demolition that contributes to a larger fraction of PM2.5 from area-wide sources.


NOX Emissions (tons/day)
8.3
3.0
30.9
4.3
7.7
9.7
109.4
360.8
19.5
ELABHWC
SBM
WCWLB
ECV
SELA
SLA
EJ
Basin
Coachella Valley


VOC Emissions (tons/day)
7.0
2.7
22.8
2.1
8.0
15.2
128.3
396.0
12.6
ELABHWC
SBM
WCWLB
ECV
SELA
SLA
EJ
Basin
Coachella Valley


PM2.5 Emissions (tons/day)
0.9
0.5
3.4
0.9
1.2
1.7
18.4
62.0
3.9
ELABHWC
SBM
WCWLB
ECV
SELA
SLA
EJ
Basin
Coachella Valley
Stationary sources
Area-wide sources
On-road
Off-road

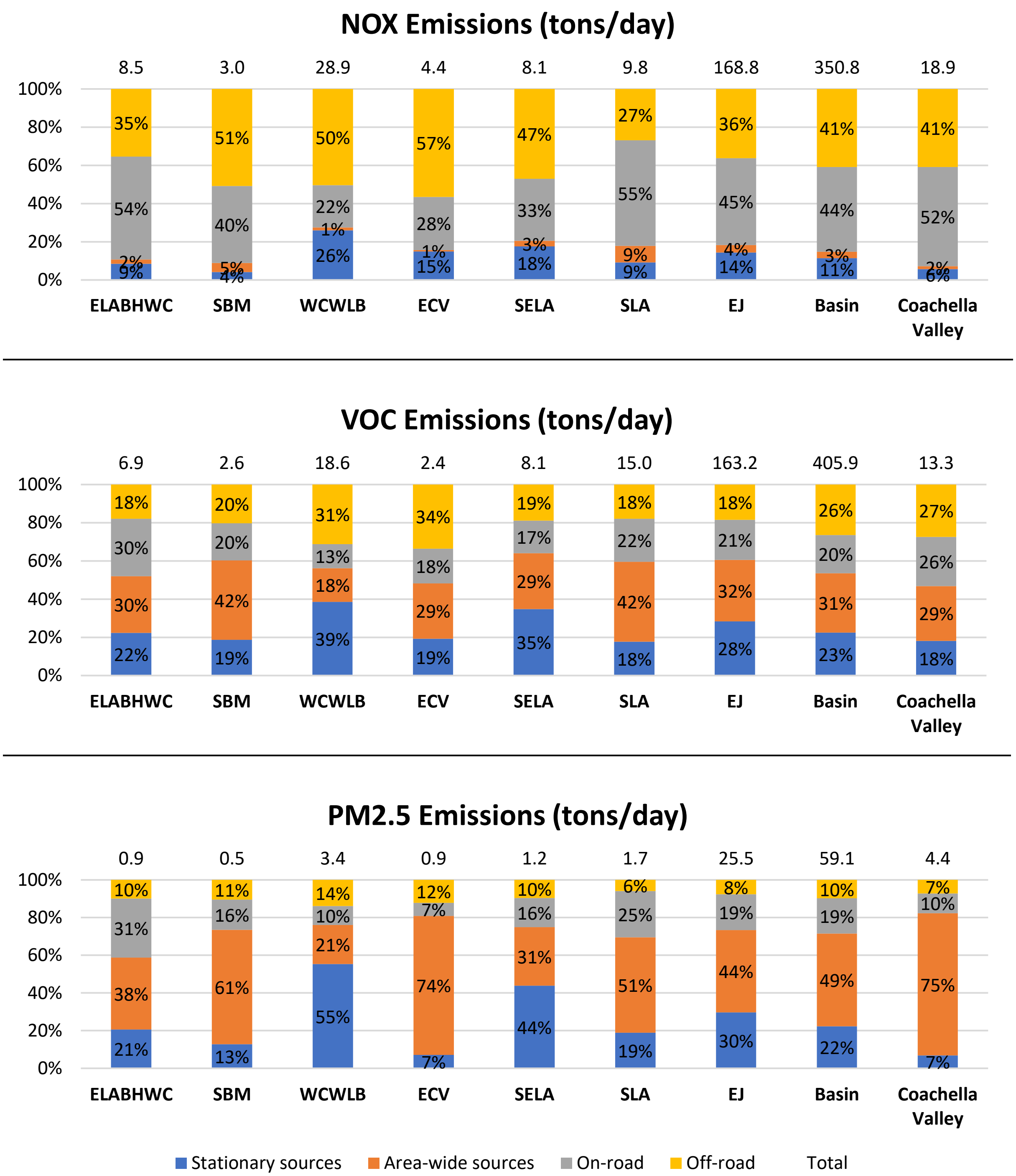


FIGURE 8-5

BASE YEAR 2018 EMISSION INVENTORIES FOR AB 617 PROGRAM COMMUNITIES AND ENVIRONMENTAL JUSTICE (EJ) COMMUNITIES

(ANNUAL AVERAGE IN TONS PER DAY SHOWN AT THE TOP OF EACH BAR. PERCENTAGE VALUES ARE ROUNDED TO THE NEAREST INTEGER AND MAY NOT ADD UP TO 100% DUE TO ROUNDING. ELABHWC - EAST LOS ANGELES/BOYLE HEIGHTS/WEST COMMERCE COMMUNITY; SBM - SAN BERNARDINO/MUSCOY COMMUNITY

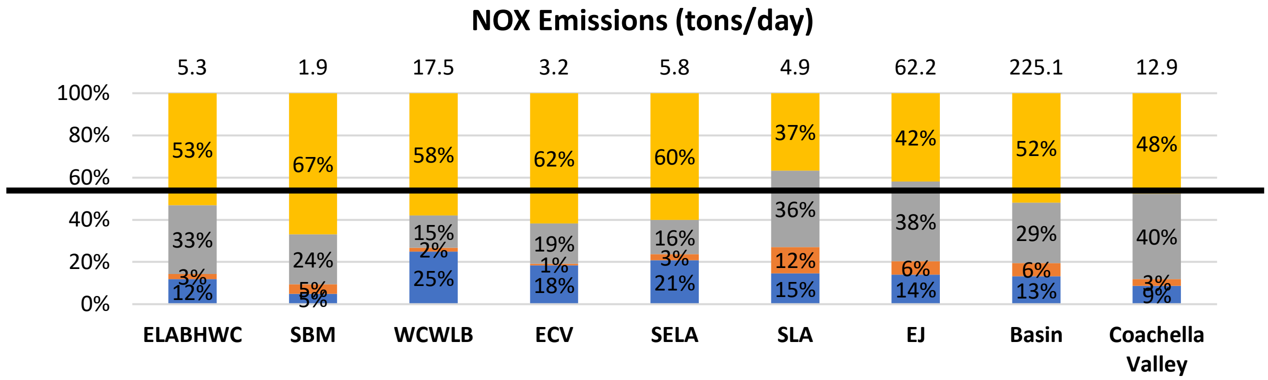
(SBM); WCWLB - WILMINGTON/CARSON/WEST LONG BEACH COMMUNITY; ECV - THE EASTERN COACHELLA VALLEY COMMUNITY; SELA - SOUTHEAST LOS ANGELES COMMUNITY (SELA); AND SLA - SOUTH LOS ANGELES COMMUNITY)

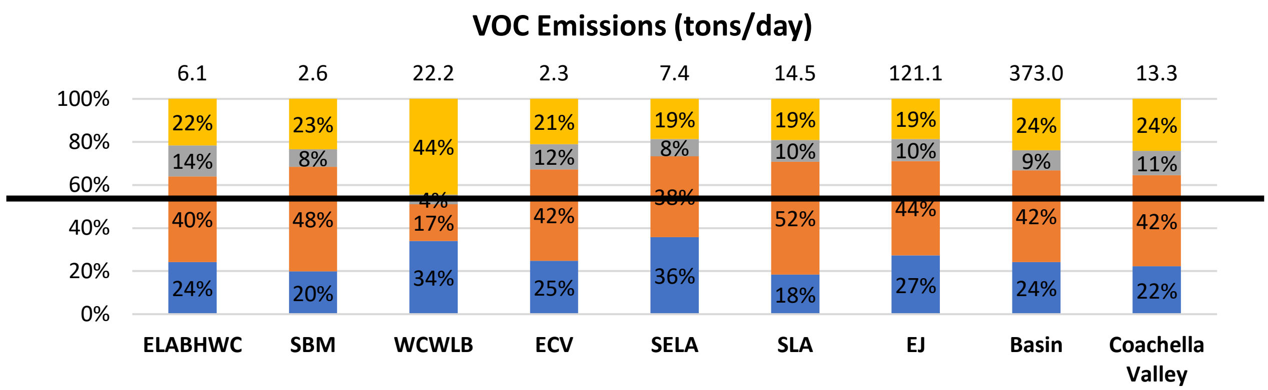
Future Emissions

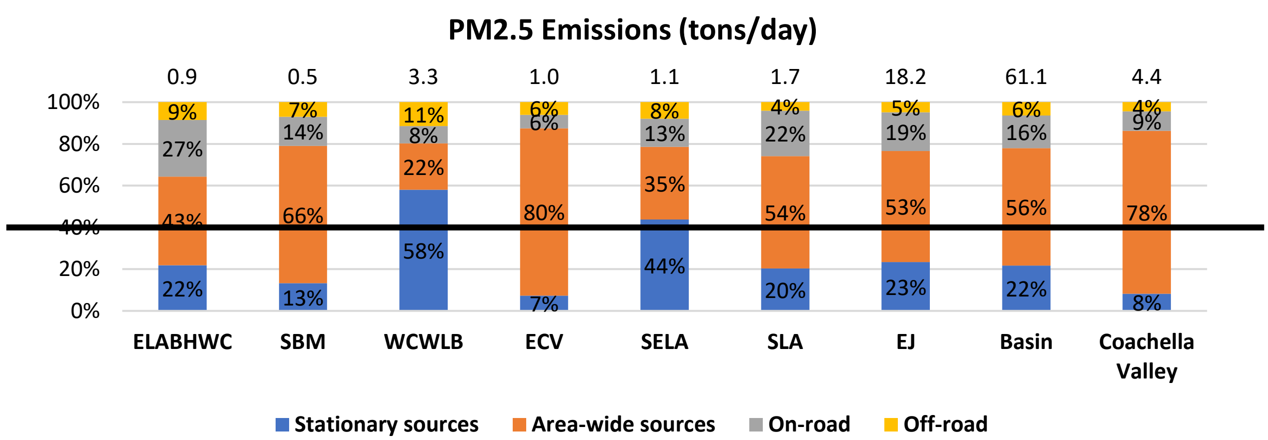
Figure 8-6 shows the NOx, VOC and PM2.5 emissions levels and relative contributions from stationary, areawide, and on- and off-road mobile sources in the six AB 617 communities and EJ areas for 2037. Significant NOx emission reductions are projected for all areas due to the implementation of South Coast AQMD and CARB regulations and programs. Emissions from on-road sources are projected to be subject to the largest reductions. Also, emissions from stationary sources in the RECLAIM program are expected to decline. Emissions from off-road equipment are also expected to decline, except for trains. As a result, the overall contribution of on-road sources diminishes with respect to the other sources, and off-road sources become the major contributor to NOx emissions in the future throughout the Basin and in many AB 617 communities. Communities with large contributions from trains and switchyards, like ELABHWC, SBM and SELA are projected to experience the largest increases in contributions from off-road sources.

VOC emissions are projected to decrease throughout the South Coast Air Basin to a significantly lesser extent than NOx emissions. This is because consumer products, which are the largest contributor to VOC emissions, are not currently largely regulated, and VOC emissions from areawide sources increase due to growth in population and industrial activity. As a result, the contribution of areawide sources increases with respect to the other sources. On the other hand, vehicle regulations and turnover to cleaner vehicles will drive the decrease in the contribution from on-road sources.

Future PM2.5 emissions in the Basin and most AB 617 communities are projected to see little change in the future. Sources like commercial cooking and road dust are expected to increase over time as the population grows, whereas emissions from mobile sources are projected to decline slightly due to cleaner vehicles. In the case of the Coachella Valley and the ECV AB 617 community, projections indicate an increase in the PM2.5 emissions from construction and demolition, which will increase the contribution of areawide sources to overall PM2.5 emissions in that region. The 2022 AQMP includes control measures aiming to reduce NOx from various emission sources. As NOx is a significant precursor of PM2.5, NOx reductions are expected to result in a decrease in PM2.5 levels in the region.


NOX Emissions (tons/day)
5.3
1.9
17.5
3.2
5.8
4.9
62.2
225.1
12.9
ELABHWC
SBM
WCWLB
ECV
SELA
SLA
EJ
Basin
Coachella Valley


VOC Emissions (tons/day)
6.1
2.6
22.2
2.3
7.4
14.5
121.1
373.0
13.3
ELABHWC
SBM
WCWLB
ECV
SELA
SLA
EJ
Basin
Coachella Valley


PM2.5 Emissions (tons/day)
0.9
0.5
3.3
1.0
1.1
1.7
18.2
61.1
4.4
ELABHWC
SBM
WCWLB
ECV
SELA
SLA
EJ
Basin
Coachella Valley
Stationary sources
Area-wide sources
On-road
Off-road

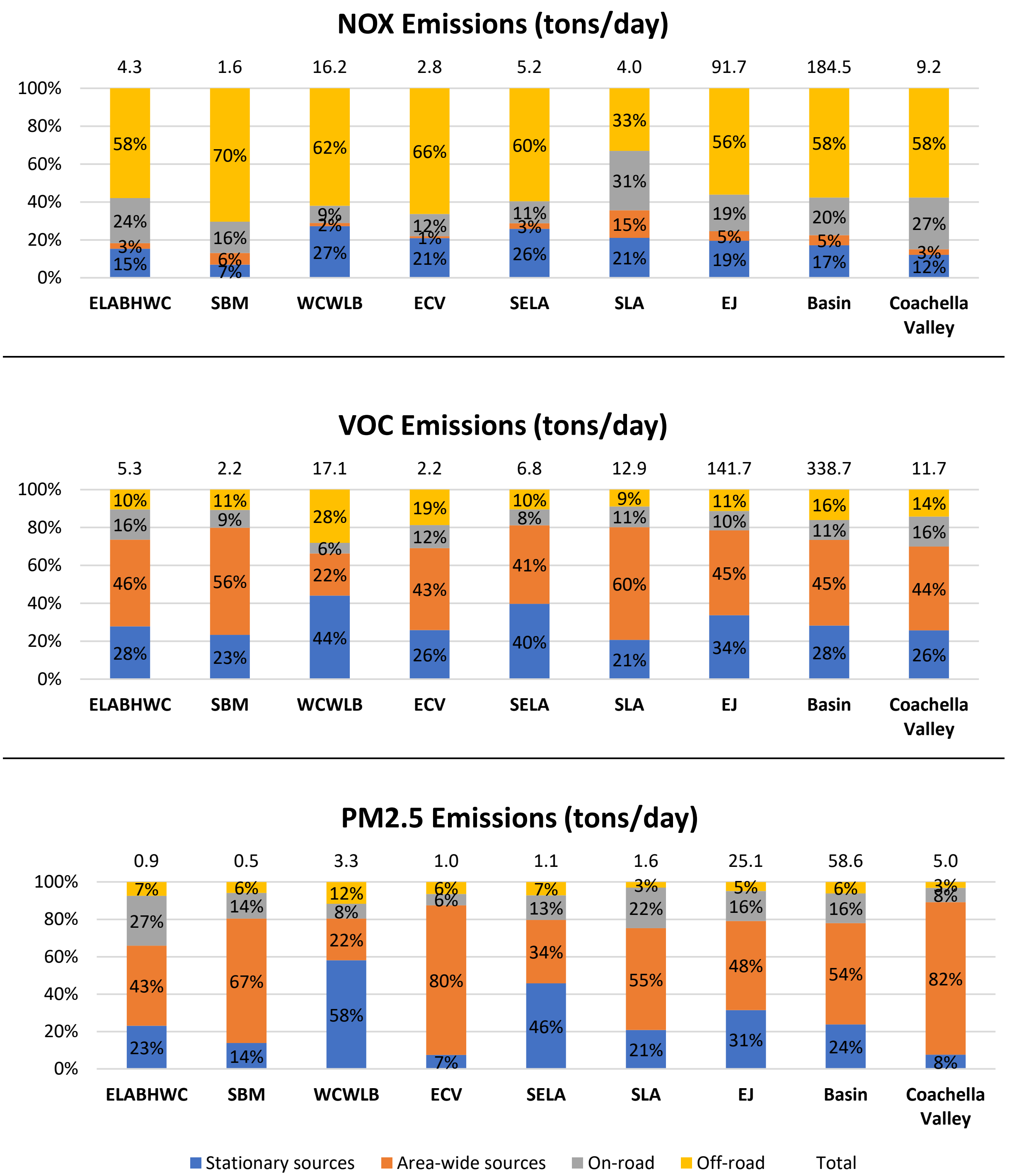


FIGURE 8-6

BASELINE 2037 EMISSION INVENTORIES FOR AB 617 PROGRAM COMMUNITIES AND ENVIRONMENTAL JUSTICE (EJ) COMMUNITIES

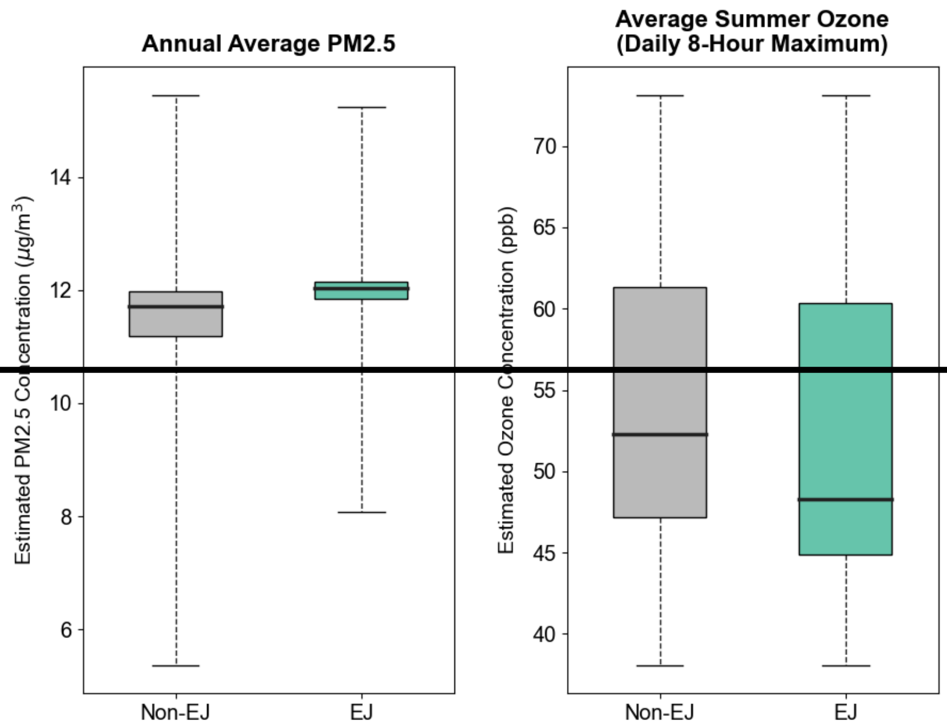
(ANNUAL AVERAGE IN TONS PER DAY SHOWN AT THE TOP OF EACH BAR. PERCENTAGE VALUES ARE ROUNDED TO THE NEAREST INTEGER AND MAY NOT ADD UP TO 100% DUE TO ROUNDING. ELABHWC - EAST LOS ANGELES/BOYLE HEIGHTS/WEST COMMERCE COMMUNITY; SBM - SAN BERNARDINO/MUSCOY COMMUNITY

(SBM); WCWLB - Wilmington/Carson/West Long Beach community; ECV - the Eastern Coachella Valley community; SELA - Southeast Los Angeles community (SELA); and SLA - South Los Angeles community)

Air Quality in Environmental Justice Communities

The impacts of air pollution are not distributed equitably throughout ~~the~~ South Coast AQMD jurisdiction, with some communities bearing much higher air pollution burdens. In this section, results from the recently released CalEnviroScreen 4.0 are used to show the distribution of air pollution across the South Coast Air Basin and Coachella Valley. Ambient ozone and PM2.5 concentrations make up two of the 13 pollution burden indicators included in CalEnviroScreen 4.0. Figures 8-7 and 8-8 show the distribution of estimated ozone and PM2.5 concentrations in EJ and non-EJ communities in the South Coast Air Basin and Coachella Valley. As described in the CalEnviroScreen 4.0 report, average annual PM2.5 concentrations in each census tract were calculated using 2015-2017 ambient air monitoring data combined with satellite observations. While estimated annual average PM2.5 concentrations span a wide range of concentrations in EJ and non-EJ communities, PM2.5 concentrations are generally higher in EJ communities in the South Coast Air Basin. Overall PM2.5 concentrations are lower in the Coachella Valley, but concentrations are also higher in EJ communities compared to other areas within the Coachella Valley. The observed disparities in both air basins are likely driven by local sources of directly emitted PM2.5 such as freeways and industrial facilities, that tend to be concentrated in disadvantaged communities. These sources also contribute to higher levels of diesel particulate matter, a powerful air toxic, in EJ communities.

Average daily maximum 8-hour ozone concentrations from May to October (i.e., peak ozone season) were estimated using 2017-2019 ambient air monitoring data. As shown in Figures 8-7 and 8-8, ozone concentration distributions are broadly similar between EJ and non-EJ communities in both the South Coast Air Basin and Coachella Valley. Since ozone is a secondary pollutant that forms downwind of precursor emission sources, local variability in ozone concentration is more muted compared to directly emitted pollutants. The lower median summer ozone concentration in EJ communities in the Basin is driven by the geographic distribution of EJ communities. In the Basin, the highest ozone concentrations are observed in the Inland Empire as sea breezes push NOx and VOC emissions inland from major urban source areas. Since EJ communities are highly concentrated in Los Angeles County, the lower median reflects generally lower ozone concentrations in areas closer to the coast.


Annual Average PM2.5
Estimated PM2.5 Concentration (μg/m3)
14
12
10
8
6
Non-EJ
EJ
Average Summer Ozone
(Daily 8-Hour Maximum)
Estimated Ozone Concentration (ppb)
70
65
60
55
50
45
40
Non-EJ
EJ

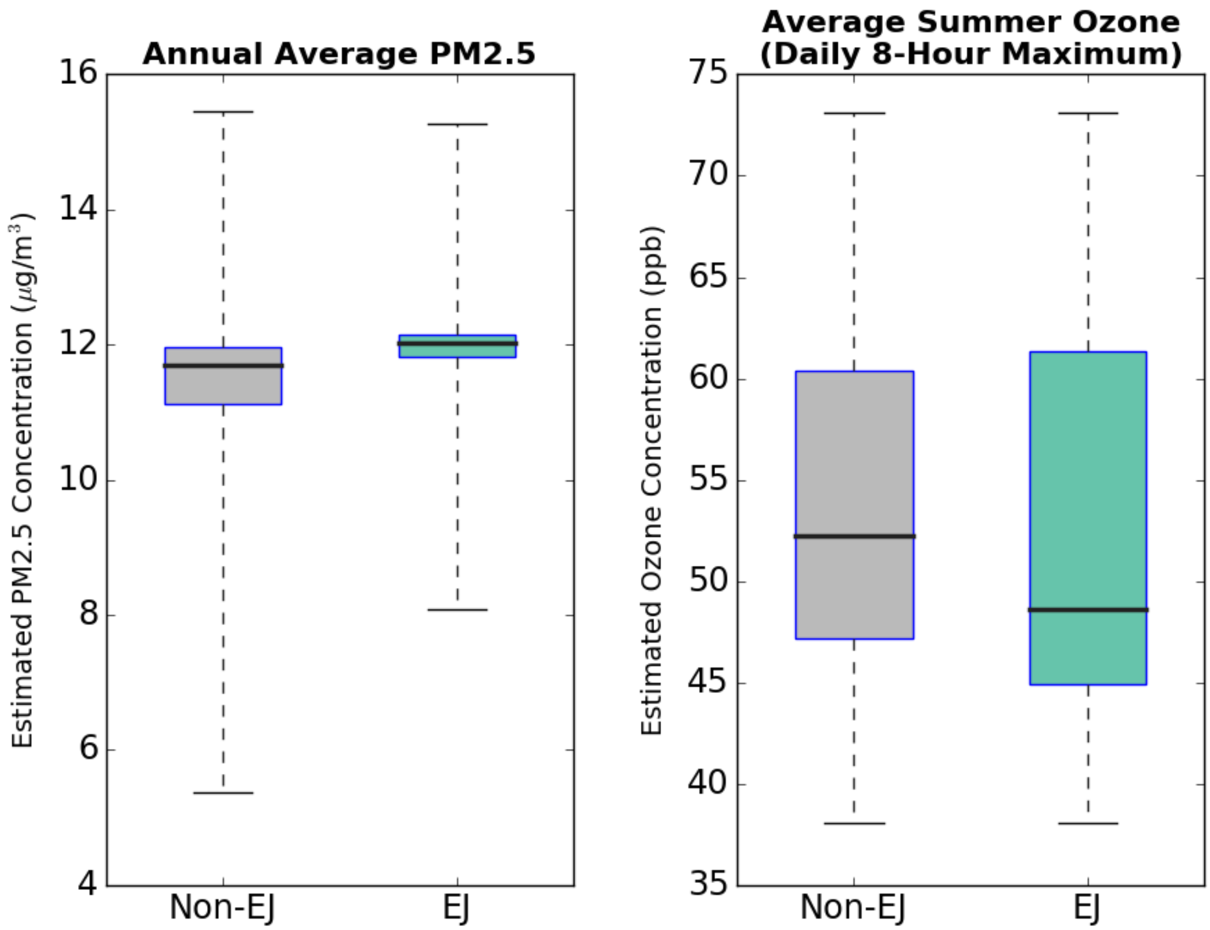
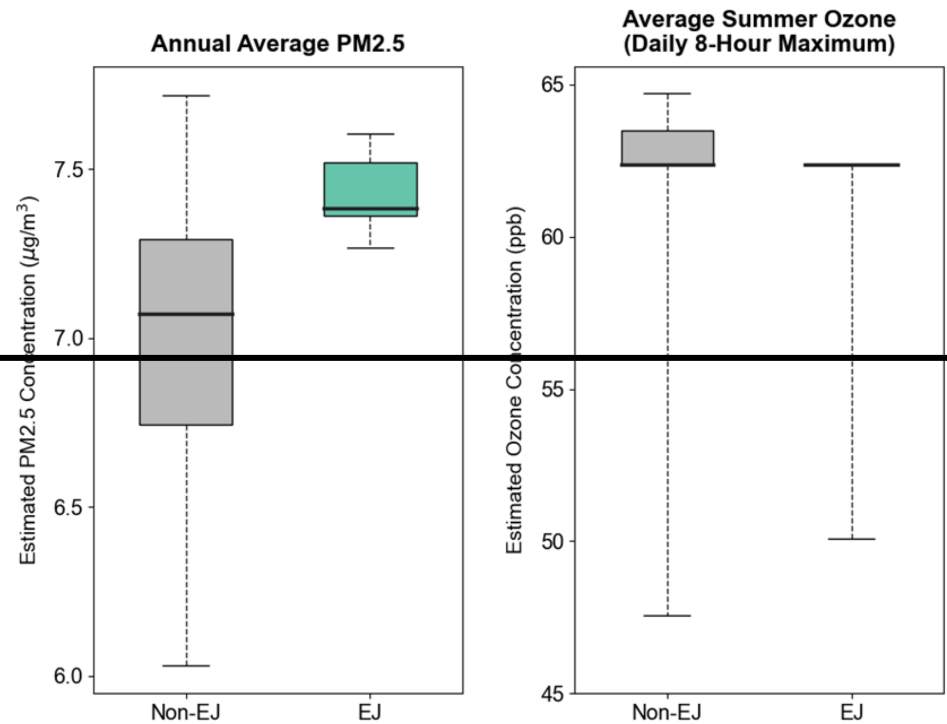


FIGURE 8-7

ESTIMATED ANNUAL AVERAGE PM2.5 AND AVERAGE SUMMER (MAY-OCTOBER) DAILY 8-HOUR MAXIMUM CONCENTRATIONS IN EJ AND NON-EJ COMMUNITIES IN THE SOUTH COAST AIR BASIN

(BASIN CENSUS TRACTS WERE DIVIDED INTO NON-EJ AND EJ GROUPS BASED ON ~~CALENVIROSCREEN 4.0 SCORES, WITH EJ COMMUNITIES DEFINED AS TRACTS WITH SCORES IN THE TOP 25% STATEWIDE AND NON-EJ COMMUNITIES AS TRACTS WITH SCORES IN THE BOTTOM 75%.~~THE DEFINITION OF DISADVANTAGED COMMUNITIES UNDER SB 535. BOXES INDICATE THE INTERQUARTILE RANGE (25TH TO 75TH PERCENTILE CONCENTRATIONS) AND BOLD LINE INDICATES THE MEDIAN CONCENTRATION (50TH PERCENTILE). DASHED WHISKERS INDICATE THE FULL RANGE OF ESTIMATED CONCENTRATIONS FOR ALL TRACTS IN EACH GROUP. PM2.5 AND OZONE CONCENTRATION DATA WERE RETRIEVED FROM CALENVIROSCREEN 4.0. FULL DETAILS ON DATA AND CALCULATIONS CAN BE FOUND IN THE CALENVIROSCREEN 4.0 REPORT.)


Annual Average PM2.5
Estimated PM2.5 Concentration (µg/m3)
7.5
7.0
6.5
6.0
Non-EJ
EJ
Average Summer Ozone (Daily 8-Hour Maximum)
Estimated Ozone Concentration (ppb)
65
60
55
50
45
Non-EJ
EJ

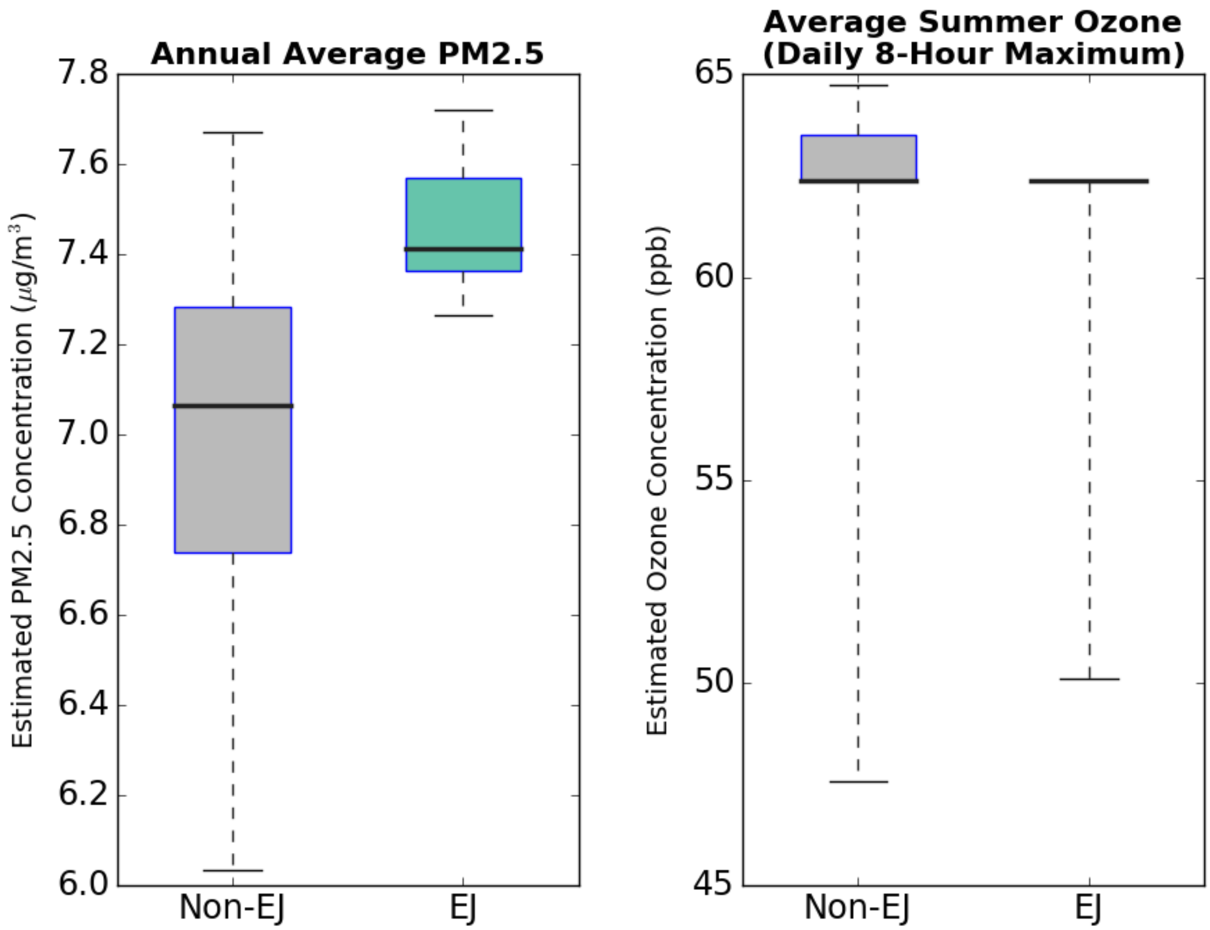


FIGURE 8-8

ESTIMATED ANNUAL AVERAGE PM2.5 AND AVERAGE SUMMER (MAY-OCTOBER) DAILY 8-HOUR MAXIMUM CONCENTRATIONS IN EJ AND NON-EJ COMMUNITIES IN THE COACHELLA VALLEY

(SAME AS ABOVE FIGURE FOR COACHELLA VALLEY CENSUS TRACTS. COACHELLA VALLEY IS DEFINED HERE AS THE PORTION OF THE SALTON SEA AIR BASIN WITHIN ~~THE~~ SOUTH COAST AQMD JURISDICTION.)

Figure 8-9 shows estimated annual average PM2.5 concentrations and average summer ozone concentrations in the six communities in ~~the~~ South Coast AQMD jurisdiction that have been designated as AB 617 communities as of early 2022. It is important to note that PM2.5 and ozone represent only two of the many air pollution challenges that these communities face. All six communities contain census tracts that rank in the CalEnviroScreen 4.0 top 25 percent most impacted tracts across California. Estimated PM2.5 concentrations for the five communities in the Basin are near or above the median concentration of all Basin tracts. The estimated annual PM2.5 concentration in the Eastern Coachella Valley (ECV) community is also elevated compared to the median concentration in the Coachella Valley. Summer ozone concentrations in the four Los Angeles County AB 617 communities are near or below the Basin median, while the summer ozone concentration in the San Bernardino/Muscoy community is significantly higher than the Basin median. This pattern again reflects the high ozone concentrations in inland areas driven by transport of the pollutants that form ozone from the Los Angeles area. The estimated summer ozone concentration in ECV is similar to the median Coachella Valley concentration.

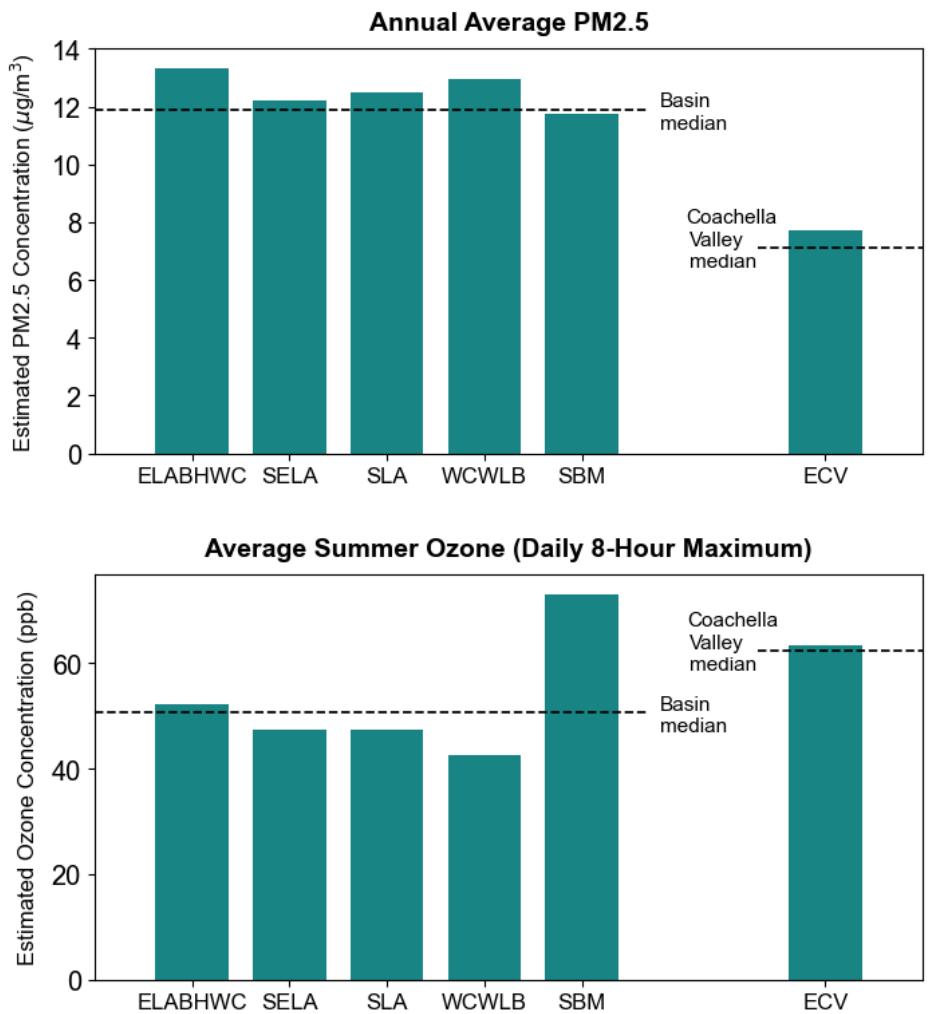


FIGURE 8-9

ESTIMATED ANNUAL AVERAGE PM2.5 AND AVERAGE SUMMER (MAY-OCTOBER) DAILY 8-HOUR MAXIMUM CONCENTRATIONS IN SOUTH COAST AQMD AB 617 COMMUNITIES

(Communities include East Los Angeles/Boyle Heights/West Commerce (ELABHWC), Southeast Los Angeles (SELA), South Los Angeles (SLA), Wilmington/Carson/West Long Beach (WCWLB), San Bernardino/Muscoy (SBM), and Eastern Coachella Valley (ECV). Bars represent the maximum concentration of all census tracts within community boundaries from CalEnviroScreen 4.0 data. Dashed lines indicate median concentrations for all tracts in the South Coast Air Basin and Coachella Valley.)

Exposure to air toxics is also an important driver of health risks in AB 617 communities. The Multiple Air Toxics Exposure Study V (MATES V)[9] found a substantial decrease in estimated cancer risk in each of the AB 617 communities from 2012 to 2018.[10] Since there are generally more sources of air toxics in or near EJ communities, such as in the AB 617 communities, the cancer risks in these communities are higher than the basin average. The ECV community cancer risk is higher than the average risk due to air pollution for the entire Coachella Valley. All the other AB 617 communities are in the South Coast Air Basin and have higher cancer risks than the average for the South Coast Air Basin. In general, the highest concentrations of cancer-causing pollutants, such as diesel particulates, are found near the source of these pollutants.

8-Hour Ozone Attainment in AB 617 and Environmental Justice Communities

Air quality simulations to demonstrate future attainment of the ozone standard are an integral part of the planning process to achieve clean air. These simulations estimate the impact of reduced emissions on ozone levels. Table 8-1 summarizes the results of the ozone simulations in each of ~~the~~ South Coast AQMD's AB 617 communities. Because regulatory ozone monitors are not located in all communities, this analysis employed the unmonitored area analysis described in Appendix V. The future ozone design values correspond to the maximum value predicted within each community. In this analysis, the "Community Boundaries" were used, and attainment of the 2015 8-hour ozone standard was demonstrated in all AB 617 communities.

Table 8-2 summarizes the results of the ozone simulations in environmental justice communities~~, defined as CalEnviroScreen 4.0 census tracts greater than or equal to the 75th percentile (the top 25 percent).~~ which correspond to the disadvantaged communities as defined by SB 535. The future ozone design values correspond to the maximum predicted value across all census tracts within ~~the~~ South Coast AQMD's jurisdiction. Attainment of the 2015 8-hour ozone standard was demonstrated in all environmental justice communities.

[9] http://www.aqmd.gov/home/air-quality/air-quality-studies/health-studies/mates-v.

[10] http://www.aqmd.gov/docs/default-source/planning/mates-v/mates-v-final-report-9-24-21.pdf?sfvrsn=6.

TABLE 8-1

MODEL-PREDICTED 8-HOUR OZONE DESIGN VALUES (PPB) IN ~~THE~~ SOUTH COAST AQMD'S AB 617 COMMUNITIES

Community	2037 Baseline	2037 Controlled
Wilmington/West Long Beach/Carson	~~64.2~~62.4	~~56.0~~57.7
San Bernardino/Muscoy	~~99.2~~95.5	~~65.9~~68.6
East LA/Boyle Heights/West Commerce	~~78.2~~74.6	~~65.6~~64.0
Eastern Coachella Valley	~~78.7~~76.2	~~66.5~~68.6
South Los Angeles	~~70.4~~69.6	~~61.9~~62.6
Southeast Los Angeles	~~71.6~~69.1	~~61.5~~62.0

TABLE 8-2

MODEL-PREDICTED 8-HOUR OZONE DESIGN VALUES (PPB) IN ENVIRONMENTAL JUSTICE COMMUNITIES

Community	2037 Baseline	2037 Controlled
All Environmental Justice	~~99.2~~97.4	69.~~9~~8

Environmental Justice Advisory Group

The South Coast AQMD Governing Board established an Ethnic Community Advisory Council on September 7, 1990, to serve as an advisory body to the Governing Board with specialized expertise on the impact of air quality issues on the ethnic communities in the South Coast Air Basin. ECAC contributed to building a strong foundation for ~~the~~ South Coast AQMD's environmental justice efforts through internal and external initiatives. Some notable accomplishments include the School Site Selection Guidance, publication of emissions data online, community "Smoke School" trainings and Air Quality Institutes, webcasting Governing Board meetings, and other enhancements to increase transparency and accessibility to the community.

In 2008, the Administrative Committee recommended that this group be restructured into an Environmental Justice Advisory Group (EJAG), with a focus on air quality and environmental justice issues in the area served by ~~the~~ South Coast AQMD. The mission of EJAG is to advise and assist ~~the~~ South Coast

AQMD in protecting and improving public health in ~~the~~ South Coast AQMD's most impacted communities through the reduction and prevention of air pollution. The goals of the EJAG are to:

- Advise ~~the~~ South Coast AQMD on issues related to environmental justice;
- Create and sustain a positive and productive relationship between ~~the~~ South Coast AQMD and community members;
- Better inform ~~the~~ South Coast AQMD about environmental justice issues; and
- Assure that ~~the~~ South Coast AQMD makes meaningful and continuous progress toward the achievement of environmental justice through its decisions and activities.

On May 1, 2009 the South Coast Governing Board amended the EJAG charter to increase membership from 20 members to 30 members. EJAG includes an ethnically and geographically diverse membership, with at least two members from each county and representatives from the most highly impacted communities within ~~the~~ South Coast AQMD's jurisdiction. EJAG meetings are held bi-monthly to quarterly.

Incentives and Funding in Environmental Justice Communities

Incentives and funding will continue to be a critical component in implementing the control strategies in the 2022 AQMP. Given the needed transformation to zero emission technologies across all emission sources, regulations alone will not be sufficient to achieve the magnitude of emission reduction needed. Significant public and private investments and continued innovation and technology advancement will be required to accelerate the deployment of advanced zero emission and cleaner technologies and associated fueling infrastructure.

Incentive funding can be used to subsidize low-emitting or zero emission equipment purchases and help promote deployment of clean technologies for both stationary and mobile sources. For mobile sources, incentive funds can facilitate the replacement of older, high-emitting vehicles and equipment with the cleanest vehicles and equipment commercially available. The South Coast AQMD has been implementing a number of incentive programs to accelerate the deployment of clean technologies with a particular emphasis on benefits to EJ communities. For example, under the Lower-Emission School Bus Program, the Carl Moyer Program and other diesel mitigation programs, not less than 50 percent of the funds appropriated are expended in a manner that directly reduces air contaminants and/or associated public health risks in disadvantaged and low-income communities. In implementing existing incentive programs and for the development of future programs, ~~the~~ South Coast AQMD will continue to prioritize incentive funding in EJ areas and seek opportunities to expand funding to benefit the most disadvantaged communities.

For stationary sources, incentives can help promote the transformation to zero emission technologies for small commercial and residential combustion sources such as water heaters and furnaces. Incentive programs will be of particular importance for measures regarding zero emission buildings ~~electrification~~. Programs to change out gas appliances, heaters and boilers may be cost-effective, but not necessarily affordable. First, there is the cost of replacing the appliances themselves – which would not be insignificant for many smaller businesses or residential households. Second, many buildings will likely need additional electrical panel upgrades and other infrastructure to support the increased electrical load needed to power the replacement appliances. These infrastructure upgrades can be far more costly than the cost of replacing gas appliances. These issues are further magnified in economically disadvantaged communities, where switching from gas to electrical appliances may be cost-prohibitive unless a substantial portion of those costs are covered by other programs.

Existing rebate programs, such as ~~the~~ South Coast AQMD's Clear Air Furnace program, funded by Rule 1111 mitigation fees, provides rebates to those installing a residential electric heat pump to replace a natural gas furnace. In addition, a specific percentage of the funding was dedicated to those applying from a disadvantaged community. This program can be further funded to enhance the existing rebate program or expanded to include other building appliances such as water heaters. In addition, partnerships with other organizations, such as Technology and Equipment for Clean Heating (TECH) Clean California or Southern California Edison, with similar programs and directives could assist in providing more rebate money to further incentivize early deployment of cleaner technologies. Therefore, evaluating funding needs and sourcing funding to support control measures associated with zero emission building ~~electrification~~measures will be critical. But a much larger issue will be structuring incentive/rebate programs in a way that is equitable and does not leave economically disadvantaged communities behind. Stationary source control measures for the R-CMB series, C-CMB series, and ECC-03 target emission reductions from residential and commercial buildings and include incentive components as part of the proposed control approach. Among control measures R-CMB-01, R-CMB-02, R-CMB-04, C-CMB-01 and C-CMB-02, a mitigation fee will be considered where appropriate. The mitigation fee collected would be utilized as incentives to accelerate the adoption of zero emission units or utilized to assist in panel upgrades or infrastructure at residences in disadvantaged communities. In developing these incentive programs, ~~the~~ South Coast AQMD will seek community input and also evaluate ways to prioritize distribution of funding to benefit the most disadvantaged communities. The South Coast AQMD will ensure that environmental justice areas are able to access advanced technologies and also benefit from the transition to zero emission technologies.

Chapter 9

Public Process and Participation

- The 2022 AQMP development process has been a multi-agency effort, including the South Coast AQMD, CARB, SCAG, and the U.S. EPA.
- The 2022 AQMP was developed through a robust and transparent process. Specific outreach efforts included:
  - Convening the 2022 AQMP Advisory Group and a Scientific, Technical, and Modeling Peer Review group;
  - Establishing six specialized working group meetings to address specific topics of interest within the draft AQMP;
  - Holding a Control Measures Workshop;
  - Holding regional public workshops and hearings;
  - Convening an Advisory Council for additional peer review; and
  - Release of ~~White Papers~~policy briefs to provide additional information on key topics in the 2022 AQMP.
- Stakeholders for the 2022 AQMP include community members, businesses, trade associations, environmental organizations, health advocates, academia and local, regional, state, and federal government entities.

In This Chapter

Introduction

The development of the Draft Final 2022 Air Quality ~~management~~ Management Plan (AQMP or Plan) has been a regional multi-agency effort including South Coast Air Quality Management District (South Coast AQMD), California Air Resources Board (CARB), Southern California Association of Governments (SCAG), the United States Environmental Protection Agency (U.S. EPA), and other entities. Staff also conducted robust public outreach efforts to engage the public and interested stakeholders, solicit feedback, and ensure transparency in the development of the Plan. The following describes specific outreach activities conducted by staff regarding the Draft Final 2022 AQMP.

Outreach Program

Government agencies like ~~the~~ South Coast AQMD must create an accurate public record of how they conduct the public's business. The 2022 AQMP outreach program approach aims to achieve multiple goals including ensuring greater transparency in the process, reaching a broader and more diverse audience, facilitating participation and engagement, and developing partnerships with stakeholder groups. The outreach program has been designed to inform the policy discussion by helping to ensure that all stakeholders have access to a common set of facts. Public awareness of the State and ~~federal~~ Federal requirements and having appropriate background information are vital to engage in meaningful dialogue on the AQMP. The clean air goals in the 2022 AQMP will not be achieved solely by the actions of ~~the~~ South Coast AQMD. The proposed control strategy will require participation from affected businesses, local communities, and multiple government agencies. It is therefore critical to inform and engage a wide range of stakeholders on the goals, requirements, approach, and potential impacts of the 2022 AQMP. Stakeholders for the 2022 AQMP include community members, businesses, labor associations, trade associations, environmental organizations, health advocates, academia, and local, regional, state, and federal government entities. Table 9-1 lists specific stakeholder groups participating in the AQMP process. Meetings with specific stakeholder groups have been ~~and will continue to be~~ held to communicate the purpose and scope of the 2022 AQMP, discuss the concerns of the representatives, solicit recommendations for inclusion in the 2022 AQMP, and gather further outreach suggestions.

TABLE 9-1

STAKEHOLDERS PARTICIPATING IN OUTREACH EFFORTS

Stakeholder Category	2022 AQMP
Public Agencies	• CARB • California Energy Commission • California Independent System Operator (ISO) • California Department of Resources Recycling and Recovery (CalRecycle) • U.S. EPA • U.S. Department of Transportation • U.S. Department of Energy
Local/Regional Government	• Council of Government/Associated Governments • SCAG • Transportation Commissions • Local Planning Departments • Building and Fire Departments • Tribal Governments • Local Cities
Special Districts	• School Districts • Sanitation Districts • Water/Power Districts
Health Advocates	• Medical Practitioners • Health Researchers • Health Providers
Community/Health/Environmental Groups	• Public Health Departments/Associations • Environmental Justice Organizations • Environmental Advocacy Groups • Faith-~~b~~Based Organizations • Labor Organizations
Academia	• Universities • National Laboratories
General Public	• Residents • Students • Interested Parties

TABLE 9-1 (CONTINUED)

STAKEHOLDERS PARTICIPATING IN OUTREACH EFFORTS

Stakeholder Category	2022 AQMP
Business	• Energy Industry (Electricity, Petroleum Production and Refining, Natural Gas, Biofuels, Renewables, etc.) • Green Technologies • Goods Movement and Logistics (Warehousing, Trucking, Railroads, Ports/Shipping/Freight) • Dairy Operations • Printing/Coating Industry • Airport/Airline Operations • Engine Manufacturers • After-~~t~~Treatment Technologies • Building and Construction Industry/Realtors • Chambers of Commerce/Business Councils • Trade Associations • Small Businesses

Interested stakeholders were notified in advance of all Advisory Group meetings, working group meetings, workshops, hearings, and were invited to participate in various activities designed to assist in enhancing communication and development of the 2022 AQMP. Outreach methods include presenting updates at regional councils of government (COGs) meetings, participation at conferences and seminars, face-to-face meetings as requested, and virtual meetings. In addition to meetings with specific stakeholders, topical workshops and focus groups have been held to address specific AQMP-related topics such as economics, incentives, energy, employment impacts, health benefits, modeling issues, climate/energy, transportation, environmental justice, specific control measures, and goods movement. A variety of formats and communication methods were utilized as part of the outreach program. The formats used for specific activities were tailored to the particular audience or venue where information was being presented and discussed. A Control Measures Workshop was also presented virtually to provide an overview of the control measures and strategies being developed for the 2022 AQMP and to solicit input from all stakeholders on control strategies. Due to the COVID-19 pandemic and pursuant to California Governor's Executive Orders N-25-20 and N-29-20 and Assembly Bill (AB) 361, South Coast AQMD Advisory Group meetings were conducted via video conferencing and ~~by~~ telephone. Upcoming regional workshops, regional hearings, and South Coast AQMD's Governing Board (Board) meetings are anticipated to be hybrid format until further changes are introduced.

Advisory Group Meetings

Staff convened the 2022 AQMP Advisory Group to provide feedback and recommendations on the development of the Plan, including development of policy and control strategies. The Advisory Group represents a diverse cross section of stakeholders, such as large and small businesses, labor associations, government agencies, environmental and community groups, and academia. The AQMP Advisory Group reviews the overall aspects of a draft air quality management plan and makes recommendations concerning emissions inventories, modeling, control measures, and socioeconomic impacts, including:

- Review and provide comments on: (a) studies relevant to advancing scientific and technical knowledge in support of AQMP preparation; (b) emissions inventory development and modeling approaches; (c) the development of new and revised control measures, including on-and off-road mobile sources; and (d) socioeconomic data and evaluations;
- Foster coordinated approaches toward overall attainment strategies; and
- Assist in resolving key technical issues.

In addition, a Scientific, Technical, and Modeling Peer Review (STMPR) Advisory Group convened to make recommendations on air quality modeling, emissions inventory, and socioeconomic modeling and analysis. Both Advisory Groups met periodically, sometimes monthly, throughout the AQMP development process and those meetings have been open to the public. Table 9-2 lists the schedule for the Advisory Groups ~~s~~ Meetings for the 2022 AQMP.

TABLE 9-2

ADVISORY GROUP MEETING SCHEDULE FOR 2022 AQMP

Date	Organization
10/~~1~~9/2019	AQMP Advisory Group Meeting
11/21/2019	AQMP Advisory Group Meeting
4/16/2020	AQMP Advisory Group Meeting
9/3/2020	AQMP Advisory Group Meeting
1/27/2021	STMPR Advisory Group Meeting
2/3/2021	AQMP Advisory Group Meeting
5/18/2021	AQMP Advisory Group Meeting
8/19/2021	STMPR Advisory Group Meeting
8/27/2021	AQMP Advisory Group Meeting
11/4/2021	STMPR Advisory Group Meeting
11/9/2021	AQMP Advisory Group Meeting
1/28/2022	AQMP Advisory Group Meeting
3/16/2022	STMPR Advisory Group Meeting
3/24/2022	AQMP Advisory Group Meeting
5/31/2022	STMPR Advisory Group Meeting

Date	Organization
10/5/2022	Joint Meeting of the Advisory Council and STMPR Advisory Group

Working Group Meetings

~~The~~ South Coast AQMD established six specialized Working Groups which are open to all interested parties to support the development of the 2022 AQMP, shown in Figure 9-1.

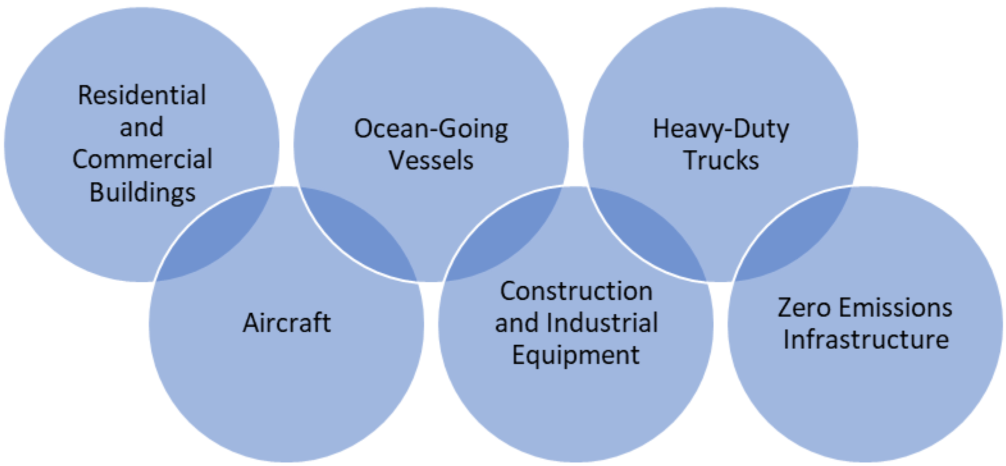


FIGURE 9-1

SOUTH COAST AQMD WORKING GROUPS FOR 2022 AQMP

The Working Groups include one stationary source Working Group (Residential and Commercial Buildings) and five mobile source Working Groups (Aircraft, Ocean-Going Vessels, Construction and Industrial Equipment, Heavy-Duty Trucks, and Zero Emissions Infrastructure). These Working Groups conducted several in-depth public meetings throughout the AQMP development process in order to facilitate more specialized discussions. The Residential and Commercial Buildings Working Group has been developed to explore measures to further reduce NOx emissions from residential and commercial appliances through replacement with zero emissions and low NOx appliances. The five ~~M~~mobile ~~S~~source Working Groups focused on development of various mobile source measures outside of South Coast AQMD's jurisdiction that require coordination with CARB and the U.S. EPA. Table 9-3 lists the schedule for the ~~W~~working ~~G~~group ~~M~~meetings for the 2022 AQMP.

TABLE 9-3

WORKING GROUP MEETING SCHEDULE FOR 2022 AQMP

Date	Organization
12/11/2020	Mobile Source Working Group
12/17/2020	Residential and Commercial Buildings Working Group Meeting
1/26/2021	Mobile Source Working Group for Heavy-Duty Trucks Meeting
1/27/2021	Mobile Source Working Group for Industrial Equipment Meeting
2/3/2021	Mobile Source Working Group for Ocean-Going Vessels Meeting
2/4/2021	Mobile Source Working Group for Aircraft Meeting
2/26/2021	Residential and Commercial Buildings Working Group Meeting
3/24/2021	Mobile Source Working Group for Heavy-Duty Trucks Meeting
4/1/2021	Mobile Source Working Group for Ocean-Going Vessels Meeting
4/6/2021	Mobile Source Working Group for Aircraft Meeting
4/7/2021	Mobile Source Working Group for Construction and Industrial Equipment Meeting
5/6/2021	Residential and Commercial Buildings Working Group Meeting
6/2/2021	Mobile Source Working Group for Ocean-Going Vessels Meeting
6/3/2021	Mobile Source Working Group for Heavy-Duty Trucks Meeting
6/8/2021	Mobile Source Working Group for Aircraft Meeting
6/15/2021	Mobile Source Working Group for Construction and Industrial Equipment Meeting
6/17/2021	Residential and Commercial Buildings Working Group Meeting
8/18/2021	Mobile Source Working Group for Aircraft Meeting
8/24/2021	Mobile Source Working Group for Ocean-Going Vessels Meeting
9/9/2021	Residential and Commercial Buildings Working Group Meeting
9/24/2021	Mobile Source Working Group for Zero Emissions Infrastructure
2/4/2022	Mobile Source Working Group for Zero Emissions Infrastructure

Control Measures Workshop

Staff held a Control Measures Workshop on November 10, 2021 to provide an overview of the control measures and strategies being developed/considered for the 2022 AQMP and to solicit input from all stakeholders on control strategies. ~~The~~ South Coast AQMD proposes a total of 48 control measures for the 2022 AQMP. Thirty control measures target stationary sources and are categorized into NOx control measures, co-benefits from climate and energy programs, limited strategic volatile organic compound (VOC) measures, and other measures. The NOx measures are further grouped by residential combustion, commercial equipment, and large equipment. Many control measures focus on widespread deployment of zero emissions and low NOx technologies through a combination of regulatory approaches and incentives~~,~~ and will require technology assessments to better understand where and when zero emissions and low NOx technologies can be implemented. The remaining 18 control measures target mobile sources. They are facility-based mobile source measures, emissions reductions from incentive programs, and partnerships with local, state, federal, and international entities. The 2022 AQMP includes measures identified in CARB's ~~draft~~ 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy) and SCAG's transportation control measures.

~~White Papers~~Policy Briefs

~~The~~ South Coast AQMD staff prepared five policy briefs ~~white papers~~ to provide policy background information supporting adoption and implementation of the 2022 AQMP~~technical background, a policy framework for the 2022 AQMP, and better integration of major planning issues such as air quality, transportation, infrastructure, climate, energy, and business considerations~~. These ~~white papers~~policy briefs were intended to assist the public, stakeholders, and ~~the~~ South Coast AQMD staff to better understand important facts and policies related to the development of the 2022 AQMP and were ~~are expected to be~~ released ~~in May 2022~~on June 9, 2022. The policy briefs were revised to reflect the emissions inventory and updated attainment demonstration included in the Revised Draft 2022 AQMP.

The five ~~white papers~~policy briefs focus on the following key topics of the 2022 AQMP:

- Black Box Measures,
- Climate Change and Decarbonization,~~; and~~
- Federal Approach (Ocean-Going Vessels, Aircraft, Locomotives, Heavy-Duty Vehicles),~~;~~
- ~~Buildings- Affordability;~~
- Infrastructure-Energy Outlook, and
- Residential and Commercial Building Appliances.

South Coast AQMD Governing Board Meetings

Before South Coast AQMD makes decisions that affect local residents and businesses, ideas and comments from the public must be considered. The opportunity to comment begins weeks prior ~~in~~ to public workshops and ends with a public hearing by the South Coast AQMD Governing Board, where the Governing Board may vote to adopt a rule or plan as proposed or with changes. Anyone ~~can~~ may testify or present written comments. Holding public workshops, recording oral and written comments, responding to those comments, publishing proposed rules and related reports, holding public hearings and voting publicly are all based on set procedures. Documenting the process is necessary to ensure public participation, fairness, and an accurate account to which interested parties can refer to in the future. The Governing Board usually meets at ~~the~~ South Coast AQMD's Diamond Bar headquarters on the first Friday of each month. However, due to COVID-19 and pursuant to Assembly Bill (AB) 361, many meetings were conducted via video conferencing and ~~by~~ telephone. In addition, select members from the South Coast AQMD Governing Board are also members of the Mobile Source and Stationary Source Committees that partake in decision-making influential to 2022 AQMP development. South Coast AQMD ~~plans to~~ released the ~~final~~ Ddraft Final ~~of the~~2022 AQMP for Board consideration ~~in summer~~ on November 23, 2022, to be incorporated into the 2015 8-hour 70 ppb ozone standard State Implementation Plan~~s~~ due to the U.S. EPA in ~~2022~~early 2023. Table 9-4 lists the schedule for the South Coast AQMD Governing Board, Mobile Source Committee, Stationary Source Committee, and all other AQMP-related meetings.

TABLE 9-4

SOUTH COAST AQMD ~~AQMP-RELATED~~GOVERNING BOARD ACTIVITIES SCHEDULE FOR 2022 AQMP

Date	Organization
4/8/2020	South Coast AQMD Public Consultation Meeting of Reasonably Available Control Technology Demonstration of 2015 8-hour Ozone NAAQS
6/5/2020	South Coast AQMD Public Hearing on Reasonably Available Control Technology Demonstration and Emissions Statement Certification of 2015 8-hour Ozone NAAQS
6/4/2021	South Coast AQMD Public Hearing for Certification of Nonattainment New Source Review (NSR) and Clean Fuels for Boilers Certification
11/10/2021	Control Measures Workshop
1/21/2022	South Coast AQMD Mobile Source Committee
1/21/2022	South Coast AQMD Stationary Source Committee
2/18/2022	South Coast AQMD Mobile Source Committee
2/18/2022	South Coast AQMD Stationary Source Committee
3/4/2022	South Coast AQMD Governing Board Meeting
3/18/2022	South Coast AQMD Mobile Source Committee
3/18/2022	South Coast AQMD Stationary Source Committee
4/15/2022	South Coast AQMD Mobile Source Committee
4/15/2022	South Coast AQMD Stationary Source Committee
5/12/2022	Special Meeting of the South Coast AQMD Governing Board- Retreat
5/13/2022	Special Meeting of the South Coast AQMD Governing Board- Retreat
8/5/2022	Status update on Draft 2022 AQMP development to South Coast AQMD Governing Board
9/16/2022	South Coast AQMD Mobile Source Committee
10/7/2022	Status update on Revised Draft 2022 AQMP development to South Coast AQMD Governing Board and Set Hearing

Date	Organization
12/2/2022	South Coast AQMD Governing Board Consideration of Draft Final AQMP

Regional Public Workshops/Regional Public Hearings

Public workshops and public consultation meetings are held prior to taking a proposed new or amended rule or other significant action to the South Coast Governing Board for consideration to obtain feedback from the affected businesses and the public. Public workshops held weeks before the South Coast AQMD Governing Board meetings provide ~~the~~an opportunity to learn about the proposed rules and major policies. Written reports on rules or policies are also available before Board meetings. ~~Several~~ Three ~~R~~regional ~~P~~public ~~W~~workshops ~~are being~~were held for the 2022 AQMP in May 2022, shown in Table 9-5. Public hearings are also held to allow public input before Governing Board members vote on new rules, rule amendments, or plans. Regional ~~P~~public ~~H~~hearings for the 2022 AQMP ~~are~~ were held~~tentatively scheduled~~ in ~~August~~ October 2022, shown in Table 9-6. Meeting materials for the public workshops and regional public hearings were translated to Spanish and each had one meeting that featured live Spanish translation.

TABLE 9-5

SOUTH COAST AQMD PUBLIC WORKSHOP SCHEDULE FOR 2022 AQMP

Date	Organization
5/25/2022	2022 AQMP Regional Public Workshop and CEQA Scoping Meeting #1
5/25/2022	2022 AQMP Regional Public Workshop and CEQA Scoping Meeting #2
5/26/2022	2022 AQMP Regional Public Workshop and CEQA Scoping Meeting for Coachella Valley

TABLE 9-6

SOUTH COAST AQMD PUBLIC HEARINGS SCHEDULE FOR 2022 AQMP

Date	Organization
10/12/2022	2022 AQMP Regional Public Hearing - Los Angeles County
10/12/2022	2022 AQMP Regional Public Hearing - San Bernardino County
10/18/2022	2022 AQMP Regional Public Hearing - Coachella Valley
10/19/2022	2022 AQMP Regional Public Hearing - Orange County
10/20/2022	2022 AQMP Regional Public Hearing - Riverside County

Advisory Council

In addition to the feedback provided by the 2022 AQMP Advisory Group and the STMPR Advisory Group, ~~the~~ South Coast AQMD staff sought additional expert peer review of specific 2022 AQMP components. California Health and Safety Code §40471(b) requires an Advisory Council, appointed by the South Coast AQMD Governing Board and Board Advisory Groups, to undertake peer review of the Health Effects report in Appendix I of the 2022 AQMP. The mission of the Advisory Council is to review and provide comments on this Health Effects report that demonstrates analysis of air pollution health impacts in the South Coast Air Basin. The South Coast AQMD Advisory Council is composed of members from different South Coast AQMD advisory groups, where each advisory group nominates members or has volunteers participate in the Advisory Council. In addition, each Governing Board member may select one person to be a member of the Advisory Council. Figure 9-2 shows the Advisory Groups that participate in the Advisory Council for the 2022 AQMP. The first Advisory Council meeting was held on August 10, 2022, followed by the Joint Meeting of the Advisory Council and STMPR Advisory Group on October 5, 2022.

FIGURE 9-2

SOUTH COAST AQMD ADVISORY GROUPS FOR 2022 AQMP

Other Outreach Meetings

South Coast AQMD recognizes that contributions towards our clean air goals matter and has performed extensive outreach for the 2022 AQMP. These outreach efforts improve transparency which increases understanding, leads to more informed choices, and improves awareness of the challenges. These efforts also improve engagement, form partnerships, and promote feedback to strengthen the AQMP. As part of this outreach, South Coast AQMD hosted meetings for each of the Assembly Bill (AB) 617 (C. Garcia, Chapter 136, Statutes of 2017) Community Air Protection Program (CAPP or Program) Community

Steering Committees (CSC) to provide an overview of and solicit feedback on the 2022 AQMP. In addition, South Coast AQMD has reached out to numerous government agencies, local community groups, environmental organizations, and business associations to provide an overview of and solicit feedback on the 2022 AQMP. A summary of these meetings is shown in Table 9-7.

TABLE 9-7

SOUTH COAST AQMD OUTREACH SCHEDULE FOR 2022 AQMP

Date	Organization
5/26/2022	Orange County Council of Governments (OCCOG) Board of Directors
6/1/2022	Environmental Justice Community Partnership Advisory Council
8/4/2022	AB 617 Community Steering Committee – Southeast Los Angeles
8/11/2022	San Bernardino County Transportation Authority Metro Valley Study Session
8/11/2022	AB 617 Community Steering Committee – San Bernardino-Muscoy
8/12/2022	Local Government and Small Business Alliance
8/17/2022	Young Leaders Advisory Council
8/18/2022	AB 617 Community Steering Committee – East Los Angeles, Boyle Heights, and West Commerce
8/25/2022	AB 617 Community Steering Committee – Wilmington, Carson, and West Long Beach Community
8/26/2022	Environmental Justice Advisory Group
9/6/2022	AB 617 Community Steering Committee – Eastern Coachella Valley Outreach Working Team
9/7/2022	Gateway Cities COG Board
9/8/2022	Clean Fuels Advisory Group
9/8/2022	AB 617 Community Steering Committee – South Los Angeles
9/8/2022	Orange County Business Council Government Affairs Committee
9/21/2022	San Gabriel Valley COG Energy, Environment and Natural Resources Committee
9/21/2022	Western Riverside COG Executive Committee
9/28/2022	San Gabriel Valley Economic Partnership Legislative Action Committee
12/2/2022	South Coast AQMD Governing Board Consideration of Draft Final AQMP

Glossary

AAQS (Ambient Air Quality Standards): Health and welfare based standards for clean outdoor air that identify the maximum acceptable average concentrations of air pollutants during a specified period of time. (See NAAQS.)

Acute Health Effect: An adverse health effect that occurs over a relatively short period of time (e.g., minutes or hours).

Aerosol: Particles of solid or liquid matter that can remain suspended in air for long periods of time because of their small size and light weight.

Air Pollutants: Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects on humans, animals, vegetation, and/or materials.

Air Quality Simulation Model: A computer program that simulates the transport, dispersion, and transformation of compounds emitted into the air and can project the relationship between emissions and air quality.

Air Toxics: A generic term referring to a harmful chemical or group of chemicals in the air. Typically, substances that are especially harmful to health, such as those considered under U.S. EPA's hazardous air pollutant program or California's AB 1807 toxic air contaminant program, are considered to be air toxics. Technically, any compound that is in the air and has the potential to produce adverse health effects is an air toxic.

ATCM (Airborne Toxic Control Measure): A type of control measure, adopted by the CARB (Health and Safety Code Section 39666 et seq.), which reduces emissions of toxic air contaminants from nonvehicular sources.

Alternative Fuels: Fuels such as methanol, ethanol, hydrogen, natural gas, and liquid propane gas that are cleaner burning and help to meet- mobile and stationary emission standards.

Ambient Air: The air occurring at a particular time and place outside of structures. Often used interchangeably with "outdoor" air.

APCD (Air Pollution Control District): A county agency with authority to regulate stationary, indirect, and area sources of air pollution (e.g., power plants, highway construction, and housing developments) within a given county, and governed by a district air pollution control board composed of the elected county supervisors and in most cases, representatives of cities within the district.

AQMD (Air Quality Management District): A group or portions of counties, or an individual county specified in law with authority to regulate stationary, indirect, and area sources of air pollution within the region and governed by a regional air pollution control board comprised mostly of elected officials from within the region.

AQMP (Air Quality Management Plan): A Plan prepared by an APCD/AQMD, for a county or region designated as a nonattainment area, for the purpose of bringing the area into compliance with the requirements of the national and/or California Ambient Air Quality Standards. AQMPs designed to attain national ambient air quality standards are incorporated into the SIP.

Area-wide Sources (also known as "area" sources): Smaller sources of pollution, including permitted sources smaller than the district~~s~~'s emission reporting threshold and those that do not receive permits (e.g., water heaters, gas furnace, fireplaces, woodstoves, architectural coatings) that often are typically associated with homes and non-industrial sources. The California Clean Air Act requires districts to include area sources in the development and implementation of the AQMPs.

Atmosphere: The gaseous mass or envelope surrounding the earth.

Attainment Area: A geographic area which is in compliance with the National and/or California Ambient Air Quality Standards (NAAQS ~~OR~~ or CAAQS).

Attainment Plan: In general, a plan that details the emission reducing control measures and their implementation schedule necessary to attain air quality standards. In particular, the federal Clean Air Act requires attainment plans for nonattainment areas; these plans must meet several requirements, including requirements related to enforceability and adoption deadlines.

BACT (Best Available Control Technology): The most up-to-date methods, systems, techniques, and production processes available to achieve the greatest feasible emission reductions for given regulated air pollutants and processes. BACT is a requirement of NSR (New Source Review) and PSD (Prevention of Significant Deterioration). BACT as used in federal law under PSD applies to permits for sources of attainment pollutants and other regulated pollutants is defined as an emission limitation based on the maximum degree of emissions reductions allowable taking into account energy, environmental & economic impacts and other costs. [(CAA Section 169(3)]. The term BACT as used in state law means an emission limitation that will achieve the lowest achievable emission rates, which means the most stringent of either the most stringent emission limits contained in the SIP for the class or category of source, (unless it is demonstrated that the limitation is not achievable) or the most stringent emission limit achieved in practice by that class in category of source. "BACT" under state law is more stringent than federal BACT and is equivalent to federal LAER (lowest achievable emission rate) which applies to nonattainment NSR permit actions.

BAR (Bureau of Automotive Repair): An agency of the California Department of Consumer Affairs that manages the implementation of the motor vehicle Inspection and Maintenance Program.

BARCT (Best Available Retrofit Control Technologies): an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.

Basin (South Coast Air Basin): Area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. It includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties.

Carrying Capacity: Amount of allowable regional emissions that would still meet health-based air quality standards.

CAA (Federal Clean Air Act): A federal law passed in 1970 and amended in 1977 and 1990 which forms the basis for the national air pollution control effort. Basic elements of the Act include national ambient air quality standards for major air pollutants, air toxics standards, acid rain control measures, and enforcement provisions.

CAAQS (California Ambient Air Quality Standards): Standards set by the State of California for the maximum levels of air pollutants which can exist in the outdoor air without unacceptable effects on human health or the public welfare. These are more stringent than NAAQS.

CARB (California Air Resources Board): The State's lead air quality agency, consisting of a nine-member Governor-appointed board. It is responsible for attainment and maintenance of the State and federal air quality standards, and is primarily responsible for motor vehicle pollution control. It oversees county and regional air pollution management programs.

CCAA (California Clean Air Act): A California law passed in 1988 which provides the basis for air quality planning and regulation independent of federal regulations. A major element of the Act is the requirement that local APCDs/AQMDs in violation of state ambient air quality standards must prepare attainment plans which identify air quality problems, causes, trends, and actions to be taken to attain and maintain California's air quality standards by the earliest practicable date.

CEQA (California Environmental Quality Act): A California law which sets forth a process for public agencies to make informed decisions on discretionary project approvals. The process aids decision makers to determine whether any environmental impacts are associated with a proposed project. It requires significant environmental impacts associated with a proposed project to be identified, disclosed, and mitigated to the maximum extent feasible.

CFCs (Chlorofluorocarbons): Any of a number of substances consisting of chlorine, fluorine, and carbon. CFCs are used for refrigeration, foam packaging, solvents, and propellants. They have been found to cause depletion of the atmosphere's ozone layer.

Chronic Health Effect: An adverse health effect which occurs over a relatively long period of time (e.g., months or years).

CO (Carbon Monoxide): A colorless, odorless gas resulting from the incomplete combustion of fossil fuels. Over 80 percent of the CO emitted in urban areas is contributed by mobile sources. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. CO is a criteria air pollutant.

CMAQ (Community Multiscale Air Quality Model): A computer modeling system designed to address air quality as a whole by including state-of-the-science capabilities for modeling multiple air quality issues, including tropospheric ozone, fine particles, toxics, acid deposition, and visibility degradation.

Conformity: Conformity is a process mandated in the federal Clean Air Act to insure that federal actions do not impede attainment of the federal health standards. General conformity sets out a process that requires federal agencies to demonstrate that their actions are air quality neutral or beneficial. Transportation conformity sets out a process that requires transportation projects that receive federal funding, approvals or permits to demonstrate that their actions are air quality neutral or beneficial and meet specified emissions budgets in the SIP.

Congestion Management Program: A state mandated program (Government Code Section 65089a) that requires each county to prepare a plan to relieve congestion and reduce air pollution.

Consumer Products: Products for consumer or industrial use such as detergents, cleaning compounds, polishes, lawn and garden products, personal care products, and automotive specialty products which are part of our everyday lives and, through consumer use, may produce air emissions which contribute to air pollution.

Contingency Measure: Contingency measures are statute-required back-up control measures to be implemented in the event of specific conditions. These conditions can include failure to meet interim milestone emission reduction targets or failure to attain the standard by the statutory attainment date. Both State and federal Clean Air Acts require that District plans include contingency measures.

Electric Vehicle: A motor vehicle which uses a battery-powered electric motor as the basis of its operation. Such vehicles emit virtually no air pollutants. Hybrid electric motor vehicles may operate using both electric and gasoline powered motors. Emissions from hybrid electric motor vehicles are also substantially lower than conventionally powered motor vehicles.

EMFAC: The EMission FACtor model used by CARB to calculate on-road mobile vehicle emissions. The ~~2016~~ 2022 AQMP is based on the latest version, ~~EMFAC2014~~EMFAC2017.

Emission Inventory: An estimate of the amount of pollutants emitted from mobile and stationary sources into the atmosphere over a specific period such as a day or a year.

Emission Offset (also known as an emission trade-off): A regulatory requirement whereby approval of a new or modified stationary source of air pollution is conditional on the reduction of emissions from other existing stationary sources of air pollution or banked reductions. These reductions are required in addition to reductions required by BACT.

Emission Standard: The maximum amount of a pollutant that is allowed to be discharged from a polluting source such as an automobile or smoke stack.

FIP (Federal Implementation Plan): In the absence of an approved State Implementation Plan (SIP), a plan prepared by the U.S. EPA which provides measures that nonattainment areas must take to meet the requirements of the Federal Clean Air Act.

Fugitive Dust: Dust particles which are introduced into the air through certain activities such as soil cultivation, off-road vehicles, or any vehicles operating on open fields or dirt roadways.

Goods Movement: An event that causes movement of commercial materials or stock typically at ports, airports, railways, highways, including dedicated truck lanes and logistics centers.

GHGs (Greenhouse Gases): A gas in an atmosphere that absorbs long-wave radiant energy reflected by the earth, which warms the atmosphere. GHGs also radiate long-wave radiation both upward to space and back down toward the surface of the earth. The downward part of this long-wave radiation absorbed by the atmosphere is known as the “greenhouse effect.”

HEV (Hybrid Electric Vehicles): Hybrids commercially available today combine an internal combustion engine with a battery and electric motor.

Hydrocarbon: Any of a large number of compounds containing various combinations of hydrogen and carbon atoms. They may be emitted into the air as a result of fossil fuel combustion, fuel volatilization, and solvent use, and are a major contributor to smog. (Also see VOCs.)

HFCV (Hydrogen Fuel Cell Vehicles): Vehicles that produce zero tailpipe emissions and run on compressed hydrogen fed into a fuel cell "stack" that produces electricity to power the vehicle.

Incentives: Tax credits, financial rebates/discounts, or non-monetary conveniences offered to encourage further use of advanced technology and alternative fuels for stationary and mobile sources.

Indirect Source: Any facility, building, structure, or installation, or combination thereof, which generates or attracts mobile source activity that results in emissions of any pollutant (or precursor). Examples of indirect sources include employment sites, shopping centers, sports facilities, housing developments, airports, commercial and industrial development, and parking lots and garages.

Indirect Source Control Program: Rules, regulations, local ordinances and land use controls, and other regulatory strategies of air pollution control districts or local governments used to control or reduce emissions associated with new and existing indirect sources.

Inspection and Maintenance Program: A motor vehicle inspection program implemented by the BAR. It is designed to identify vehicles in need of maintenance and to assure the effectiveness of their emission control systems on a biennial basis. Enacted in 1979 and strengthened in 1990. (Also known as the "Smog Check" program.)

LEV (Low Emission Vehicle): A vehicle which is certified to meet the CARB 1994 emission standards for low emission vehicles.

Low NOx Technologies: Refers to NOx emissions approaching zero and will be delineated for individual source categories through the process of developing the Air Quality Management Plan/State Implementation Plan and subsequent control measures.

Maintenance Plan: In general, a plan that details the actions necessary to maintain air quality standards. In particular, the federal Clean Air Act requires maintenance plans for areas that have been redesignated as attainment areas.

Mobile Sources: Moving sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats and airplanes.

Model Year: Model year refers to the actual annual production period (year) as determined by the manufacturer.

NAAQS (National Ambient Air Quality Standards): Standards set by the federal U.S. EPA for the maximum levels of air pollutants which can exist in the outdoor air without unacceptable effects on human health or the public welfare.

NOx (Nitrogen Oxides, Oxides of Nitrogen): A general term pertaining to compounds of nitric acid (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant, and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility.

Nonattainment Area: A geographic area identified by the U.S. EPA and/or CARB as not meeting either NAAQS or CAAQS standards for a given pollutant.

NSR (New Source Review): A program used in development of permits for new or modified industrial facilities which are in a nonattainment area, and which emit nonattainment criteria air pollutants. The two major requirements of NSR are Best Available Control Technology and Emission Offsets.

Ozone: A strong smelling reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy. Ozone exists in the upper atmosphere ozone layer as well as at the earth's surface. Ozone at the earth's surface causes numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

Ozone Precursors: Chemicals such as hydrocarbons and oxides of nitrogen, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, a major component of smog.

PZEV (Partial Zero Emission Vehicle): A vehicle emissions rating within California’s exhaust emission standards. Cars that are certified as PZEVs meets the Super Ultra Low Emission Vehicle exhaust emission standard and has zero evaporative emissions from its fuel system.

Permit: Written authorization from a government agency (e.g., an air quality management district) that allows for the construction and/or operation of an emissions generating facility or its equipment within certain specified limits.

PEV (Plug-in Electric Vehicle): Vehicles that can be recharged from any external source of electricity and the electricity is stored in a rechargeable battery pack to drive or contribute to drive the wheels.

PHEV (Plug-in Hybrid Electric Vehicle): Vehicles similar to traditional hybrids but are also equipped with a larger, more advanced battery that allows the vehicle to be plugged in and recharged in addition to refueling with gasoline. This larger battery allows the car to drive on battery alone, gasoline alone, or a combination of electric and gasoline fuels.

PM (Particulate Matter): Solid or liquid particles of soot, dust, smoke, fumes, and aerosols.

PM10 (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the air sacs in the lungs where they may be deposited, resulting in adverse health effects. PM10 also causes visibility reduction and is a criteria air pollutant.

PM2.5 (Particulate Matter less than 2.5 microns): A major air pollutant consisting of tiny solid or liquid particles, generally soot and aerosols. The size of the particles (2.5 microns or smaller, about 0.0001 inches or less) allows them to easily enter the air sacs deep in the lungs where they may cause adverse health effects, as noted in several recent studies. PM2.5 also causes visibility reduction and is a criteria air pollutant.

PSD (Prevention of Significant Deterioration): A program used in development of permits for new or modified industrial facilities in an area that is already in attainment. The intent is to prevent an attainment area from becoming a non-attainment area. This program, like require BACT as defined in the Clean Air Act and, if an AAQS is projected to be exceeded, Emission Offsets.

Public Workshop: A workshop held by a public agency for the purpose of informing the public and obtaining its input on the development of a regulatory action or control measure by that agency.

RACM (Reasonably Available Control Measures): An area-specifc analysis focusing on area, mobile and non-major point sources. It considers measures that are readily implemented, are economically and technologically feasible, and contribute to the advancement of attainment in a manner that is “as expeditious as practicable.”

RACT (Reasonably Available Control Technology): The lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.

RTP (Regional Transportation Plan): The long-range transportation plan developed by the Southern California Association of Governments that provides a vision for transportation investments throughout the South Coast region. The RTP considers the role of transportation in the broader context of economic, mobility, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address regional mobility needs.

~~ROG (Reactive Organic Gas): A reactive chemical gas, composed of hydrocarbons, that may contribute to the formation of smog. Also sometimes referred to as Non-Methane Organic Compounds (NMOCs). (Also see VOC.)~~

SSAB (Salton Sea Air Basin): Area comprised of a central portion of Riverside County (the Coachella Valley) and Imperial County. The Riverside ~~c~~County portion of the SSAB is bounded by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

SIP (State Implementation Plan): A document prepared by each state describing existing air quality conditions and measures which will be taken to attain and maintain national ambient air quality standards. (see AQMP.)

Smog: A combination of smoke, ozone, hydrocarbons, nitrogen oxides, and other chemically reactive compounds which, under certain conditions of weather and sunlight, may result in a murky brown haze that causes adverse health effects. The primary source of smog in California is motor vehicles. (See Inspection and Maintenance Program.)

Smoke: A form of air pollution consisting primarily of particulate matter (i.e., particles). Other components of smoke include gaseous air pollutants such as hydrocarbons, oxides of nitrogen, and carbon monoxide. Sources of smoke may include fossil fuel combustion, agricultural burning, and other combustion processes.

SO_2 (Sulfur Dioxide): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Ocean-going vessels, which may use oil high in sulfur content, can be major sources of SO_2. SO_2 and other sulfur oxides contribute to ambient PM2.5. SO_2 is also a criteria pollutant.

Stationary Sources: Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants; can include area sources depending on context.

SULEV (Super Ultra Low Emission Vehicle): A vehicle emissions rating within California's LEV 1 and LEV 2 exhaust emission standards.

SCS (Sustainable Communities Strategy): Planning element in the RTP that integrates land use and transportation strategies that will achieve CARB's GHG emissions reduction targets.

TAC (Toxic Air Contaminant): An air pollutant, identified in regulation by the CARB, which may cause or contribute to an increase in deaths or in serious illness, or which may pose a present or potential hazard to human health. TACs are considered under a different regulatory process (California Health and Safety Code Section 39650 et seq.) than pollutants subject to CAAQS. Health effects due to TACs may occur at extremely low levels, and it is typically difficult to identify levels of exposure which do not produce adverse health effects.

TCM (Transportation Control Measure): Under Health & Safety Code Section 40717, any control measure to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions. TCMs can include encouraging the use of carpools and mass transit. Under federal law, includes, but is not limted to those measures listed in CAA Section 108(f).

UFP (Ultrafine Particles): Particles with a diameter less than 0.1 µm (or 100 nm).

ULEV (Ultra Low Emission Vehicle): Vehicles with low emission ratings within California's LEV 1 or LEV 2 exhaust emission standards. The LEV 1 emission standards typically apply to cars from 1994–2003. The LEV 2 emission standards were adopted in 1998 and typically apply to cars from 2004–2010.

U.S. EPA (United States Environmental Protection Agency): The federal agency charged with setting policy and guidelines, and carrying out legal mandates for the protection of national interests in environmental resources.

VMT (Vehicle Miles Traveled): Total vehicle miles traveled by all or a subset of mobile sources.

Visibility: 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.

VOCs (Volatile Organic Compounds): Hydrocarbon compounds that exist in the ambient air. VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints.

Zero Emission Technologies: Advanced technology or control equipment that generates zero end-use emissions from stationary or mobile source applications.

ZEV (Zero Emission Vehicle): A vehicle that produces no emissions from the on-board source of power.