

# **SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**

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## **Draft 2021 Redesignation Request and Maintenance Plan for the 2006 and 1997 24-Hour PM<sub>2.5</sub> Standards for South Coast Air Basin**

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## Executive Summary

The South Coast Air Basin (SCAB) is currently designated as a serious nonattainment area for the 2006 24-hour average PM2.5 National Ambient Air Quality Standard (NAAQS) and a moderate nonattainment area for the 1997 24-hour average PM2.5 NAAQS. Design values have decreased from 55  $\mu\text{g m}^{-3}$  to 35  $\mu\text{g m}^{-3}$  since the 2005 – 2007 period when the SCAB was initially designated as a moderate nonattainment area for the 2006 PM2.5 NAAQS. In the three-year period from 2018 to 2020 the design value was 35  $\mu\text{g m}^{-3}$ , subject to the U.S. EPA approval of an exceptional event demonstration showing that exceedances recorded from September 11<sup>th</sup> to 16<sup>th</sup> were the result of the Bobcat and El Dorado Fires. This design value is equal to the 2006 PM2.5 NAAQS limit and less than the 1997 PM2.5 NAAQS limit, therefore, the SCAB meets both PM2.5 NAAQS. The purpose of this document is to revise the PM2.5 State Implementation Plans (SIP) to request redesignation of the Basin to attainment for both the 2006 and 1997 24-hour average PM2.5 standards, and to submit the maintenance plan and other required actions to qualify for such redesignation by the U.S. EPA.

The following requirements of section 107 (d)(3)(E) of the CAA are addressed in this plan.

**U.S. EPA must determine that the NAAQS have been attained.** Section 2 calculates design values after removing the Bobcat and El Dorado Fires exceptional event, demonstrating the NAAQS have been attained. Trends of design values since 2001 after removing suspected exceptional events demonstrate the improvement in air quality.

**The applicable implementation plan must be fully approved by the U.S. EPA under section 110(k).** The 2012 and 2016 Air Quality Management Plans (AQMP) included control measures for PM2.5 and PM2.5 precursor emissions addressing the 2006 24-hour PM2.5 NAAQS. The 2007 AQMP included control measures addressing the 1997 24-hour PM2.5 NAAQS. The Serious Area Plan for the Basin was included in the 2016 AQMP and 2016 California SIP and was approved by the U.S. EPA in 2019. The requirement of an approved implementation plan under section 110(k) is thus satisfied by the approved portions of the PM2.5 part of the 2007 AQMP and the 2016 AQMP and California SIP.

**The U.S. EPA must determine that the improvement in air quality is due to permanent and enforceable reductions in emissions.** California Emissions Projection Analysis Model 2016 was used to estimate 2002 and 2008 emissions, and 2020 emissions were determined from the attainment inventory in this plan. Emissions of primary PM2.5 and precursors decreased, especially NOx and SOx, which decreased 67% (NOx) and 78% (SOx) from 2002 to 2020 and 54% (NOx) and 74% (SOx) from 2008 to 2020. Meteorological measurements from 2008 – 2020 along with calculations using AERMET and AERSURFACE, which are U.S. EPA preferred/recommended, demonstrate that meteorology during 2018 – 2020 was not more conducive to lower PM2.5 concentrations, providing evidence that concentration reductions were due to emission reductions.

**The South Coast AQMD is submitting a Maintenance Plan for 24-Hour Average PM2.5 in the SCAB that meets the requirements of Section 175A concurrently with this redesignation request.** A maintenance demonstration for the 2006 and 1997 NAAQS through 2035 uses 2018 actual reported emissions as the base year emissions and develops emission inventories for 2020 (attainment year), 2023 and 2031 (interim years) and 2035 (maintenance horizon year) following the methodology used in previous air quality management plans and recent attainment and maintenance plans. The maintenance demonstration uses Community Multiscale Air Quality model (CMAQ) along with the relative response

factor method to calculate future PM<sub>2.5</sub> concentrations. Future PM<sub>2.5</sub> design values are less than or equal to the NAAQS limit of 35 µg m<sup>-3</sup>, with the highest predicted PM<sub>2.5</sub> concentrations in 2023, 2031, and 2035 at the Long Beach-Route 710 Near Road stations. Attainment will be maintained through 2035 with baseline emissions scenarios, which reflect on-going and expected emissions reductions from already adopted regulations. No additional emission reductions are required for maintaining attainment of the 2006 and 1997 standards in the South Coast Air Basin.

The maintenance plan establishes a commitment to maintain a future PM<sub>2.5</sub> monitoring network and a commitment to verify continued attainment of the NAAQS by periodically reviewing the inputs and assumptions for the emission inventory and updating the inventory if those inputs or assumptions have changed.

The maintenance plan establishes a contingency plan in case the 2006 24-Hour PM<sub>2.5</sub> standard or the 1997 24-Hour PM<sub>2.5</sub> standard is violated in the future. The contingency plan describes the method by which exceptional events are removed from the contingency plan trigger. If the contingency plan is triggered, then South Coast AQMD will take actions to reduce emissions. Potential actions include amending Rules 444 (Open Burning) and 445 (Wood-Burning Devices) to further strengthen prohibitions on particulate emission and proposing new rules to reduce particulate emissions, if needed.

Transportation conformity is the federal regulatory procedure for linking and coordinating the transportation and air quality planning processes. The California Air Resources Board (CARB) has prepared the motor vehicle emissions budget (MVEB), which are being submitted in this plan. Subsequent transportation plans and programs produced by transportation planning agencies are required to conform to the SIP by demonstrating that the emissions from the proposed plan, program, or project do not exceed the MVEB.

## 1. Introduction

The South Coast Air Basin (SCAB) is currently designated as a serious nonattainment area for the 2006 24-hour average PM<sub>2.5</sub> National Ambient Air Quality Standard (NAAQS) and a moderate nonattainment area for the 1997 24-hour average PM<sub>2.5</sub> NAAQS. Pursuant to the federal Clean Air Act (CAA), an area can be redesignated as attainment if the NAAQS have been attained and other requirements of the CAA are met. Due to regulatory and incentive-based emission controls, PM<sub>2.5</sub> concentrations in the SCAB have decreased over the last two decades. Design values have decreased from 55  $\mu\text{g m}^{-3}$  to 35  $\mu\text{g m}^{-3}$  since the 2005 – 2007 period when the SCAB was initially designated as a moderate nonattainment area for the 2006 24-hour PM<sub>2.5</sub> NAAQS. In the three-year period from 2018 to 2020 the design value was 35  $\mu\text{g m}^{-3}$ , subject to the U.S. EPA approval of an exceptional event demonstration showing that exceedances recorded from September 11<sup>th</sup> to 16<sup>th</sup> were the result of the Bobcat and El Dorado Fires. This design value is equal to the 2006 24-hour PM<sub>2.5</sub> NAAQS limit, and the SCAB is thus in attainment with the 2006 24-hour average PM<sub>2.5</sub> NAAQS. The design value in the three-year period from 2018 to 2020 is also less than the 1997 24-hour average PM<sub>2.5</sub> NAAQS limit of 65  $\mu\text{g m}^{-3}$ , and the SCAB is thus also in attainment with the 1997 24-hour average PM<sub>2.5</sub> NAAQS. This is confirmed by the U.S. EPA determination, effective August 24, 2016, that the SCAB attained the 1997 24-hour PM<sub>2.5</sub> NAAQS based on 2011-2013 data<sup>1</sup>.

The purpose of this document is to revise the PM<sub>2.5</sub> State Implementation Plans (SIP) to request redesignation of the Basin to attainment for both the 2006 24-hour average PM<sub>2.5</sub> standard and the 1997 24-hour average PM<sub>2.5</sub> standard, and to submit the maintenance plan and other required actions to qualify for such redesignation by the U.S. EPA. Section 107 (d)(3)(E) of the CAA requires the U.S. EPA administrator to make five findings prior to granting a request for redesignation:

1. The U.S. EPA has determined that the NAAQS have been attained.
2. The applicable implementation plan has been fully approved by the U.S. EPA under section 110(k).
3. The U.S. EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions.
4. The State has met all applicable requirements for the area under Section 110 and Part D.
5. The U.S. EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A.

Section 2 in this document provides analysis and data to support items 1 through 4 above: that the 2006 and 1997 NAAQS have been attained, that the state implementation plans are approved under section 110(k), that improvements in PM<sub>2.5</sub> are due to permanent and enforceable emission reductions, and that the South Coast Air Quality Management District (South Coast AQMD) has met Section 110 and Part D requirements. Section 2 also discusses exceptional event demonstrations that South Coast AQMD has prepared. The South Coast AQMD flags PM<sub>2.5</sub> data after 2018 for exclusion from the NAAQS due to impacts from wildfires and cultural events such as fireworks displays in accordance with the U.S. EPA exceptional event policy. However, only events with an exceptional event demonstration that the U.S. EPA has concurred upon may be removed from the design value determination. A single exceptional event demonstration has been prepared to demonstrate that the Bobcat and El Dorado fires caused

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<sup>1</sup> <https://www.federalregister.gov/documents/2016/07/25/2016-17410/clean-data-determination-for-1997-pm25>



PM<sub>2.5</sub> exceedances between September 11 and 16 in 2020. This document demonstrates a clear causal relationship between the wildfires and exceedances and that the wildfires were natural events that were not reasonably controllable or preventable.

The South Coast AQMD is submitting a Maintenance Plan for 24-Hour Average PM<sub>2.5</sub> in the SCAB that meets the requirements of Section 175A concurrently with this redesignation request (Sections 3 through 8 of this document). The maintenance plan includes a demonstration of maintenance of both the 2006 and 1997 24-Hour PM<sub>2.5</sub> NAAQS through 2035, a commitment to maintain a future PM<sub>2.5</sub> monitoring network, a commitment to verify continued attainment of the NAAQS, and a contingency plan in case the 2006 24-Hour PM<sub>2.5</sub> standard or the 1997 24-Hour PM<sub>2.5</sub> standard is violated in the future.

Both the 2006 and 1997 PM<sub>2.5</sub> standards are addressed in this document simultaneously as the requirements for the Maintenance Plan and Redesignation Request are identical for both standards. The South Coast AQMD intends that this document can be severed to address each standard individually.

## 2. Redesignation Request

### 2.1. Attainment of the Standard

The 2006 24-hour average PM<sub>2.5</sub> NAAQS is attained if the design value is less than or equal to 35  $\mu\text{g m}^{-3}$ , and the 1997 24-hour average PM<sub>2.5</sub> NAAQS is attained if the design value is less than or equal to 65  $\mu\text{g m}^{-3}$ . The design value for both standards is calculated by determining the 98th percentile of the 24-hour average PM<sub>2.5</sub> concentrations in a year and then averaging the 98th percentile values over three years. The calculation is performed at each monitoring site and the highest design value in the SCAB is used to determine attainment. Exceptional events that have been concurred upon by the U.S. EPA are removed from consideration when determining the 98th percentile. This section discusses the monitoring network, design value trends, and discussion of the exceptional event demonstration in development that is needed to show attainment.

The South Coast AQMD uses federal reference method (FRM) gravimetric monitors and federal equivalent method (FEM) beta attenuation monitors (BAM) to measure PM<sub>2.5</sub> in the SCAB. Only some of the BAMs meet the requirements for comparability with FRM; other BAMs that do not meet the requirements are not used for comparison with the NAAQS. For calculation of design value, we use data that is labeled with air quality system (AQS) parameter code 88101, which is the code for PM<sub>2.5</sub> data that is comparable with the NAAQS, and a supplemental list of monitors that report data comparable to the NAAQS but which has not yet been labeled with AQS parameter code 88101. Figure 2-1 shows the locations of PM<sub>2.5</sub> monitors that have operated in the SCAB since 2018. Table 2-1 lists the monitors along with the type (FRM or FEM BAM).

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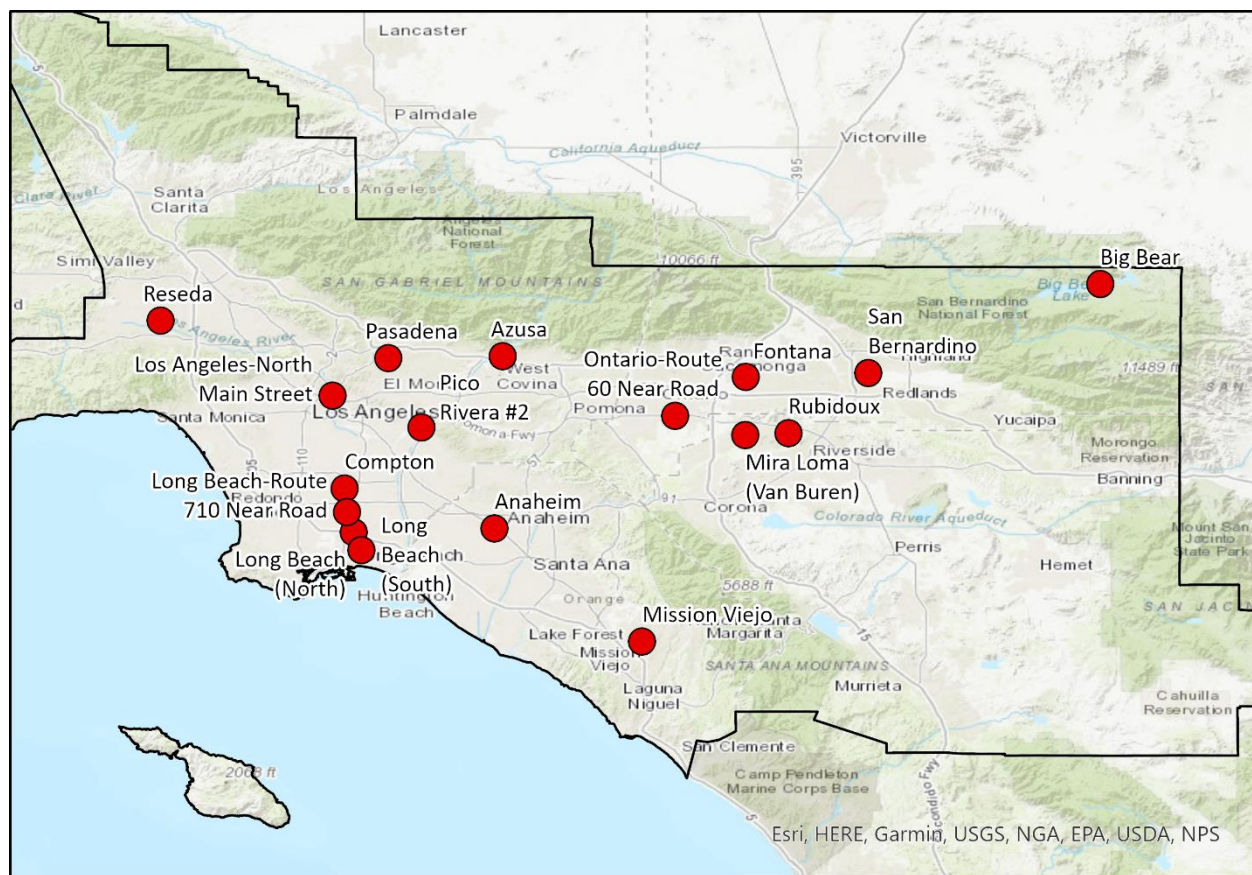


Figure 2-1: PM<sub>2.5</sub> monitoring sites that have operated in the SCAB since 2018.

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*Table 2-1: PM<sub>2.5</sub> monitors that operated in the SCAB since 2018. Only monitors that can be compared with the standard (labeled with AQS code 88101 or in a supplemental list of monitors) are shown.*

Site Name	State Code	County Code	Site Number	Parameter Occurrence Code (POC)	Monitor Type
Anaheim	6	59	7	2	FRM
Anaheim	6	59	7	1	FRM
Anaheim	6	59	7	3	FEM BAM
Azusa	6	37	2	21	FRM
Azusa	6	37	2	1	FRM
Big Bear	6	71	8001	1	FRM
Compton	6	37	1302	1	FRM
Fontana	6	71	2002	21	FRM
Fontana	6	71	2002	1	FRM
Long Beach (North)	6	37	4002	1	FRM
Long Beach (South)	6	37	4004	1	FRM
Long Beach (South)	6	37	4004	3	FEM BAM
Long Beach-Route 710 Near Road	6	37	4008	1	FRM
Long Beach-Route 710 Near Road	6	37	4008	3	FEM BAM
Los Angeles-North Main Street	6	37	1103	2	FRM
Los Angeles-North Main Street	6	37	1103	1	FRM
Mira Loma (Van Buren)	6	65	8005	1	FRM
Mira Loma (Van Buren)	6	65	8005	2	FRM
Mira Loma (Van Buren)	6	65	8005	3	FEM BAM
Mission Viejo	6	59	2022	1	FRM
Ontario-Route 60 Near Road	6	71	27	3	FEM BAM
Ontario-Route 60 Near Road	6	71	27	1	FRM
Pasadena	6	37	2005	1	FRM
Pasadena	6	37	2005	2	FRM
Pico Rivera #2	6	37	1602	21	FRM
Pico Rivera #2	6	37	1602	2	FRM
Pico Rivera #2	6	37	1602	1	FRM
Reseda	6	37	1201	1	FRM
Rubidoux	6	65	8001	1	FRM
Rubidoux	6	65	8001	2	FRM
Rubidoux	6	65	8001	9	FEM BAM
San Bernardino	6	71	9004	1	FRM

We calculated design values in this plan to: 1) demonstrate attainment in the 2018 – 2020 attainment period and 2) analyze trends of design values over the previous decade to provide evidence that concentration reductions are due to emission reductions. To calculate design values we first remove the PM<sub>2.5</sub> data that is influenced by suspected exceptional events. Exceptional events are those data points where the concentration was caused by a natural event or activity that is unlikely to reoccur and that is not reasonably controllable or preventable. In the case of PM<sub>2.5</sub>, wildfires or fireworks often cause exceptional events. We used a methodology that is consistent with the U.S. EPA's exceptional event guidance to remove exceptional events:

1. There is a clear causal relationship between the event and a monitored exceedance
2. The event is not reasonably controllable or preventable because it is a natural event or an event caused by human activity that is unlikely to recur at a particular location

Exceptional events are identified using different methods for demonstrating attainment and analyzing trends. To demonstrate attainment, we analyzed measured exceedances of the 2006 24-hour average PM<sub>2.5</sub> NAAQS during 2018 – 2020. Events that are regulatory significant, because not removing them would result in non-attainment of the 2006 NAAQS, and meet the U.S. EPA exceptional event guidance criteria were removed from calculation of the 2018 – 2020 design values. During the period from September 11 through 16, 2020 smoke from the Bobcat and El Dorado Fires affected PM<sub>2.5</sub> measurements throughout the SCAB. This is a regulatory significant exceptional event and South Coast AQMD is preparing an exceptional event demonstration consistent with U.S. EPA exceptional event guidance for this event.

To evaluate trends in measured calculations, measurements that are not regulatory significant but generally meet the definition of an exceptional event were removed. These events are defined as “suspected exceptional events” as they do not have a supporting exceptional event demonstration because removal or inclusion of the exceedance does not have regulatory significance. There are too many exceptional events to use this approach when calculating design value trends over the last decade. So we applied a screening method that used the hazard mapping system fire and smoke data (HMS) to identify when smoke plumes from wildfires may have affected the PM<sub>2.5</sub> measurements. While this screening criteria provides only an approximate estimate of the days that were influenced by exceptional events, it allows for a methodical and consistent evaluation of a decade of measurements at every monitor in the South Coast Air Basin. In addition to the HMS data, we also removed data measured on July 4th and 5th since these days are affected by fireworks. To screen for wildfire smoke we downloaded shapefiles representing the outlines of smoke plumes as determined from GOES East and GOES West satellite imagery<sup>2</sup>. Then we flagged suspected exceptional events when a monitor was inside the smoke plume outlines on each day and the 24-hour average PM<sub>2.5</sub> measurement also exceeded 35  $\mu\text{g m}^{-3}$ . The smoke plumes determined from satellite imagery are indicative of conditions when high ground level PM<sub>2.5</sub> concentrations may occur. But the smoke from distant wildfires or fires with significant buoyant plume rise may be elevated above the mixed layer and thus there can be visible smoke on satellite images but no significant smoke at ground level. Still the satellite analysis is a useful screening approach that can remove exceptional events for analysis of trends.

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<sup>2</sup> Shapefiles were downloaded from <https://www.ospo.noaa.gov/Products/land/hms.html>

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Table 2-2 lists measured exceedances of the 2006 PM2.5 NAAQS during 2018 – 2020, whether the exceedances meet the screening criteria listed above and whether the exceedances are covered as part of the exceptional event demonstration of the Bobcat and El Dorado fires.

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Table 2-2: PM2.5 exceedances from 2018 – 2020 at stations that exceed the 2006 NAAQS before removing exceptional events. Exceedances of the 1997 standard are labeled with an asterisk.

<u>Date</u>	<u>Station</u>	<u>24-hr PM2.5 (µg/m<sup>3</sup>)</u> <u>(POC)</u>	<u>Likely Cause</u>	<u>Meets Screening</u> <u>Criteria</u>	<u>Preparing</u> <u>Demonstration</u>
1/1/2018	Los Angeles-North Main Street	61.4 (1)		No	No
1/1/2018	Mira Loma (Van Buren)	86.0 (1)		No	No
1/1/2018	Ontario-Route 60 Near Road	60.4 (1), 67.6 (3)		No	No
1/2/2018	Los Angeles-North Main Street	42.4 (2), 42.3 (1)		No	No
1/2/2018	Mira Loma (Van Buren)	44.9 (1), 48.0 (2)		No	No
1/2/2018	Ontario-Route 60 Near Road	47.6 (1), 56.3 (3)		No	No
1/2/2018	Pico Rivera #2	56.3 (1), 56.1 (2)		No	No
1/16/2018	Ontario-Route 60 Near Road	37.1 (1), 42.8 (3)		No	No
1/17/2018	Ontario-Route 60 Near Road	36.7 (3)		No	No
7/4/2018	Pico Rivera #2	42.4 (21)	Fourth of July Fireworks	Yes	No
7/5/2018	Ontario-Route 60 Near Road	55.7 (1), 70.6 (3)	Fourth of July Fireworks	Yes	No
10/29/2018	Los Angeles-North Main Street	43.0 (2), 42.7 (1)		No	No
11/11/2018	Los Angeles-North Main Street	39.6 (1)	Woolsey Fire	Yes	No
12/16/2018	Mira Loma (Van Buren)	35.6 (1)		No	No
12/21/2018	Ontario-Route 60 Near Road	37.1 (3)		No	No
12/22/2018	Mira Loma (Van Buren)	42.7 (1), 46.1 (2)		No	No
12/22/2018	Ontario-Route 60 Near Road	36.5 (1), 41.3 (3)		No	No
12/22/2018	Pico Rivera #2	35.4 (1), 36.0 (2)		No	No
12/23/2018	Los Angeles-North Main Street	43.8 (1)		No	No
12/23/2018	Mira Loma (Van Buren)	54.7 (1)		No	No
12/23/2018	Ontario-Route 60 Near Road	38.9 (1), 42.2 (3)		No	No
12/24/2018	Los Angeles-North Main Street	43.2 (1)		No	No
12/24/2018	Mira Loma (Van Buren)	64.8 (1)		No	No
12/24/2018	Ontario-Route 60 Near Road	46.3 (1), 45.1 (3)		No	No
1/29/2019	Mira Loma (Van Buren)	36.4 (1)		No	No
1/29/2019	Ontario-Route 60 Near Road	38.0 (1), 43.6 (3)		No	No
1/30/2019	Mira Loma (Van Buren)	36.2 (1)		No	No
7/5/2019	Mira Loma (Van Buren)	54.7 (1)	Fourth of July Fireworks	Yes	No

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<u>Date</u>	<u>Station</u>	<u>24-hr PM2.5 (µg/m<sup>3</sup>)</u> <u>(POC)</u>	<u>Likely Cause</u>	<u>Meets Screening</u> <u>Criteria</u>	<u>Preparing</u> <u>Demonstration</u>
7/5/2019	Ontario-Route 60 Near Road	57.7 (1), 71.2 (3)	Fourth of July Fireworks	Yes	No
7/5/2019	Pico Rivera #2	50.2 (21)	Fourth of July Fireworks	Yes	No
11/5/2019	Ontario-Route 60 Near Road	35.3 (3)		No	No
11/6/2019	Mira Loma (Van Buren)	36.9 (1)		No	No
11/7/2019	Los Angeles-North Main Street	43.5 (1)		No	No
11/7/2019	Mira Loma (Van Buren)	37.1 (1)		No	No
11/7/2019	Ontario-Route 60 Near Road	36.3 (1), 37.1 (3)		No	No
11/11/2019	Mira Loma (Van Buren)	35.5 (1), 37.5 (2)		No	No
11/11/2019	Ontario-Route 60 Near Road	36.8 (1)		No	No
11/12/2019	Mira Loma (Van Buren)	36.2 (1)		No	No
11/13/2019	Mira Loma (Van Buren)	42.2 (1)		No	No
11/13/2019	Ontario-Route 60 Near Road	41.3 (1), 40.1 (3)		No	No
11/14/2019	Mira Loma (Van Buren)	46.7 (1)		No	No
11/14/2019	Ontario-Route 60 Near Road	40.3 (1), 39.5 (3)		No	No
12/3/2019	Ontario-Route 60 Near Road	35.1 (3)		No	No
12/13/2019	Mira Loma (Van Buren)	38.1 (1)		No	No
1/14/2020	Ontario-Route 60 Near Road	35.7 (3)		No	No
1/15/2020	Ontario-Route 60 Near Road	47.5 (1), 49.7 (3)		No	No
1/26/2020	Los Angeles-North Main Street	47.3 (1)		No	No
1/26/2020	Mira Loma (Van Buren)	35.7 (1)		No	No
1/26/2020	Ontario-Route 60 Near Road	42.6 (1), 40.2 (3)		No	No
1/27/2020	Ontario-Route 60 Near Road	35.1 (1), 40.3 (3)		No	No
2/8/2020	Mira Loma (Van Buren)	36.4 (1)		No	No
2/8/2020	Ontario-Route 60 Near Road	36.9 (3)		No	No
7/4/2020	Los Angeles-North Main Street	90.2 (1)	Fourth of July Fireworks	Yes	No
7/5/2020	Los Angeles-North Main Street	175.0* (1)	Fourth of July Fireworks	Yes	No
7/5/2020	Ontario-Route 60 Near Road	42.8 (1), 53.4 (3)	Fourth of July Fireworks	Yes	No
7/5/2020	Pico Rivera #2	82.9* (21)	Fourth of July Fireworks	Yes	No
8/21/2020	Ontario-Route 60 Near Road	53.1 (1), 52.8 (3)	Smoke impacts from northern California	Yes	No
9/11/2020	Los Angeles-North Main Street	48.7 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes

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<u>Date</u>	<u>Station</u>	<u>24-hr PM2.5 (µg/m<sup>3</sup>) (POC)</u>	<u>Likely Cause</u>	<u>Meets Screening Criteria</u>	<u>Preparing Demonstration</u>
9/11/2020	Mira Loma (Van Buren)	36.5 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/11/2020	Ontario-Route 60 Near Road	42.0 (1), 47.2 (3)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/12/2020	Los Angeles-North Main Street	55.0 (1), 55.0 (2)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/12/2020	Mira Loma (Van Buren)	60.9 (1), 62.2 (2)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/12/2020	Ontario-Route 60 Near Road	59.2 (1), 65.6* (3)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/12/2020	Pico Rivera #2	60.5 (2)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/13/2020	Los Angeles-North Main Street	47.1 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/13/2020	Mira Loma (Van Buren)	50.4 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/13/2020	Ontario-Route 60 Near Road	50.2 (1), 55.0 (3)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/14/2020	Los Angeles-North Main Street	56.9 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/14/2020	Mira Loma (Van Buren)	49.3 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/14/2020	Ontario-Route 60 Near Road	53.7 (1), 57.2 (3)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/15/2020	Los Angeles-North Main Street	56.7 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/15/2020	Mira Loma (Van Buren)	49.7 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/15/2020	Ontario-Route 60 Near Road	44.0 (1), 50.6 (3)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/15/2020	Pico Rivera #2	48.5 (21)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/16/2020	Los Angeles-North Main Street	36.0 (1)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
9/16/2020	Ontario-Route 60 Near Road	37.0 (1), 41.7 (3)	Smoke from Bobcat and El Dorado Fires	Yes	Yes
10/4/2020	Los Angeles-North Main Street	39.2 (1)	Smoke from Central and Northern California	Yes	No
10/4/2020	Mira Loma (Van Buren)	44.0 (1)	Smoke from Central and Northern California	Yes	No
10/4/2020	Ontario-Route 60 Near Road	38.8 (1), 42.8 (3)	Smoke from Central and Northern California	Yes	No
10/5/2020	Los Angeles-North Main Street	42.5 (1)	Smoke from Central and Northern California	Yes	No
10/5/2020	Mira Loma (Van Buren)	47.4 (1)	Smoke from Central and Northern California	Yes	No
10/5/2020	Ontario-Route 60 Near Road	44.1 (1), 47.2 (3)	Smoke from Central and Northern California	Yes	No
10/6/2020	Mira Loma (Van Buren)	40.1 (1), 44.2 (2)	Smoke from Central and Northern California	Yes	No
10/6/2020	Ontario-Route 60 Near Road	37.5 (1), 43.7 (3)	Smoke from Central and Northern California	Yes	No
10/6/2020	Pico Rivera #2	39.8 (1), 39.9 (2)	Smoke from Central and Northern California	Yes	No
10/7/2020	Ontario-Route 60 Near Road	39.3 (3)		Yes	No
10/21/2020	Mira Loma (Van Buren)	38.7 (1)		Yes	No
10/21/2020	Ontario-Route 60 Near Road	40.6 (1)		Yes	No



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<u>Date</u>	<u>Station</u>	<u>24-hr PM<sub>2.5</sub> (µg/m<sup>3</sup>) (POC)</u>	<u>Likely Cause</u>	<u>Meets Screening Criteria</u>	<u>Preparing Demonstration</u>
10/21/2020	Pico Rivera #2	35.4 (21)		Yes	No
10/26/2020	Ontario-Route 60 Near Road	35.8 (3)	Silverado and Blue Ridge Fires	Yes	No
10/27/2020	Pico Rivera #2	46.8 (21)	Silverado and Blue Ridge Fires	Yes	No
10/28/2020	Mira Loma (Van Buren)	35.3 (1)	Silverado and Blue Ridge Fires	Yes	No
10/28/2020	Ontario-Route 60 Near Road	35.1 (3)	Silverado and Blue Ridge Fires	Yes	No
11/3/2020	Los Angeles-North Main Street	39.6 (1)		No	No
11/21/2020	Mira Loma (Van Buren)	36.9 (1)		No	No

Design values calculated for the 2018 – 2020 three year period before and after removing regulatory significant exceptional events and all suspected exceptional events are shown in Table 2-3. After removing the Bobcat and El Dorado fire event (regulatory significant) the highest 24-hour average PM<sub>2.5</sub> design value in the SCAB is 35  $\mu\text{g m}^{-3}$  at Mira Loma (Van Buren), Compton, Azusa, Fontana, and Long Beach-Route 710 Near Road. Thus the SCAB attained the 2006 24-hour average PM<sub>2.5</sub> NAAQS during 2018 – 2020 because the design value is equal to the level of the NAAQS. The Silverado and Blue Ridge Fires, the Bond and Airport Fires, Long-range transport of wildfire smoke from Central and Northern California wildfires, and Independence day fireworks during 2018 - 2020 also caused exceedances of the NAAQS that are likely exceptional events; the last column in Table shows the design values if these events were excluded through exceptional event demonstrations. If the South Coast AQMD submits exceptional event demonstrations for all of these events and the demonstrations are approved by U.S. EPA<sup>3</sup> then the maximum design value would be 35  $\mu\text{g m}^{-3}$  at Mira Loma (Van Buren) and the second highest design value would be 33  $\mu\text{g m}^{-3}$  at Ontario-Route 60 Near Road and Compton.

The design values are less than the 1997 24-hour average PM<sub>2.5</sub> NAAQS (65  $\mu\text{g m}^{-3}$ ) before or after removing regulatory significant exceptional events. The SCAB thus also attained the 1997 24-hour average PM<sub>2.5</sub> NAAQS during 2018 – 2020. On July 25, 2016 U.S. EPA finalized a determination that the SCAB attained the 1997 24-hour PM<sub>2.5</sub> NAAQS, effective August 24, 2016<sup>4</sup>. This determination was based on 2011-2013 data and the design value calculations in this plan demonstrate that the SCAB continues to attain the 1997 24-hour PM<sub>2.5</sub> NAAQS.

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<sup>3</sup> This scenario is hypothetical as U.S. EPA will only review exceptional event demonstrations that are considered regulatory significant.

<sup>4</sup> <https://www.federalregister.gov/documents/2016/07/25/2016-17410/clean-data-determination-for-1997-pm25>

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*Table 2-3: Design values for both the 2006 and 1997 24-hour average PM<sub>2.5</sub> NAAQS in the SCAB during 2018-2020 before and after removing regulatory significant exceptional events and after removing all suspected exceptional events.*

Site Name	No Exceptional Events Removed	Regulatory Significant Exceptional Events Removed	All Suspected Exceptional Events Removed
Azusa	35	35	26
Los Angeles-North Main Street	37	32	30
Reseda	29	29	26
Compton	35	35	33
Pico Rivera #2	37	34	31
Pasadena	31	31	29
Long Beach (North)	33	33	27
Long Beach (South)	32	32	28
Long Beach-Route 710 Near Road	35	35	31
Anaheim	33	33	28
Mission Viejo	23	23	23
Rubidoux	34	34	30
Mira Loma (Van Buren)	36	35	35
Ontario-Route 60 Near Road	36	34	33
Fontana	35	35	30
Big Bear	22	22	22
San Bernardino	28	28	27

We analyzed trends of 24-hour average PM<sub>2.5</sub> design values over the 2001 – 2020 period after removing suspected exceptional events due to wildfire smoke and fireworks (from 2010 – 2020) (Figure 2-2). Removing suspected exceptional events only affects the 2020 design values, resulting in the design value of 35 µg m<sup>-3</sup> at Mira Loma (Van Buren). Maximum PM<sub>2.5</sub> design values in the Basin have decreased by 34% since 2008 and 54% since 2001.

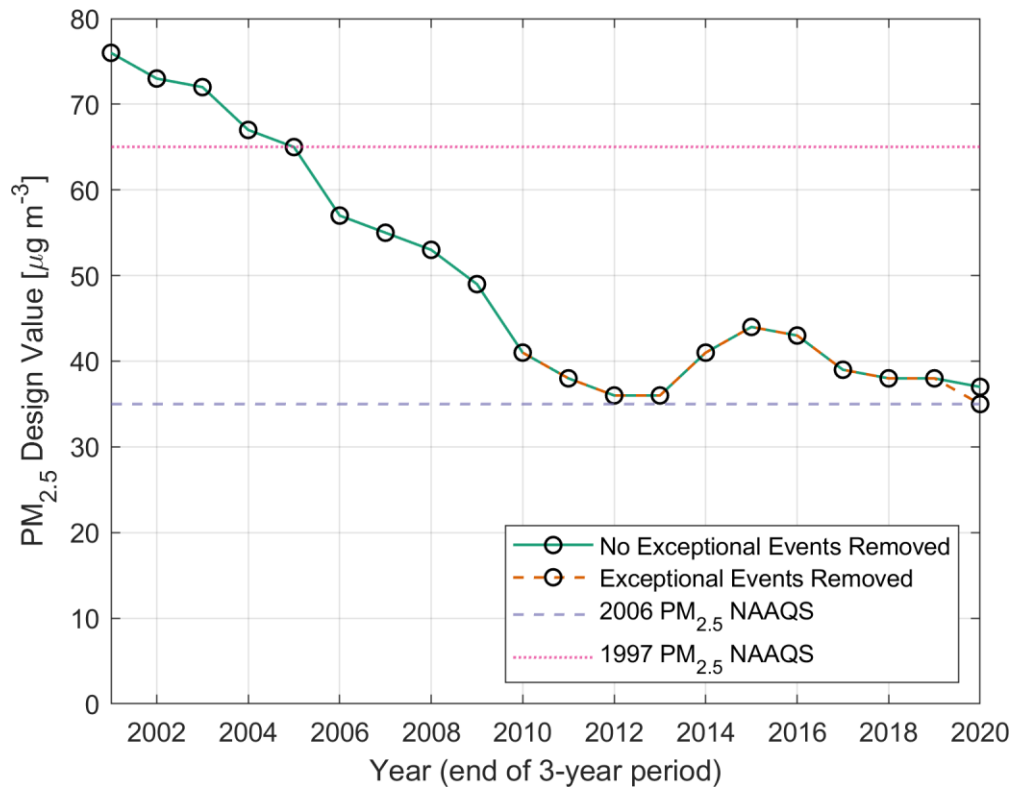


Figure 2-2: Trend of 24-hour average PM<sub>2.5</sub> design values in the Basin from 2001 – 2020 before and after removing suspected exceptional events.

Mira Loma (Van Buren) has been the design station since 2008, except for 2018 and 2019 when Compton was the design station. The high design values at Compton in 2017, 2018, and 2019 were caused by three anomalous measurements in 2017<sup>5</sup>. To demonstrate the reduction in concentrations at these design stations over the past decade, we plotted their design value trends in Figure 2-3. There is a decreasing trend at Mira Loma (Van Buren) since 2010 (reduction of 6 μg m<sup>-3</sup>) and a slight increasing design value trend at Compton. However, the trend at Compton is explained by the anomalously high measurements in 2017 and thus is not representative of typical emissions.

<sup>5</sup> In 2017, FRM measurements were conducted in a 1 in 6 day schedule at Compton.

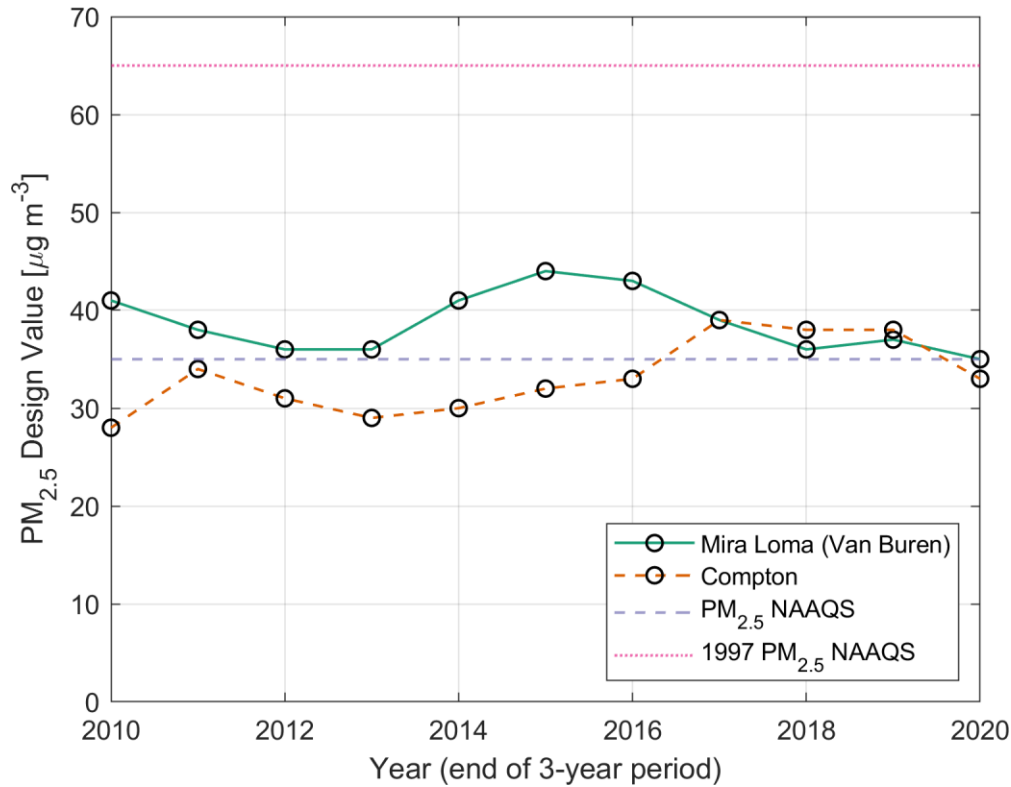


Figure 2-3: Trend of 24-hour average PM<sub>2.5</sub> design values in the Basin at Mira Loma (Van Buren) and Compton from 2010 – 2020 after removing suspected exceptional events.<sup>6</sup>

## 2.2. Permanent and Enforceable Emission Reductions

The improvement in PM<sub>2.5</sub> must be attributable to permanent and enforceable emission reductions for the U.S. EPA to grant a request for redesignation. U.S. EPA guidance also requires that the percent reduction of emissions from the year used for designation be calculated<sup>7</sup>. PM<sub>2.5</sub> and its precursor emissions are provided in Table 2-4 for 2008, the end of the 3-year period for which the SCAB was initially designated as nonattainment for the 2006 NAAQS<sup>8</sup>, and 2020, the attainment year in this redesignation request. For the 1997 24-hour PM<sub>2.5</sub> standard, the SCAB was designated as nonattainment based on the 2003 design value, which reflects measurements taken during 2001 to 2003. The 2007 Air Quality Management Plan (AQMP), which is the first AQMP to address the 1997 24-hour average PM<sub>2.5</sub> NAAQS for the SCAB, used 2002 as the base year for emissions inventory development. Considering these two factors, the emissions inventory for 2002 was included in this

<sup>6</sup> No monitors meet quarterly data completeness requirements for design value calculations in 2014. However valid design values were calculated by using data substitution tests.

<sup>7</sup> United States Environmental Protection Agency. 1992. Procedures for Processing Requests to Redesignate Areas to Attainment. Memorandum from John Calcagni to USEPA Regional Directors. September 4. Available at: [https://www.epa.gov/sites/production/files/2016-03/documents/calcagni\\_memo\\_-\\_procedures\\_for\\_processing\\_requests\\_to\\_redesignate\\_areas\\_to\\_attainment\\_090492.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf).

<sup>8</sup> Federal Register :: Air Quality Designations for the 2006 24-Hour Fine Particle (PM<sub>2.5</sub>). Available at: <https://www.federalregister.gov/documents/2009/11/13/E9-25711/air-quality-designations-for-the-2006-24-hour-fine-particle-pm25>

analysis to quantify progress toward attainment and demonstrate that emission reductions are permanent and enforceable. California Emissions Projection Analysis Model (CEPAM) 2016 was used to estimate 2002 and 2008 emissions and the 2020 emissions are from the attainment inventory included in section 3.

As shown in Table 2-4, all pollutant emissions have decreased substantially, especially NO<sub>x</sub> and SO<sub>x</sub> emissions, which have been reduced by 67% and 78%, respectively, since the initial designation of nonattainment status for the 1997 NAAQS. Corresponding emissions reductions are 48% NO<sub>x</sub> and 59% SO<sub>x</sub>, respectively, from 2008 to 2020. These reductions are thanks to regulations and programs that reduce emissions from stationary sources as well as mobile sources. For stationary sources, amendments to South Coast AQMD's Regulation XX in addition to other regulations resulted in significant reductions of NO<sub>x</sub> and SO<sub>x</sub> emissions from facilities belonging to the Regional Clean Air Incentives Market (RECLAIM).

*Table 2-4: Reduction of Annual Average Basin Total Emissions of PM<sub>2.5</sub> and its Precursors from 2002 to 2020 and 2008 to 2020.*

	2002 (tons per day)	2008 (tons per day)	2020 (tons per day)	Reductions from 2002 to 2020 (%)	Reductions from 2008 to 2020 (%)
PM <sub>2.5</sub>	82	76	61	26	19
NO <sub>x</sub>	1027	729	338	67	54
VOC	828	571	385	53	32
SO <sub>x</sub>	66	57	15	78	74
NH <sub>3</sub>	104	87	76	27	13

The emission reductions are due to permanent and enforceable regulations adopted by South Coast AQMD and California Air Resources Board (CARB). These regulations are listed in the South Coast Air Basin Attainment Plan for 2006 24-Hour PM<sub>2.5</sub> Standard<sup>9</sup> and the SIP enforceable rules are available from the U.S. EPA<sup>10</sup>. There are many South Coast AQMD rules that regulate emissions of PM<sub>2.5</sub> and PM<sub>2.5</sub> precursors; selected rules that regulate primary particulate matter (PM) are listed in Table 2-5. In addition, regulations of PM<sub>2.5</sub> precursor emissions such as NO<sub>x</sub>, SO<sub>x</sub> and VOC brought permanent and enforceable emission reductions.

<sup>9</sup> Available at <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/2-final-attainment-plan-for-2006-24-hour-pm2-5-standard-for-the-south-coast-air-basin.pdf?sfvrsn=6>

<sup>10</sup> <https://www.epa.gov/sips-ca/epa-approved-south-coast-air-district-regulations-california-sip#iv>

*Table 2-5: Selected South Coast AQMD rules that regulate major sources of primary PM (PM<sub>10</sub> and PM<sub>2.5</sub>).*

<b>Emission Sources</b>	<b>South Coast AQMD Rule Number</b>
Fugitive Dust and Construction	403
Wood-Burning Devices	445
Open Burning	444
Particulate Matter (PM) Control Devices	1155
Further Reductions of Particulate Emissions from Cement Manufacturing Facilities	1156
Aggregate and Related Operations	1157
Storage, Handling, and Transport of Coke, Coal, and Sulfur	1158
Paved and Unpaved Roads and Livestock Operations	1186
Emissions of Particulate Matter and Carbon Monoxide from Cement Kilns	1112.1
PM <sub>10</sub> Emission Reductions from Woodworking Operations	1137
Abrasive Blasting	1140

In the rest of this section we demonstrate that conditions during 2018 – 2020 were not unusually favorable to low PM<sub>2.5</sub>. This provides evidence that concentration reductions were caused by permanent emission reductions rather than year to year variations in meteorological factors or other factors that influence PM<sub>2.5</sub> such as mixing heights, wind speeds, and precipitation. There were some emission reductions resulting from changes in human behavior during the early months of the COVID-19 related shelter-in-place order in 2020, however, since 2017, all exceedances that were not exceptional events at stations with design values near the level of the 2006 NAAQS were recorded in January, February, October, November, and December. Since the 98<sup>th</sup> percentile standard is a function of the highest days each year, temporary emission reductions from reduced activity in March and the 2<sup>nd</sup> quarter of 2020 likely did not influence the design value. A more complete discussion of the influence of the COVID-19 pandemic on air quality is presented in Weight of Evidence in section 4.

To account for variation of meteorology we constructed two indexes that quantify the influence of atmospheric transport and dispersion on concentrations. The indexes are calculated using the following equations:

$$C_1 = \frac{1}{hU} \quad (1)$$

$$C_2 = \frac{1}{\sigma_w} \quad (2)$$

where  $h$  is the mixed layer height,  $U$  is the wind speed, and  $\sigma_w$  is the standard deviation of vertical turbulent velocity at a height of  $h/2$ .  $C_1$  is indicative of meteorological influences on concentrations when pollutants are vertically mixed through the mixed layer height and  $C_2$  is indicative of the influence of meteorology on concentrations when pollutants are not mixed through the mixed layer height which occurs when the receptor is near the pollution source. The expressions are based on direct plume

equations in the formulation of the AERMOD dispersion model<sup>11</sup>, in which concentrations are inversely proportional to the product of wind speed and vertical plume spread,  $\sigma_z$ , and  $\sigma_z \sim \sigma_w/U$ . Many simplifications have been made and thus the expressions neglect complicating effects of the vertical structure of the mixed layer, lateral dispersion, effect of emission release height, plume rise, terrain, and buildings.

We calculate the meteorological indexes using hourly historical measurements of wind speed, temperature, and total sky cover at several South Coast AQMD and Automated Surface Observing Systems (ASOS) monitoring stations. The parameters  $h$ ,  $\sigma_w$ , and  $U$  are determined using the AERMET meteorological processor and the AERSURFACE preprocessor for AERMET, which are preferred/recommended models in U.S. EPA's guidelines on air quality models<sup>12</sup>. AERMET estimates the surface friction velocity ( $u_*$ ), convective velocity scale ( $w_*$ ), and  $h$ , and AERSURFACE estimates the surface roughness length ( $z_0$ ). Then the relationships  $U = \frac{u_*}{\kappa} \ln \left( \frac{h/2}{z_0} \right)$ , where  $\kappa = 0.4$  is the von Karman constant, and  $\sigma_w^2 = 0.35w_*^2 + 0.8u_*^2$ , taken from the AERMOD formulation for the vertical profiles of  $U$  and  $\sigma_w$  at half the mixed layer height, are used to calculate the parameters in equations 1 and 2. During the night, when the surface heat flux is downward and no convection exists,  $w_* = 0$ .

We average the hourly indexes calculated using equations 1 and 2 over the four quarters of each year during the period from 2008 – 2021 (for 2021 we only calculated the first two quarters because quarters three and four were unavailable at the time this document was written). We then calculate baseline indexes for each quarter as the average of the meteorological indexes in each quarter over the period 2008 – 2012. We finally normalize the meteorological indexes in each quarter with the baseline index corresponding to that quarter.

The trend of normalized quarterly meteorological indexes is shown in Figure (hU) and Figure ( $\sigma_w$ ). Both indices increased over time at both Compton and Mira Loma (Van Buren), the stations with the highest PM<sub>2.5</sub> 98<sup>th</sup> percentile values in recent years, relative to the baseline period of 2008 – 2012. The figures indicate that meteorological conditions were slightly favorable to higher concentrations after about 2010. This shows that the transport and dispersion related meteorological conditions during the design value period (2018 – 2020) were not unusually favorable to lower concentrations.

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<sup>11</sup> See equation 59 of the AERMOD model formulation document <https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod>

<sup>12</sup> <https://www.epa.gov/scram/meteorological-processors-and-accessory-programs>



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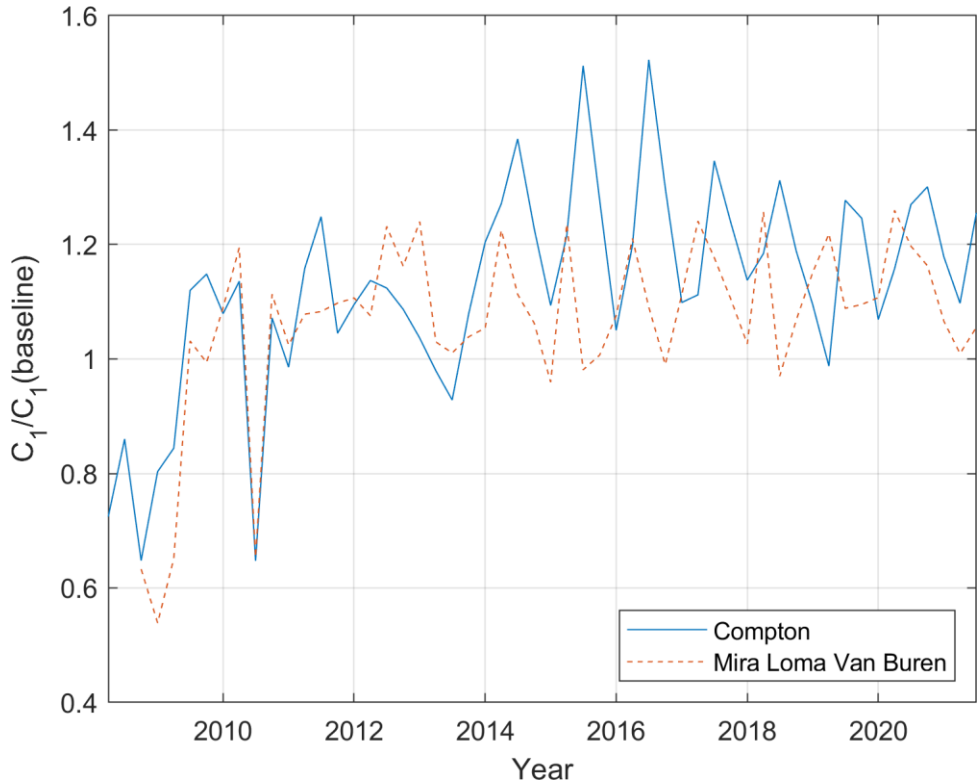


Figure 2-4: Trend of dispersion index ( $hU$ ) at Compton and Mira Loma (Van Buren).

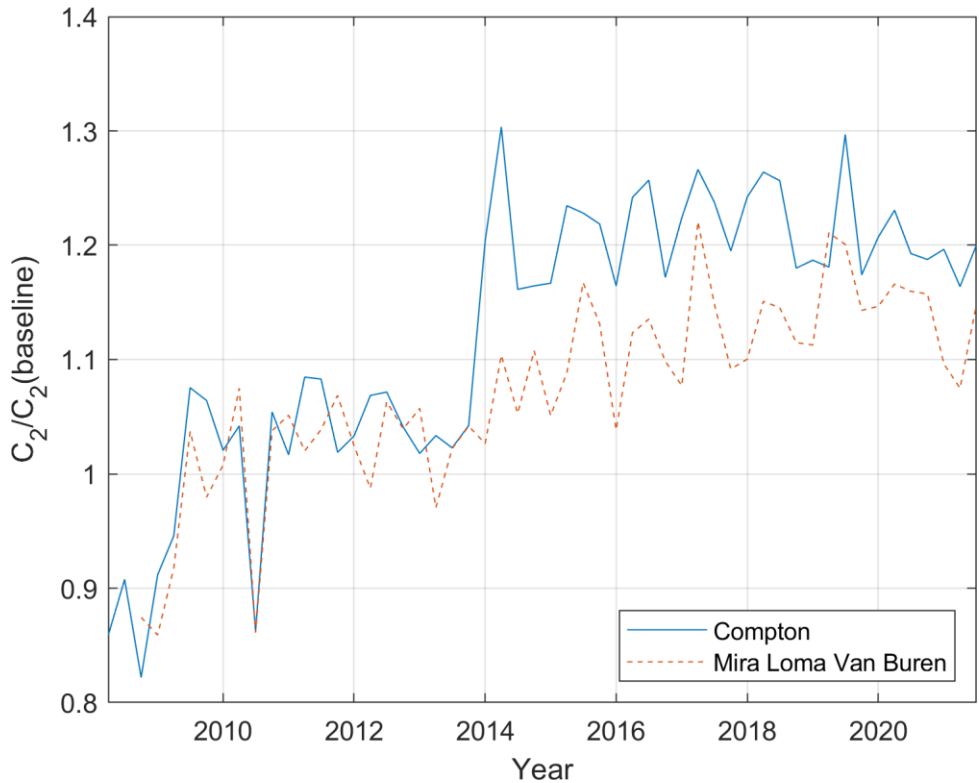


Figure 2-5: Trend of dispersion index ( $\sigma_w$ ) at Compton and Mira Loma (Van Buren).

The indexes in equations 1 and 2 do not account for meteorological effects on removal due to wet deposition. To evaluate whether wet deposition rates could have caused lower PM<sub>2.5</sub> concentrations in the design value period, we analyze trends in precipitation. We retrieved historical measurements of precipitation from 2000 – 2020 at Los Angeles International Airport (LAX) and Ontario International Airport (ONT). LAX is located on the western side of the SCAB and is representative of meteorology at the Compton monitoring station, which is only 11 miles away. ONT is located towards the center of the SCAB and is representative of the Mira Loma monitoring station, which is located 9.6 miles from ONT. The annual average number of days with precipitation greater than 0.01 inches are plotted in Figure . The data indicates a slight decreasing trend of precipitation days at both LAX and Ontario and the average number of days with precipitation from 2018 – 2020 (26.3) is slightly lower than the average over 2000 – 2020 (28.3). The slightly lower number of precipitation days in the design value period is more conducive to higher PM<sub>2.5</sub> concentrations (less wet deposition), thus providing evidence that precipitation was not favorable to lower PM<sub>2.5</sub> concentrations in the design value period.

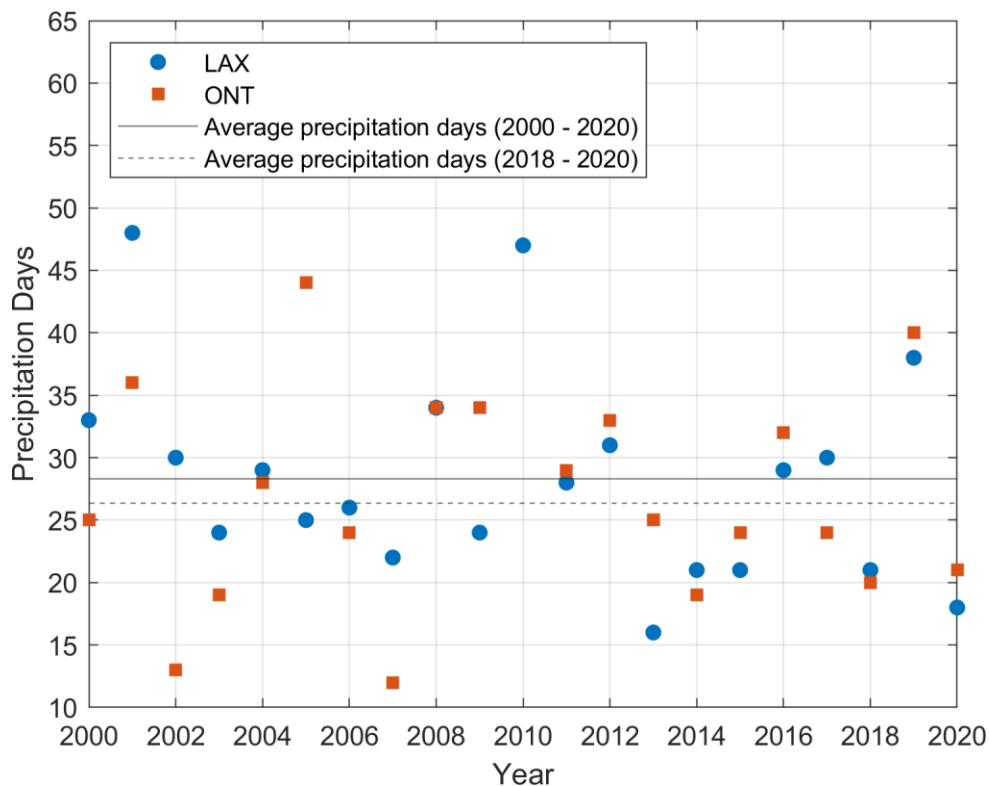


Figure 2-6: Trends of number of days with precipitation greater than 0.01 inches. The average number of precipitation days from 2000 – 2020 and 2018 – 2020 are shown as horizontal lines.

### 2.3. Basin PM<sub>2.5</sub> State Implementation Plan

The federal State Implementation Plan (SIP) requirements are addressed by the Air Quality Management Plans (AQMP), which are regional plans to achieve air quality standards. The AQMPs are submitted to U.S. EPA as part of the California SIP. The 2007 AQMP included control measures addressing the 1997 24-hour PM<sub>2.5</sub> NAAQS. The 2012 and 2016 AQMP included control measures for PM<sub>2.5</sub> and PM<sub>2.5</sub> precursor emissions addressing the 2006 24-hour PM<sub>2.5</sub> NAAQS. The Serious Area Plan for the Basin

was included in the 2016 AQMP and 2016 California SIP and was approved by the U.S. EPA in 2019.<sup>13</sup> The requirement of an approved implementation plan under section 110(k) is thus satisfied by the approved portions of the PM2.5 part of the 2007 AQMP and the 2016 AQMP and California SIP.

### 3. Emissions Inventory

South Coast Air Basin attained the 2006 24-hour PM2.5 standard based on design values which use 98<sup>th</sup> percentile PM2.5 measurements taken during 2018 to 2020. The U.S. EPA's 1994 guidance<sup>14</sup> requires that the inventory used in the maintenance demonstration should represent emissions during the time period associated with the monitoring data showing attainment. Clean Air Act (CAA) section 175A requires a maintenance plan must demonstrate continued attainment of the applicable NAAQS for at least ten years after EPA approves a re-designation to attainment. In this Plan, 2035 was chosen as the maintenance horizon year, which is 15 years from the 2020 attainment year. The emissions inventory for year 2020 was included as the "attainment year" inventory. Interim milestone years of 2023 and 2031 are included as way points to track the maintenance effort. This chapter provides the methodology to estimate emissions, and includes detailed emissions inventory for base, attainment, and future milestone years. The emissions inventory included in the Plan is consistent with the U.S. EPA's 1994 guidance, "PM10 Emissions Inventory Requirements".

#### 3.1. Methodology

The emissions inventory used in this Plan follows the methodology used in previous air quality management plans and recent attainment and maintenance plans. Emissions inventories are in continuous development to incorporate the most up-to-date information via various public processes. Inventory developments in the last 5 years were subsequently reported in recently adopted plans and on-going efforts:

- 2016 Air Quality Management Plan<sup>15</sup>
- South Coast Air Basin Attainment Plan for 2006 24-Hour PM2.5 Standard (hereafter, referred as 189(d) Plan)<sup>16</sup>
- 2021 PM10 Maintenance Plan for the South Coast Air Basin<sup>17</sup>
- 2022 Air Quality Management Plan preliminary inventory

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<sup>13</sup> 84 FR 3305 (effective March 14, 2019).

<sup>14</sup> U.S. EPA, 1994, "PM10 Emissions Inventory Requirements" EPA, Office of Air Quality Planning and Standards, EPA-454/R-94-033 (September 1994). Available at <http://www.epa.gov/ttn/chief/eidocs/pm10eir.pdf>

<sup>15</sup> 2016 Air Quality Management Plan, available at: <http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp>

<sup>16</sup> South Coast Air Basin Attainment Plan for 2006 24-Hour PM2.5 Standard, available at: <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/draft-south-coast-air-basin-pm2-5-plan-09172020.pdf?sfvrsn=6>

<sup>17</sup> 2021 PM10 Maintenance Plan for the South Coast Air Basin, available at: <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/draft-final-pm10-maintenance-plan-for-the-south-coast-air-basin.pdf?sfvrsn=8>

Selected area and off-road sources have been updated from the 2021 PM10 Maintenance Plan using the socio-economic forecast from the 2020 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). A brief description of the four major categories of emissions is provided below.

### **Point Sources**

Point sources generally correspond to permitted facilities with one or more emission sources at an identified location (e.g., power plants, refineries). The larger point source facilities with annual emissions of 4 tons or more of either Volatile Organic Compounds (VOC), Nitrogen Oxide (NOx), Sulfur Oxide (SOx), or total Particulate Matter (PM), or annual emissions of over 100 tons of Carbon Monoxide (CO) are required to report their criteria pollutant emissions and selected air toxics pursuant to Rule 301 through the AER Program. These facilities need to report emissions on an annual basis and are subject to emission audits. This Plan uses the 2018 actual reported emissions, which is consistent with the 2021 PM10 Maintenance Plan<sup>18</sup>.

### **Area Sources**

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 region and are not required to individually report their annual emissions. There are about 400 area source categories for which emission estimates are jointly developed by CARB and South Coast AQMD. The emissions from these sources are estimated using specific activity information and emission factors. Activity data are usually obtained from survey data or scientific reports - e.g., Energy Information Administration (EIA) reports for fuel consumption (other than natural gas), Southern California Gas Company for natural gas consumption, paint suppliers under Rule 314 and various South Coast AQMD databases. Emission factors are based on rule compliance factors, source tests, manufacturer's product or technical specification data, default factors (mostly from the U.S. EPA's AP-42 published emission factor compilations), or weighted emission factors derived from the point source facilities' annual emissions reports. Major updates in area sources for this plan include updates in consumer products, adhesives and sealants, architectural coatings, natural gas and liquefied petroleum gas (LPG) combustion in residential, commercial and industrial sectors, paved and unpaved road dust, composting and livestock husbandry.

### **On-Road Mobile Sources**

On-road sources include motor vehicles such as passenger cars and trucks that travel on roads, streets, and highways. Emissions from on-road sources are calculated using travel activity and vehicle-specific emission factors that depend on temperature and relative humidity. The on-road mobile source emissions in this Plan were developed using travel activity data from SCAG's 2020 RTP/SCS and the emission factors from CARB's EMFAC 2017 model, which is consistent with the recently adopted PM10 maintenance plan.

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<sup>18</sup> 2021 PM10 Maintenance Plan for the South Coast Air Basin, available at: <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/draft-pm10-maintenance-plan-for-the-south-coast-air-basin.pdf>

### Off-Road Mobile Sources

Mobile sources not included in the on-road mobile source emissions inventory are classified as off-road mobile sources. CARB uses several models to estimate emissions for more than 100 off-road equipment categories of different fuel types, engine sizes, and engine types. The models account for the effects of various adopted regulations, technology types, and seasonal effects on emissions. The models combine equipment population, equipment activity, horsepower, load factors, population growth, survival rates, and emission factors to yield the annual emissions by county, air basin, or statewide. Most off-road sources in this Plan are consistent with the emissions presented in the PM10 maintenance plan, with additional updates in locomotives and aircraft. Description of the latest updates in off-road source emissions inventory developed by CARB can be found in CARB's off-road mobile source inventory portal<sup>19</sup>.

South Coast Air Basin total emissions for 2018 from the four inventories discussed above are provided in Figure 3-1. NOx, SOx and PM2.5 emissions are marginally lower than the 2016 AQMP, which was caused by the differences of projected and actual emissions for 2018. The 2016 AQMP used 2012 as an anchor year to project to future year, while the other three plans used actual reported AER emissions for 2018.

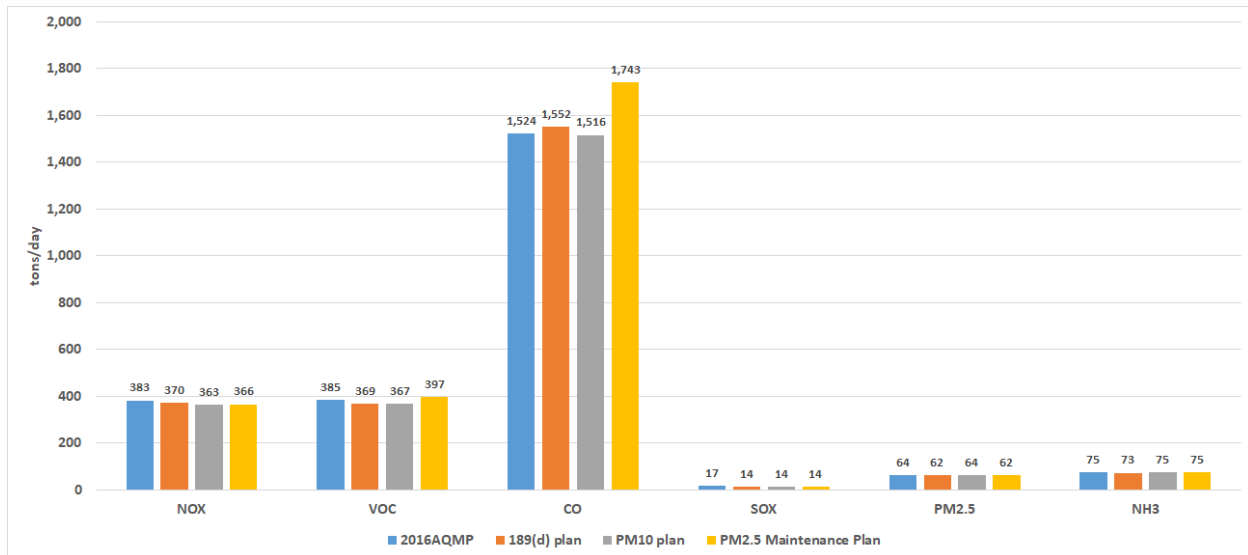


Figure 3-1. South Coast Air Basin Total Emissions from 2016 AQMP (blue), 189(d) Plan (orange), PM10 Maintenance Plan (grey) and PM2.5 Maintenance Plan (yellow) for 2018.

### 3.2. Base (2018) Year Emissions Inventory

Table 3-1 shows the base year (2018) annual average emissions inventory for the South Coast Air Basin by major source category. While on-road and off-road mobile sources are the largest contributors to the Basin's total NOx and CO emissions, stationary sources are the largest contributor to PM10, PM2.5, SOx and NH3 emissions. The top 10 PM2.5 sources in 2018 and their emissions are provided in Figure 3-2.

<sup>19</sup> Mobile Source Emissions Inventory (MSEI) - Documentation - Off-Road - Diesel Equipment, available at: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road>

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The largest sources of PM<sub>2.5</sub> emissions in the Basin include cooking, paved road dust, residential fuel combustion, light duty passenger vehicles, and paper and wood industrial processes.

*Table 3-1: 2018 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin  
(tpd)*

SOURCE CATEGORY	Annual Average						
	VOC	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
<b>STATIONARY SOURCES</b>							
Fuel Combustion	5.33	21.12	80.93	2.09	5.42	5.35	7.79
Waste Disposal	14.67	1.44	0.65	0.44	0.26	0.25	5.74
Cleaning and Surface Coatings	36.98	0.01	0.12	0.00	1.51	1.45	0.14
Petroleum Production and Marketing	19.61	0.25	2.65	0.30	1.28	0.91	0.07
Industrial Processes:							
Wood and Paper	0.19	0.00	0.00	0.00	4.49	2.70	0.00
Others	10.04	0.11	0.67	0.13	5.08	2.02	9.14
Solvent Evaporation	120.31	0.00	0.00	0.00	0.02	0.02	1.25
Misc. Processes:							
Residential Fuel Combustion	8.88	19.10	47.62	0.33	6.96	6.77	0.11
Construction and Demolition	0.00	0.00	0.00	0.00	22.66	2.27	0.00
Paved Road Dust	0.00	0.00	0.00	0.00	56.40	8.46	0.00
Cooking	1.08	0.00	0.00	0.01	11.44	11.44	0.00
Others	2.62	17.94	15.03	5.54	21.07	4.04	34.27
<b>Total Stationary Sources</b>	219.72	59.97	147.67	8.84	136.60	45.67	58.52
<b>MOBILE SOURCES</b>							
On-Road Vehicles	79.03	170.85	724.31	1.68	23.91	11.06	16.25
Off-Road Vehicles	98.03	135.44	870.55	3.61	6.25	5.36	0.17
<b>Total Mobile Sources</b>	177.06	306.29	1594.86	5.29	30.17	16.42	16.43
<b>TOTAL</b>	396.78	366.26	1742.52	14.12	166.77	62.10	74.94

<sup>1</sup> Values may not sum due to rounding

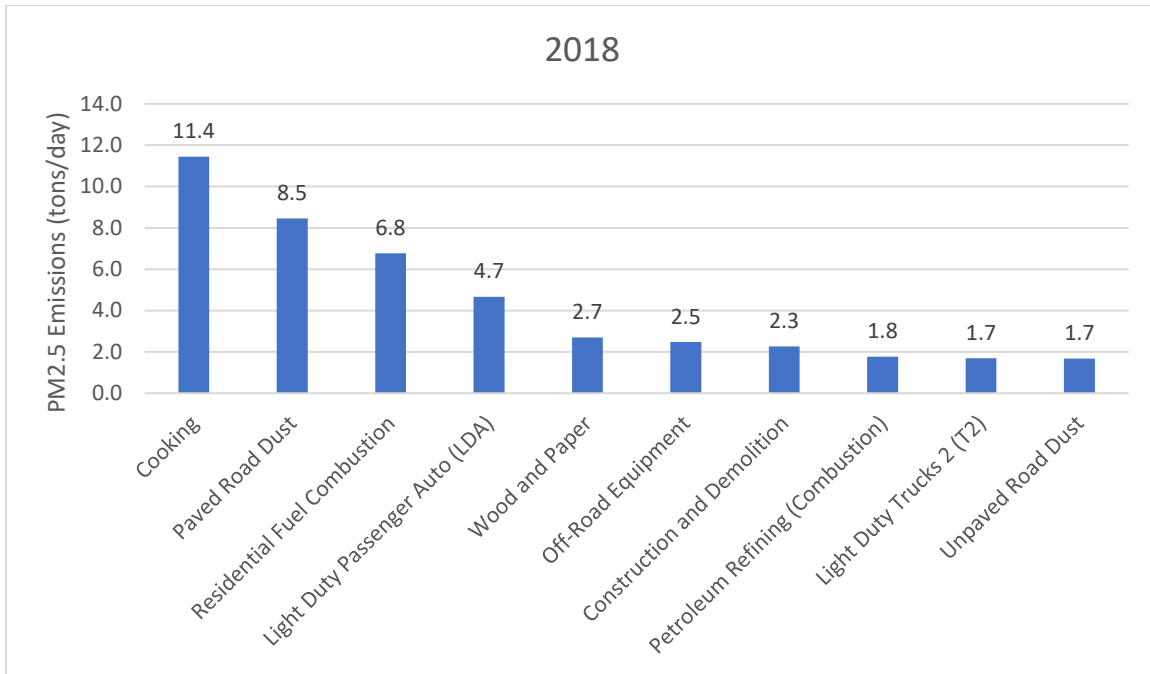


Figure 3-2. Top 10 PM<sub>2.5</sub> sources in 2018

### 3.3. Attainment (2020) and Future Milestone Years (2023, 2031, and 2035) Emissions Inventory

In this Plan, attainment and future years' stationary source emissions were projected using socio-economic growth forecast from the 2020 RTP/SCS. Recently adopted regulations since the 2016 AQMP were also reflected in the future emissions.

Future years' stationary source emissions are divided into RECLAIM and non-RECLAIM point source emissions and area sources. Future NO<sub>x</sub> and SO<sub>x</sub> emissions from RECLAIM point sources are estimated based on their allocations as specified by South Coast AQMD Rule 2002 – Allocations for NO<sub>x</sub> and SO<sub>x</sub>. The forecasts for non-RECLAIM point and area emissions were developed using: (1) emissions from the 2018 base year, (2) reductions expected from the implementation of rules adopted by South Coast AQMD and CARB since the 2016 AQMP, and (3) growth forecast from the 2020 RTP/SCS between the base and future years. Chapter 3 and Appendix III of the 2016 AQMP provide detailed information on the methodology to project emissions for future years.

Tables 3-2 through 3-5 present the annual average emissions for 2020, 2023, 2031 and 2035. 2020 is the year the 2006 24-hour PM<sub>2.5</sub> standard was attained in the South Coast Air Basin, and therefore, 2020 emissions inventory serves as the "attainment" inventory. The year 2035 is the new maintenance horizon year and 2023 and 2031 are interim years added to ensure the projected maintenance of the standard through 2035. Detailed emissions inventories by major source category can be found in Appendix I.

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*Table 3-2: 2020 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin  
(tpd<sup>1</sup>)*

SOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
<b>STATIONARY SOURCES</b>							
Fuel Combustion	5.34	20.43	79.67	2.11	5.45	5.37	7.74
Waste Disposal	14.86	1.45	0.65	0.44	0.26	0.25	5.85
Cleaning and Surface Coatings	37.25	0.01	0.12	0.00	1.54	1.48	0.14
Petroleum Production and Marketing	19.33	0.25	2.65	0.30	1.28	0.91	0.07
Industrial Processes:							
Wood and Paper	0.20	0.00	0.00	0.00	4.65	2.79	0.00
Others	10.12	0.11	0.68	0.13	5.13	2.05	9.14
Solvent Evaporation	121.84	0.00	0.00	0.00	0.02	0.02	1.24
Misc. Processes:							
Residential Fuel Combustion	9.02	20.77	48.76	0.34	7.11	6.92	0.11
Construction and Demolition	0.00	0.00	0.00	0.00	23.00	2.30	0.00
Paved Road Dust	0.00	0.00	0.00	0.00	56.96	8.55	0.00
Cooking	1.10	0.00	0.00	0.01	11.58	11.58	0.00
Others	1.82	20.33	5.88	6.11	20.97	3.38	33.70
<b>Total Stationary Sources</b>	220.88	63.36	138.40	9.45	137.12	45.47	57.99
<b>MOBILE SOURCES</b>							
On-Road Vehicles	69.27	141.91	628.36	1.60	23.45	10.52	17.59
Off-Road Vehicles	95.05	132.38	910.37	3.79	5.89	5.04	0.18
<b>Total Mobile Sources</b>	164.32	274.29	1538.73	5.40	29.33	15.56	17.77
<b>TOTAL</b>	385.20	337.65	1677.13	14.85	166.45	61.03	75.76

<sup>1</sup>Values may not sum due to rounding



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*Table 3-3: 2023 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin  
(tpd<sup>1</sup>)*

SOURCE CATEGORY	Annual Average						
	VOC	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
<b>STATIONARY SOURCES</b>							
Fuel Combustion	5.41	20.51	79.37	2.12	5.47	5.39	7.73
Waste Disposal	15.12	1.41	0.66	0.45	0.27	0.25	6.02
Cleaning and Surface Coatings	37.69	0.01	0.12	0.00	1.58	1.52	0.15
Petroleum Production and Marketing	19.02	0.25	2.64	0.31	1.28	0.91	0.07
Industrial Processes:							
Wood and Paper	0.20	0.00	0.00	0.00	4.91	2.95	0.00
Others	10.28	0.11	0.71	0.13	5.20	2.09	9.14
Solvent Evaporation	125.58	0.00	0.00	0.00	0.03	0.02	1.22
Misc. Processes:							
Residential Fuel Combustion	8.97	18.97	48.33	0.34	6.96	6.77	0.11
Construction and Demolition	0.00	0.00	0.00	0.00	23.59	2.36	0.00
Paved Road Dust	0.00	0.00	0.00	0.00	58.04	8.71	0.00
Cooking	1.12	0.00	0.00	0.01	11.79	11.79	0.00
Others	1.63	14.44	5.88	6.11	20.00	3.15	33.10
<b>Total Stationary Sources</b>	225.01	55.71	137.71	9.48	139.11	45.92	57.54
<b>MOBILE SOURCES</b>							
On-Road Vehicles	55.74	93.43	501.69	1.49	22.71	9.64	19.80
Off-Road Vehicles	92.30	127.26	960.78	4.05	5.37	4.59	0.19
<b>Total Mobile Sources</b>	148.04	220.69	1462.47	5.54	28.08	14.23	19.99
<b>TOTAL</b>	373.04	276.40	1600.18	15.02	167.19	60.15	77.53

<sup>1</sup>Values may not sum due to rounding

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*Table 3-4: 2031 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin  
(tpd<sup>1</sup>)*

SOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
<b>STATIONARY SOURCES</b>							
Fuel Combustion	5.42	19.86	74.73	2.13	5.33	5.25	7.20
Waste Disposal	15.78	1.41	0.69	0.46	0.27	0.26	6.42
Cleaning and Surface Coatings	39.33	0.01	0.12	0.00	1.66	1.60	0.16
Petroleum Production and Marketing	18.68	0.24	2.62	0.34	1.28	0.91	0.07
Industrial Processes:							
Wood and Paper	0.21	0.00	0.00	0.00	5.39	3.23	0.00
Others	10.54	0.11	0.76	0.14	5.32	2.16	9.15
Solvent Evaporation	137.59	0.00	0.00	0.00	0.03	0.03	1.18
Misc. Processes:							
Residential Fuel Combustion	8.86	14.81	47.33	0.32	6.77	6.58	0.11
Construction and Demolition	0.00	0.00	0.00	0.00	25.08	2.51	0.00
Paved Road Dust	0.00	0.00	0.00	0.00	59.88	8.98	0.00
Cooking	1.17	0.00	0.00	0.01	12.37	12.37	0.00
Others	1.57	16.59	5.87	5.57	19.90	3.12	34.29
<b>Total Stationary Sources</b>	239.15	53.03	132.12	8.98	143.27	47.00	58.59
<b>MOBILE SOURCES</b>							
On-Road Vehicles	40.84	71.94	377.44	1.24	22.69	9.50	22.07
Off-Road Vehicles	90.56	126.51	1049.83	4.79	4.87	4.15	0.22
<b>Total Mobile Sources</b>	131.40	198.45	1427.27	6.03	27.55	13.65	22.29
<b>TOTAL</b>	370.55	251.48	1559.39	15.01	170.83	60.65	80.88

<sup>1</sup>Values may not sum due to rounding

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Standards for South Coast Air Basin

*Table 3-5: 2035 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin  
(tpd<sup>1</sup>)*

SOURCE CATEGORY	Annual Average						
	VOC	NO <sub>x</sub>	CO	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NH <sub>3</sub>
<b>STATIONARY SOURCES</b>							
Fuel Combustion	5.43	19.59	72.90	2.15	5.30	5.23	7.06
Waste Disposal	16.03	1.43	0.70	0.47	0.28	0.26	6.55
Cleaning and Surface Coatings	39.35	0.01	0.12	0.00	1.66	1.60	0.16
Petroleum Production and Marketing	18.81	0.24	2.61	0.35	1.28	0.91	0.07
Industrial Processes:							
Wood and Paper	0.21	0.00	0.00	0.00	5.40	3.24	0.00
Others	10.55	0.11	0.77	0.14	5.33	2.17	9.15
Solvent Evaporation	143.59	0.00	0.00	0.00	0.03	0.03	1.17
Misc. Processes:							
Residential Fuel Combustion	8.85	13.81	47.28	0.32	6.76	6.57	0.11
Construction and Demolition	0.00	0.00	0.00	0.00	25.77	2.58	0.00
Paved Road Dust	0.00	0.00	0.00	0.00	61.05	9.16	0.00
Cooking	1.20	0.00	0.00	0.01	12.64	12.64	0.00
Others	1.55	16.56	5.87	5.57	19.86	3.11	34.85
<b>Total Stationary Sources</b>	245.56	51.75	130.24	9.01	145.35	47.49	59.12
<b>MOBILE SOURCES</b>							
On-Road Vehicles	36.52	66.23	359.12	1.19	22.83	9.50	22.91
Off-Road Vehicles	91.19	124.82	1086.93	5.17	4.82	4.11	0.23
<b>Total Mobile Sources</b>	127.71	191.04	1446.05	6.36	27.65	13.61	23.14
<b>TOTAL</b>	373.27	242.79	1576.30	15.36	173.00	61.10	82.26

<sup>1</sup> Values may not sum due to rounding

While Basin total NO<sub>x</sub> emissions are expected to decrease dramatically over time, PM<sub>2.5</sub> emissions are projected to decrease by 1.07 tpd from 2018 to 2020 and then increase marginally from 2023 to 2035

mostly driven by cooking and paved road entrained dust categories. Reductions in mobile sources emissions contributed to the overall decrease in 2020, however, growth in economic activities and population is expected to catch up with the reductions from stationary combustion sources in 2023 and later. This growth is evident in stationary sources, which dominates Basin's total PM<sub>2.5</sub> emissions.

Top 10 sources of PM<sub>2.5</sub> emissions for 2020, 2023, 2031, and 2035 are presented in Figures 3-3 through 3-6. The top 10 sources of PM<sub>2.5</sub> emissions remain the same in the attainment and future years, with cooking and paved road dust leading to the overall increases in total PM<sub>2.5</sub> emissions. Entrained dust emissions from paved road dust grows in future years due to increased vehicle-miles traveled. The top 6 sources' ranks remain the same from 2018 to 2023; they include cooking, paved road dust, residential fuel combustion, light duty passenger vehicles (LDA), paper and wood industrial processes, and construction and demolition. The off-road equipment source's rank drops steadily from 6<sup>th</sup> highest (2.5 tpd) in 2018 to 10<sup>th</sup> highest in 2031(1.6) and 2035 (1.5 tpd).

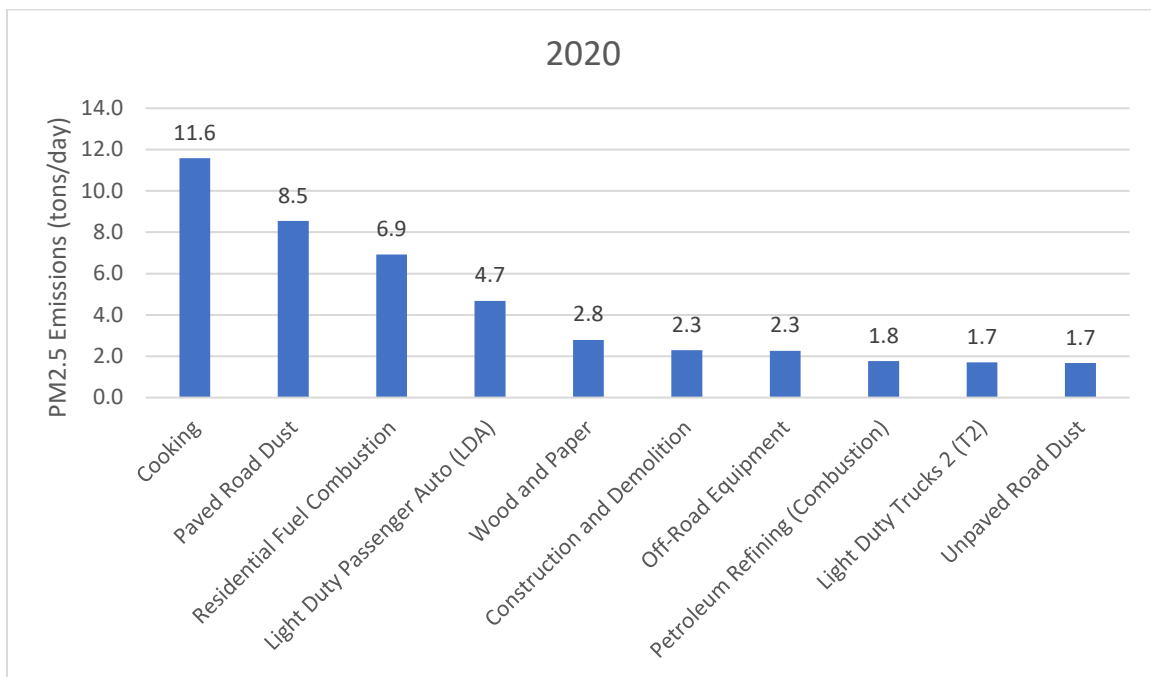


Figure 3-3: Top 10 PM<sub>10</sub> sources in 2020

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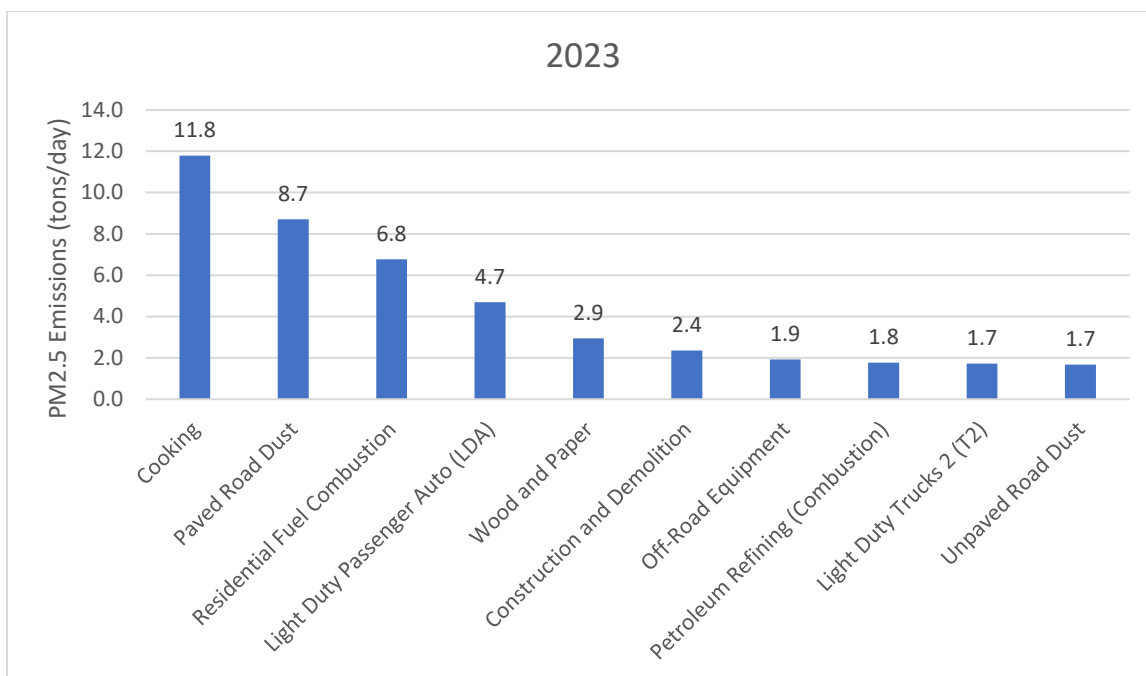


Figure 3-4: Top 10 PM<sub>2.5</sub> sources in 2023

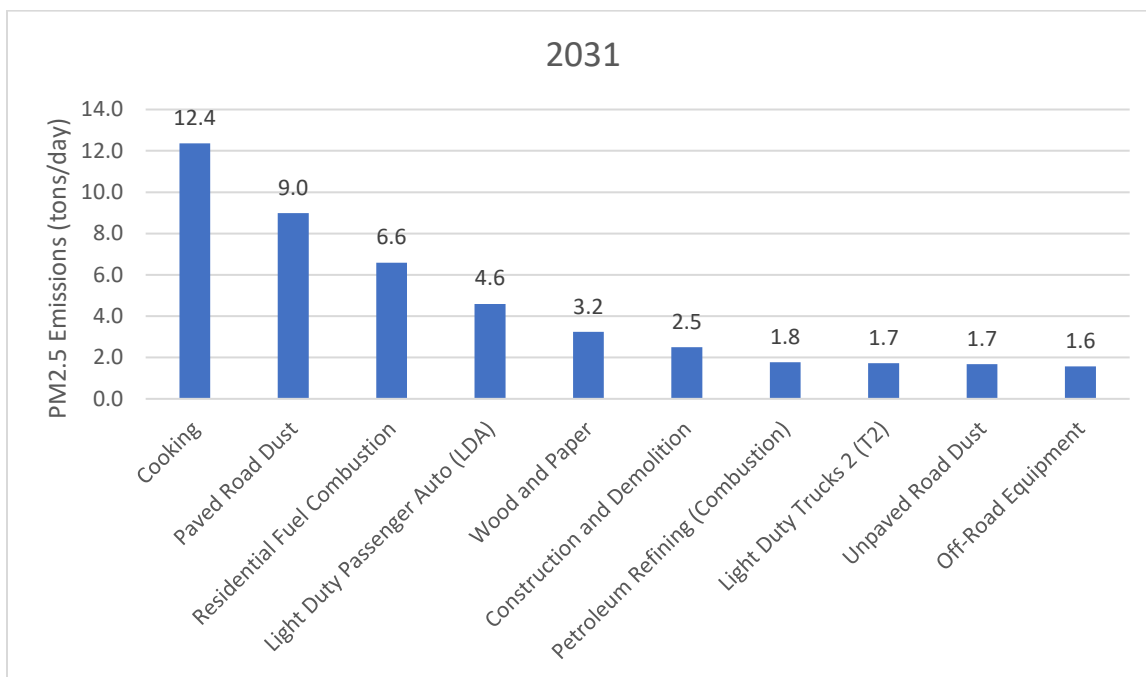


Figure 3-5: Top 10 PM<sub>2.5</sub> sources in 2031

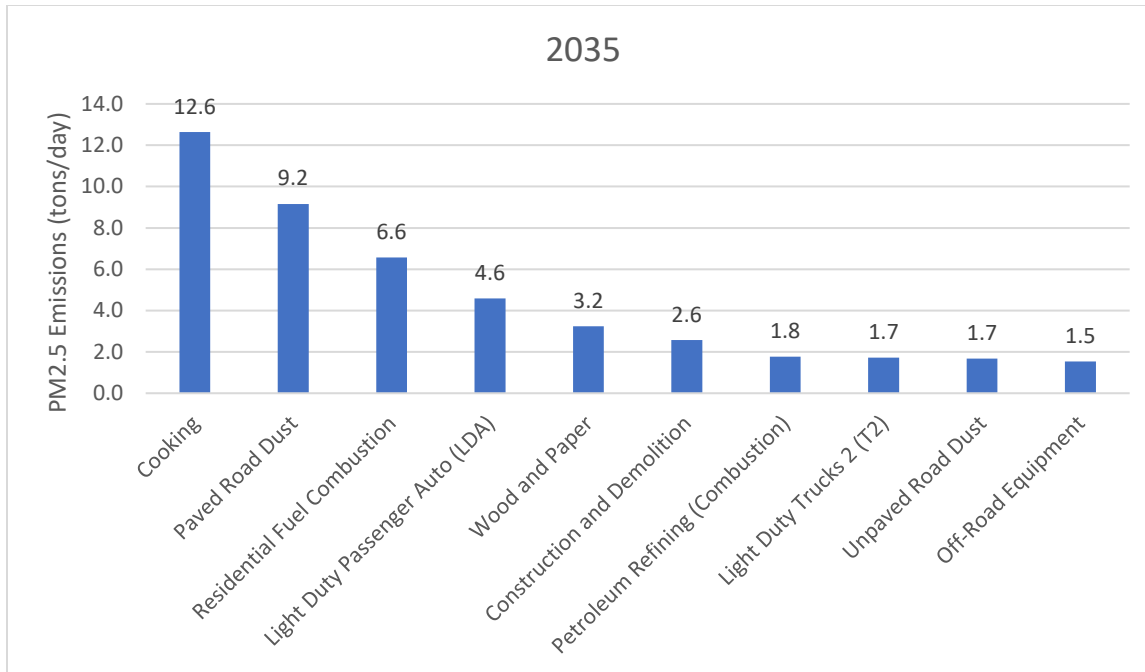


Figure 3-6: Top 10 PM<sub>2.5</sub> sources in 2035

### 3.4. Condensable and Filterable Portions of PM<sub>2.5</sub> Emissions

Per PM<sub>2.5</sub> NAAQS final implementation rule<sup>20</sup>, the SIP emissions inventory is required to identify the condensable and filterable portions of PM<sub>2.5</sub> separately, in addition to primary PM<sub>2.5</sub> emissions. Primary PM emissions consist of both condensable and filterable portions. Condensable PM is the material that is in vapor phase in stack conditions, which condenses and/or reacts upon cooling and dilution in the ambient air to form solid or liquid PM immediately after discharge from the stack. All condensable PM, if present from a source, is typically in the PM<sub>2.5</sub> size fraction. The U.S. EPA's Air Emissions Reporting Requirements (AERR) requires states to report annual emissions of filterable and condensable components of PM<sub>2.5</sub> and PM<sub>10</sub>, "as applicable," for large sources for every inventory year and for all sources every third inventory year, beginning with 2011. Subsequent emissions inventory guidance from the U.S. EPA clarifies the meaning of the phrase "as applicable" by providing a list of source types "for which condensable PM is expected by the AERR." These source types are stationary point and area combustion sources that are expected to generate condensable PM and include sources such as commercial cooking, fuel combustion at electric generating utilities, industrial processes like cement or chemical manufacturing, and flares or incinerators associated with waste disposal. The condensable PM<sub>2.5</sub> from stationary point and area sources are estimated using the methodology described in the 189(d) Plan. Filterable PM comprises "particles that are directly emitted by a source as a solid or liquid [aerosol] at stack or release conditions." Primary PM<sub>2.5</sub> is the sum of condensable and filterable PM<sub>2.5</sub> emissions. Mobile sources emit PM in both filterable and condensable form; however, the AERR does not require states to report filterable and condensable PM separately for mobile sources.

<sup>20</sup> 40 CFR 51.1008(a)(1)(iv)

Therefore, the condensable and filterable PM<sub>2.5</sub> emissions submitted here include only those from stationary point and area sources. Condensable and Filterable Portions of PM<sub>2.5</sub> emissions were estimated for attainment (2020), and future milestone years (2023, 2031 and 2035). Figure 3-7 shows the annual average emissions of primary (or direct), condensable and filterable PM<sub>2.5</sub> emissions for 2020, 2023, 2031 and 2035.

As shown on Figure 3-7, total primary PM<sub>2.5</sub> emissions from stationary point and area sources increased marginally from 2020 (45.5 tpd) to 2023 (45.9 tpd); the same marginal increase holds for the change from 2031 (47.0) to 2035 (47.5). The marginal increases appear in both condensable and filterable portions of primary PM<sub>2.5</sub> emissions in the Basin; for example, 0.2 tpd increase in both condensable and filterable portions of PM<sub>2.5</sub> from 2020 to 2023. These increases can be attributed to the growth in population and economic activities in the Basin. Table 3-6 presents the top five source categories for condensable PM<sub>2.5</sub> in 2020, 2023, 2031, and 2035. Majority of condensable PM<sub>2.5</sub> is emitted from the “Cooking” category, which accounts for 74.9% and 77.2% of the total condensable PM<sub>2.5</sub> in 2020 and 2035, respectively. The sum of the top five condensable PM<sub>2.5</sub> categories represents 95.6% and 96.0% of the total condensable PM<sub>2.5</sub> both in 2020 and 2035, respectively. Table 3-7 shows the top five categories for filterable PM<sub>2.5</sub>. The “Paved Road Dust” source category is the top emitter of filterable PM<sub>2.5</sub>. The top five filterable PM<sub>2.5</sub> emissions categories account for approximately 71.1% (2020) and 72.0% (2035) of the total filterable PM<sub>2.5</sub> emissions. This points to a marginally higher contribution of top five filterable categories to total filterable PM<sub>2.5</sub> emissions in future years. Detailed emissions by major source category are included in Appendix II of this Plan.

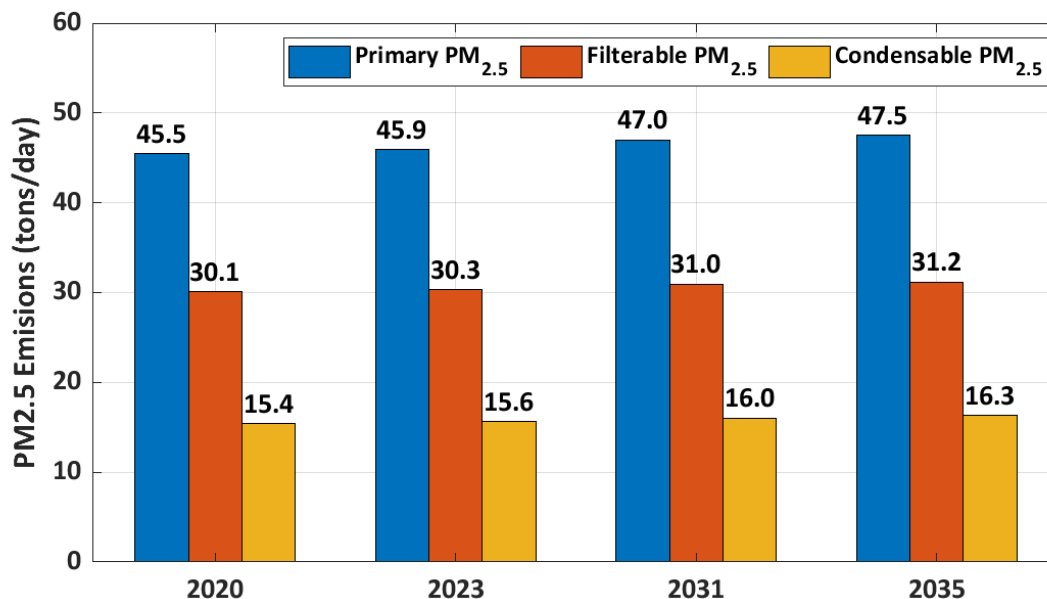


Figure 3-7: Annual Average Primary, Filterable and Condensable PM<sub>2.5</sub> emissions

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*Table 3-6: Top 5 categories emitting Condensable PM<sub>2.5</sub> (tons per day)*

Category	2020	2023	2031	2035
Cooking	11.53	11.75	12.32	12.59
Petroleum Refining (combustion)	1.00	1.00	1.00	1.00
Residential Fuel Combustion	0.85	0.82	0.77	0.76
Manufacturing and Industrial	0.72	0.73	0.73	0.72
Service and Commercial	0.63	0.63	0.59	0.58

*Table 3-7: Top 5 categories emitting Filterable PM<sub>2.5</sub> (tons per day)*

Category	2020	2023	2031	2035
Paved Road Dust	8.55	8.71	8.98	9.16
Residential Fuel Combustion	6.07	5.95	5.82	5.81
Wood and Paper	2.79	2.94	3.23	3.24
Construction and Demolition	2.30	2.36	2.51	2.58
Unpaved Road Dust	1.67	1.67	1.67	1.67



## 4. Maintenance of Attainment of the 1997 and 2006 24-hour PM<sub>2.5</sub> standards through 2035

Section 175A(a) of the CAA requires a demonstration of maintenance of the NAAQS for at least 10 years after re-designation. Generally, a State can demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show that the future anticipated mix of sources and emission rates will not cause a violation of the NAAQS. In this Plan, a photochemical modeling approach was chosen as a primary tool to demonstrate maintenance of attainment of the 1997 and 2006 24-hour PM<sub>2.5</sub> standards through 2035 for the South Coast Air Basin. This is because secondary PM<sub>2.5</sub> has significant contribution to the ambient PM<sub>2.5</sub> in the Basin; and therefore, chemical reactions and transport of precursor pollutants need to be considered in predicting future PM<sub>2.5</sub> levels in the Basin. Additionally, emissions inventories for attainment and future milestone years are included as weight of evidence.

This chapter presents the projected future PM<sub>2.5</sub> air quality which demonstrates continued attainment of the 1997 and 2006 24-hour PM<sub>2.5</sub> standards for the South Coast Air Basin (Basin) through 2035. Future attainment status is assessed through a comprehensive modeling system employing the Weather Research and Forecasting (WRF) model, the Sparse Matrix Operator Kernel Emissions (SMOKE) model, the Model of Emissions of Gases and Aerosols from Nature (MEGAN) and the Community Multiscale Air Quality (CMAQ) model to predict PM<sub>2.5</sub> concentrations for the attainment and future milestone years. This chapter describes the Relative Response Factor (RRF) approach to predict future air quality, the PM<sub>2.5</sub> chemical species fractions included in the RRF, future PM<sub>2.5</sub> concentrations in the Basin, and the unmonitored area analysis. The modeling and RRF process presented in this chapter is consistent with the U.S. EPA's guidance.<sup>21</sup>

### PM<sub>2.5</sub> Modeling Approach

In this maintenance demonstration, 2018 meteorology and 2020 emissions (projected from 2018) are used for the baseline simulation from which future design values are projected. PM<sub>2.5</sub> modeling employs the same approach as described in the South Coast Air Basin Attainment Plan for the 2006 24-Hour PM<sub>2.5</sub> Standard (hereafter, 189(d) Plan) except for updates in the modeling platform, input databases, and emissions inventory.<sup>22</sup> Models used include CMAQ 5.2.1, MEGAN 3.0, SMOKE 4.8, and WRF 4.0.3.

Future year design values are determined following U.S. EPA's guidance. Site-specific quarterly-averaged RRFs are calculated for the following PM<sub>2.5</sub> components: ammonium, nitrate, sulfate, organic carbon, elemental carbon, crustal, and salt, and remaining future particle-bound water is calculated from RRF-based future ammonium, nitrate and sulfate. The RRFs are applied to the baseline 3-year averaged 2020

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<sup>21</sup> U.S. EPA, (2018). Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM<sub>2.5</sub>, and Regional Haze. [https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling\\_Guidance-2018.pdf](https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf)

<sup>22</sup> South Coast AQMD, (2020). South Coast Air Basin Attainment Plan for the 2006 24-Hour PM<sub>2.5</sub> Standard. <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/2-final-attainment-plan-for-2006-24-hour-pm2-5-standard-for-the-south-coast-air-basin.pdf?sfvrsn=6>

PM2.5 design values. A 3-Year design value was chosen instead of 5-year weighted average. This is because the 3-year 2020 design value corresponds to the year in which attainment was achieved. This approach was concurred upon by U.S.EPA staff. Further discussions on 3-year vs 5-year design value are given in the Weight-of-Evidence section of this chapter. A future design value less than or equal to 35.49  $\mu\text{g}/\text{m}^3$  attains the NAAQS.

#### 4.1. PM2.5 Design Values and PM2.5 Composition Data

##### Design Values

The 24-hour PM2.5 design value is defined as the three-year average of the 98<sup>th</sup> percentile of all 24-hour concentrations sampled at a monitoring site. Sites with everyday sampling frequency use the 8<sup>th</sup> highest value; sites with every 3<sup>rd</sup> day sampling frequency use the 3<sup>rd</sup> highest value; and sites with every 6<sup>th</sup> day sampling frequency use the 2<sup>nd</sup> highest value as the 98<sup>th</sup> percentile<sup>23</sup>.

As shown in Figure 4-1, the Basin's 24-hour PM2.5 design values have decreased significantly over the last 20 years due to the implementation of regulations by South Coast AQMD and CARB which has resulted in attainment of the standard in 2020.

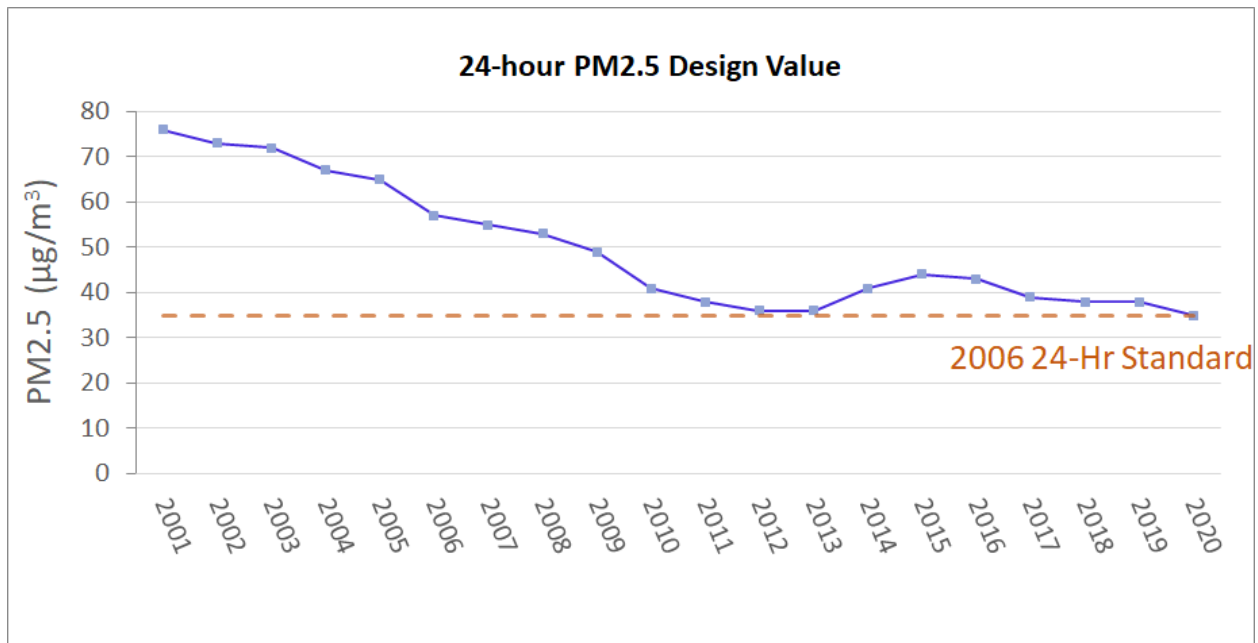


Figure 4-1: South Coast Air Basin 24-Hour PM2.5 Design Values

Table 4-1 provides the 2020 24-hour PM2.5 design values and 98<sup>th</sup> percentiles for 2018, 2019 and 2020, which were used to calculate the design values. The design values in Table 4-1 exclude specific 2020 PM2.5 measurements associated with smoke from the Bobcat and El Dorado wildfires for the period

<sup>23</sup> For 2020, it was assumed a minimal number of missed samples on scheduled sampling days throughout the year. Design values from 2001-2019 are consistent with EPA's published values.

from September 11 through 16. South Coast AQMD is preparing an exceptional event demonstration consistent with the U.S. EPA exceptional event guidance for these events. Other than those measurements, all valid 2018-2020 measurements were included. All monitoring sites attain the 2006 24-hour PM<sub>2.5</sub> standard, with Mira Loma (Van Buren), Long Beach-Route 710 Near Road, Fontana, Compton, and Azusa at 35 µg/m<sup>3</sup> and the rest of stations below 35 µg/m<sup>3</sup>.

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*Table 4-1: 24-hour Measured PM<sub>2.5</sub> 98<sup>th</sup> Percentile and Design Values (µg/m<sup>3</sup>)*

Monitoring Site	2018 98 <sup>th</sup> Percentile	2019 98 <sup>th</sup> Percentile	2020 98 <sup>th</sup> Percentile	Design Value
Anaheim	32.1	23.3	42.4	33
Azusa	30.2	22.8	53.1	35
Big Bear	16.0	31.0	20.4	22
Compton	34.8	26.6	43.2	35
Fontana	26.8	35.7	41.9	35
Long Beach – North	33.0	20.7	45.7	33
Long Beach – South	33.5	23.2	39.0	32
Long Beach- Route 710 Near Road	36.1	26.4	41.7	35
Los Angeles- North Main Street	34.1	28.3	34.6	32
Mira Loma (Van Buren)	34.2	36.2	35.7	35
Mission Viejo	20.3	14.7	35.0	23
Ontario-Route 60 Near Road	32.7	31.4	37.5	34
Pasadena	29.5	27.5	34.9	31
Pico Rivera #2	35.4	27.5	39.8	34
Reseda	23.8	26.3	36.0	29
Riverside Rubidoux	28.2	32.7	40.3	34
San Bernardino	22.9	33.0	25.7	27

### PM<sub>2.5</sub> Composition

PM<sub>2.5</sub> is either directly emitted into the atmosphere (primary particles) or formed through atmospheric chemical reactions from precursor gases (secondary particles). Primary PM<sub>2.5</sub> includes road dust, diesel soot, combustion products, and other sources of fine particles. Secondary products, such as sulfates,

nitrates, and complex organic carbon compounds, are formed from reactions with oxides of sulfur, oxides of nitrogen, VOCs, and ammonia.

PM<sub>2.5</sub> speciation data measured at four Chemical Speciation Network (CSN) sites provide the chemical characterization needed for validation of the CMAQ model predictions and estimation of future design values. With one site in each county, the four CSN sites are strategically located to represent aerosol characteristics in the four counties in the Basin. Riverside-Rubidoux was traditionally the Basin maximum location. Fontana and Anaheim experience high concentrations within their respective counties, and the Los Angeles-North Main Street site was intended to capture the characteristics of an emissions from high volume of traffic and human activities in the Los Angeles county. The chemical speciation data used in this Plan is identical to those employed in the 189(d) Plan.

In general, the proportions of organic carbon and sulfate are higher during summer, while the proportions of nitrate and elemental carbon are higher during winter. This is because the organic fraction is influenced strongly by photochemistry during summer and by temperature-sensitive emission sources such as biogenic emissions, while the higher sulfate burden during summer is likely attributable to faster photochemistry and increased water vapor.<sup>24,25</sup> Inorganic nitrate is a semi-volatile component therefore shifts toward the gas phase during summer.<sup>26</sup> These trends are observed at all CSN sites without major spatial gradients. Details can be found in Ch. 4 of the 189(d) Plan.

## 4.2. PM<sub>2.5</sub> Modeling Approach

### WRF-SMOKE-MEGAN-CMAQ Modeling

The 2018 meteorological data was used for emissions and chemical transport modeling. This is because 2018 meteorology represents an approximately climatological norm in forming ozone and PM<sub>2.5</sub> in the Basin in recent years. The U.S. EPA's guidance for attainment modeling indicates that meteorological data for any of the three years for which measurements were included in the design value can be used for attainment modeling. CMAQ simulations were conducted for 365 days from January 1 to December 31. Meteorological inputs were generated using WRF, and biogenic emissions were estimated using MEGAN. On-road and biogenic emissions were adjusted to each day's meteorological conditions. County-level emissions of NO<sub>x</sub>, SO<sub>x</sub>, CO, PM<sub>2.5</sub> and NH<sub>3</sub> were spatially and temporally allocated using SMOKE and on-road mobile source processing algorithm. The simulations included 8,760 consecutive hours from which daily 24-hour average PM<sub>2.5</sub> concentrations were calculated. The modeling system was applied to the emissions representing 2020, 2023, 2031, and 2035.

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<sup>24</sup> Nussbaumer, C.M. and Cohen, R.C. (2021), Impact of OA on the Temperature Dependence of PM 2.5 in the Los Angeles Basin, *Environ. Sci. Technol.*, 55, 6, 3549-3558.

<sup>25</sup> Jiang, Y., Yang, X.-Q., and Liu, X. (2015), Seasonality in anthropogenic aerosol effects on East Asian climate simulated with CAM5, *J. Geophys. Res. Atmos.*, 120, 10,837– 10,861.

<sup>26</sup> Karydis, V. A., Tsimpidi, A. P., Lei, W., Molina, L. T., and Pandis, S. N.: Formation of semivolatile inorganic aerosols in the Mexico City Metropolitan Area during the MILAGRO campaign, *Atmos. Chem. Phys.*, 11, 13305–13323

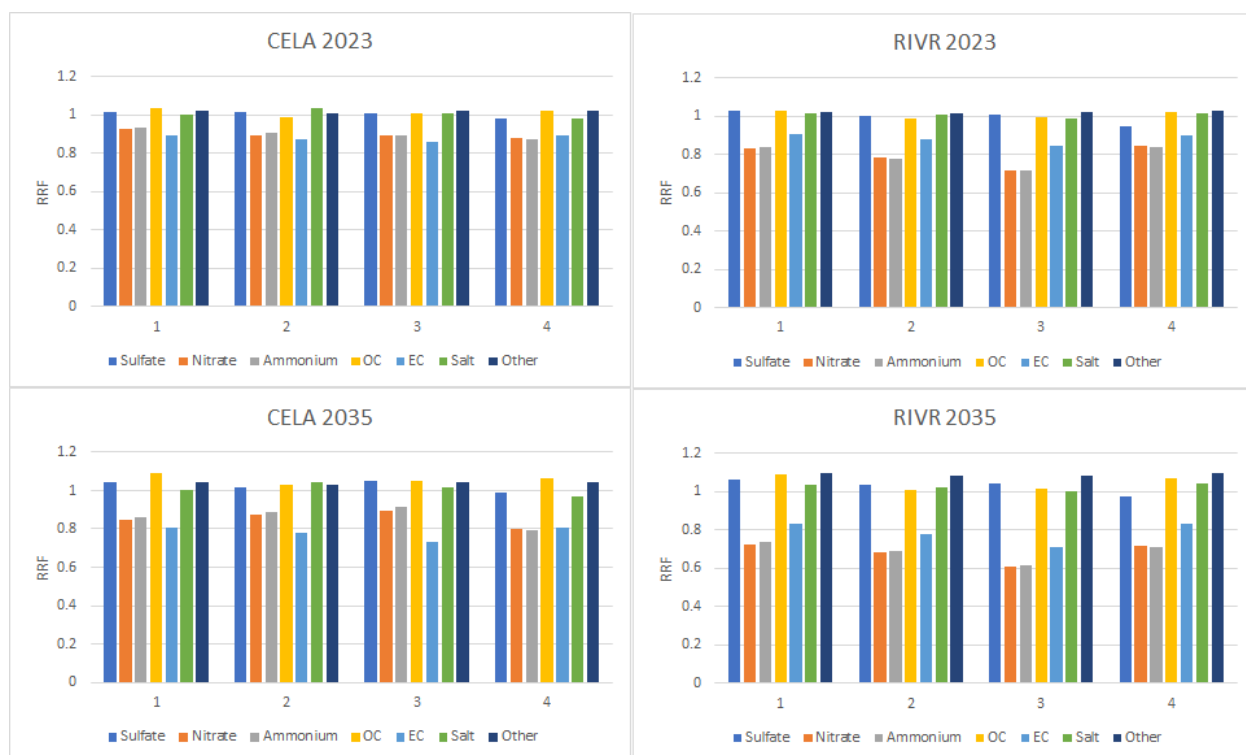
### **Design Value Calculation using Relative Response Factor (RRF) Approach**

RRF is defined as the ratio of the CMAQ predictions for a future year to the attainment year (2020). A set of RRFs were generated for the attainment year and each future milestone year for the top 10 percent high days with modeled daily 24-hour averaged PM<sub>2.5</sub>. RRFs were generated for seven species: ammonium (NH<sub>4</sub>), nitrate (NO<sub>3</sub>), sulfate (SO<sub>4</sub>), organic carbon (OC), elemental carbon (EC), sea salts (Salt) and a combined grouping of crustal compounds and metals (Others). Future year concentrations of the seven species were calculated by applying the model generated quarterly RRFs to the speciated 24-hour PM<sub>2.5</sub> measured data based on the eight highest PM<sub>2.5</sub> concentrations in each quarter of the three year period used in the design value shown in Table 4-1. Particle bound water was determined using a regression model based on simulated concentrations of the ammonium, nitrate and sulfate ions.<sup>27</sup> A blank mass of 0.2 µg/m<sup>3</sup> was added to base and future year concentrations. The 32 days in each year (top 8 high PM days per quarter) were then re-ranked based on the sum of all predicted PM species to establish a new 98<sup>th</sup> percentile concentration each year. An average of the resulting future year 98<sup>th</sup> percentile concentrations for the three years was used to calculate future design values for the maintenance demonstration. The 98<sup>th</sup> percentile value was determined based on the data sampling frequency. For example, every day sampling makes the 8<sup>th</sup> highest day the 98<sup>th</sup> percentile and every 6<sup>th</sup> day sampling makes the 2<sup>nd</sup> highest day the 98<sup>th</sup> percentile. The proportion of nitrate, elemental carbon, and ammonium decreases from 2023 to 2035 consistent with the quarterly averaged RRFs in Figure 4-2.

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<sup>27</sup> Neil H. Frank (2006) Retained Nitrate, Hydrated Sulfates, and Carbonaceous Mass in Federal Reference Method Fine Particulate Matter for Six Eastern U.S. Cities, *Journal of the Air & Waste Management Association*, 56:4, 500-511

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*Figure 4-2: Component specific RRFs by quarter in 2023 and 2035*

### 4.3. PM<sub>2.5</sub> Modeling Results

#### Model Performance Evaluation

Model performance was evaluated against corresponding measured PM<sub>2.5</sub> mass. Figure 4-3 depicts this comparison for Los Angeles-North Main Street. In general, the model performance is reasonably good, with a tendency to underestimate during summer and overestimate during winter. Statistics for all sites are presented in Table 4-2. Because the U.S. EPA guidance (U.S. EPA, 2018) requires that the model predictions be applied in a relative rather than absolute sense, potential biases present in the model prediction are less likely transferred to future design values.

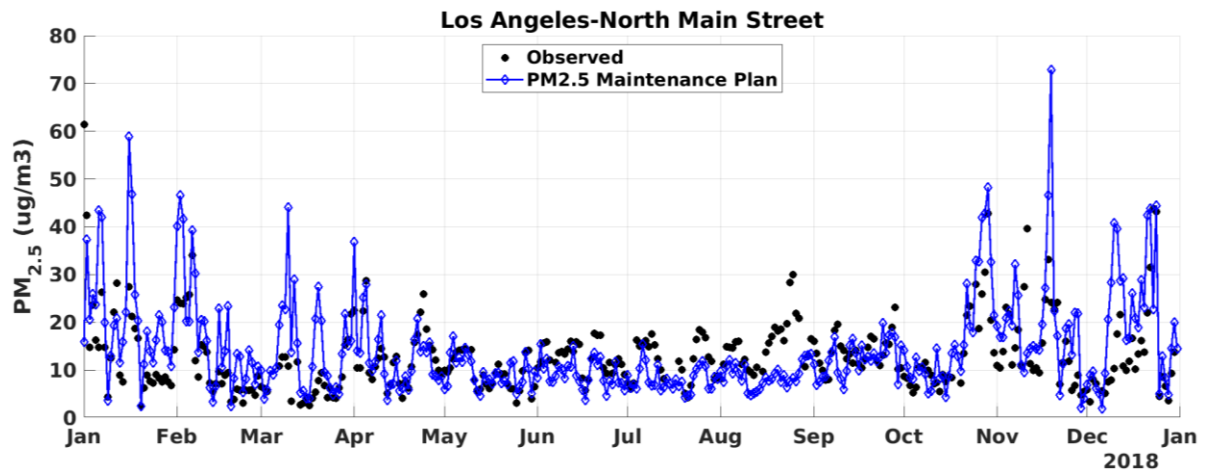


Figure 4-3: Time Series Comparison of PM<sub>2.5</sub> Observations and Simulated Mass Concentrations at the Los Angeles-North Main Street Monitoring Site



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*Table 4-2: Statistical Comparison of Simulation Results with Observations*

Station	OBS_AVE <sup>1</sup> (µg/m <sup>3</sup> )	SIM_AVE <sup>2</sup> (µg/m <sup>3</sup> )	R <sup>3</sup>	RMSE <sup>4</sup> (µg/m <sup>3</sup> )	MB <sup>5</sup> (µg/m <sup>3</sup> )	MAGE <sup>6</sup> (µg/m <sup>3</sup> )	NMB <sup>7</sup> (%)	NME <sup>8</sup> (%)
Anaheim	11.4	9.2	0.6	7.0	-2.2	4.6	-19.1	40.4
Azusa	10.9	11.5	0.5	7.4	0.3	5.5	2.9	50.3
Los Angeles- North Main Street	12.9	14.2	0.6	8.6	1.4	5.7	11.1	43.9
Compton	13.3	11.3	0.7	7.5	-2.3	5.2	-17.2	38.8
Fontana	11.1	8.9	0.3	7.4	-2.8	5.4	-25.2	48.2
Long Beach - North	8.3	4.7	0.3	5.4	-3.6	4.1	-43.1	48.9
Long Beach - South	11.6	10.0	0.6	7.2	-1.5	4.8	-13.2	41.6
Mira Loma (Van Buren)	14.2	8.3	0.6	9.5	-5.9	6.8	-41.6	47.5
Mission Viejo	8.5	6.8	0.5	5.6	-1.6	4.1	-19.5	48.9
Ontario	14.5	10.8	0.6	7.6	-3.6	5.5	-25.0	37.7
Pasadena	10.3	12.0	0.5	7.3	1.5	5.0	14.3	49.0
Pico Rivera #2	13.0	10.9	0.6	7.7	-2.2	5.2	-16.7	39.9
Reseda	6.0	3.6	0.5	4.2	-2.4	2.9	-40.4	48.3
Rubidoux	10.5	7.2	0.4	6.6	-3.4	4.6	-32.4	43.5
San Bernardino	11.2	8.5	0.5	6.3	-3.0	4.8	-26.6	42.5
AVERAGE	11.3	9.1	0.5	7.1	-2.2	5.0	-20.4	44.4

<sup>1</sup> Observation average

<sup>2</sup> Simulation average

<sup>3</sup> Coefficient of correlation

<sup>4</sup> Root Mean Squared Error

<sup>5</sup> Mean Bias

<sup>6</sup> Mean Adjusted Gross Error

<sup>7</sup> Normalized Mean Bias

<sup>8</sup> Normalized Mean Error

### Changes in Chemical Composition in Future Years

CMAQ predicted chemical composition data for 2023 and 2035 are presented in Figures 4-4 through 4-7. These are based on “Sulfate, Adjusted Nitrate, Derived Water, Inferred Carbon Hybrid (SANDWICH)” approach provided in the U.S. EPA’s guidance and adjusted with RRF for high PM<sub>2.5</sub> days for Los Angeles and Riverside-Rubidoux. High PM<sub>2.5</sub> day is defined as annual 98<sup>th</sup> percentile day. The relative portion of nitrate, elemental carbon, and ammonium decreases from 2023 to 2035, while organic carbon increases. The contribution of nitrate to the total mass is expected to decrease in accordance with NO<sub>x</sub> emissions reductions. Directly emitted PM<sub>2.5</sub> and ammonia emissions increase marginally with time in response to the growth in population and economic activities, as shown in Chapter 3 of this Plan. However, the relative contribution of EC to the total PM<sub>2.5</sub> mass decreased marginally. Given the increased contribution of organic carbon, this overall composition change indicates that high PM days are expected to be driven by secondary PM from chemical reactions. Similarly, ammonium contribution was predicted be marginally smaller despite increased ammonia emissions, indicating ammonium nitrate formation depends on the availability of nitrogen oxides as well as ammonia emissions and there is surplus NO<sub>x</sub> compared to ammonia. The spatial plots in Figure 4-8 demonstrate that this trend is expected across the Basin on an annual average basis for all future milestone years. Chemical composition for 2031 is not presented here for brevity, but the trends observed between 2023 and 2035 are also observed between 2023 and 2031.

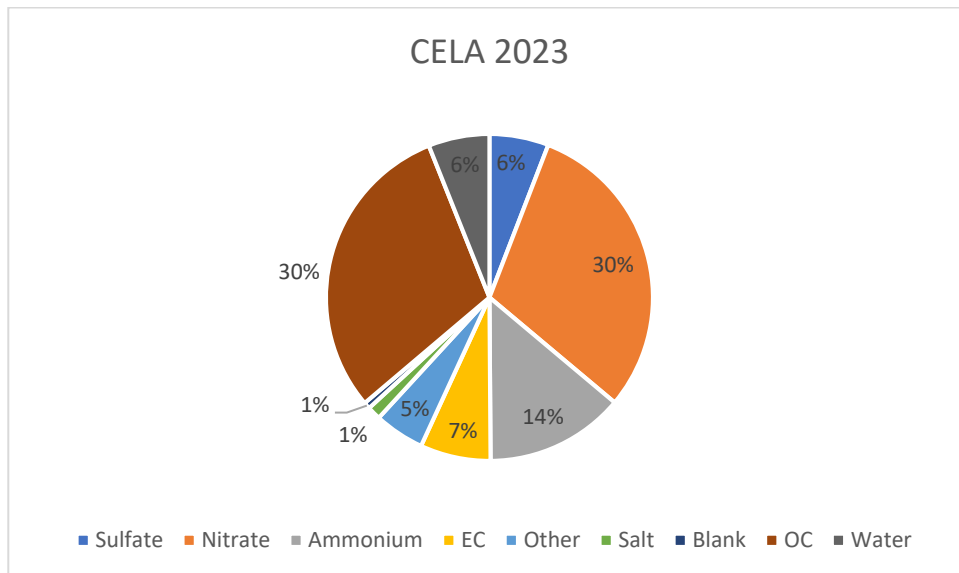


Figure 4-4: RRF-adjusted composition of 98<sup>th</sup> percentile PM<sub>2.5</sub> in 2023 at Los Angeles-North Main Street (CELA)

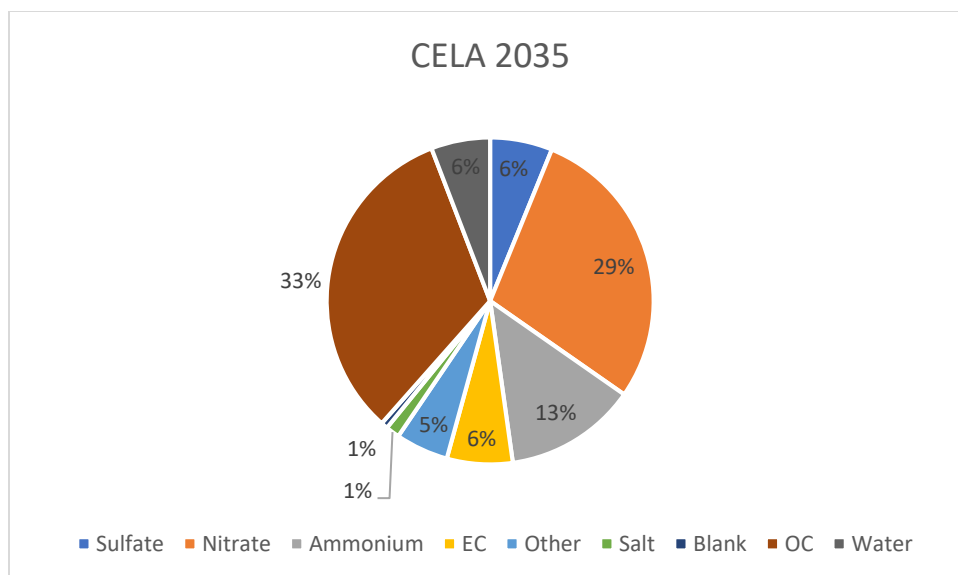


Figure 4-5: RRF-adjusted composition of 98<sup>th</sup> percentile PM<sub>2.5</sub> in 2035 at Los Angeles-North Main Street (CELA)

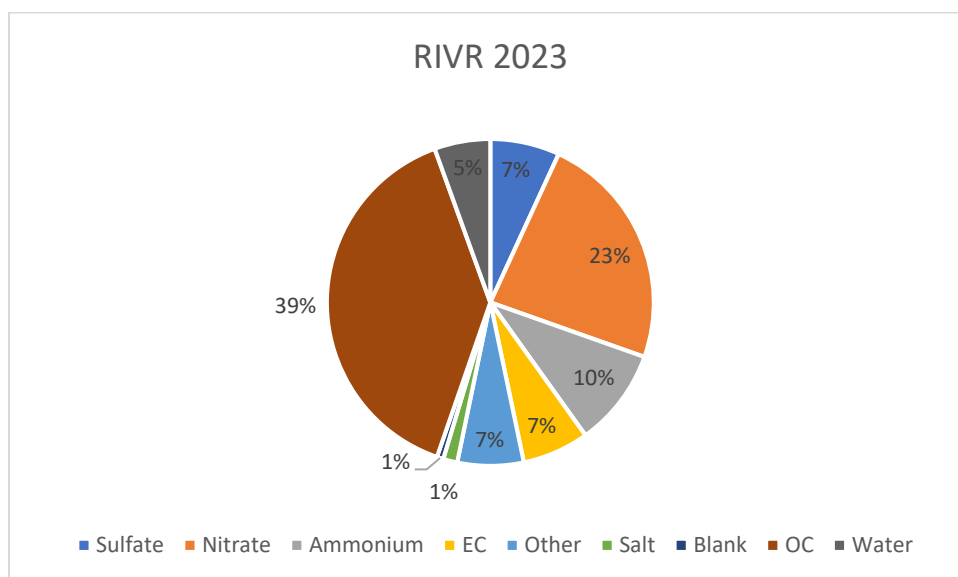


Figure 4-6: RRF-adjusted composition of 98<sup>th</sup> percentile PM<sub>2.5</sub> in 2023 at Riverside-Rubidoux (RIVR)

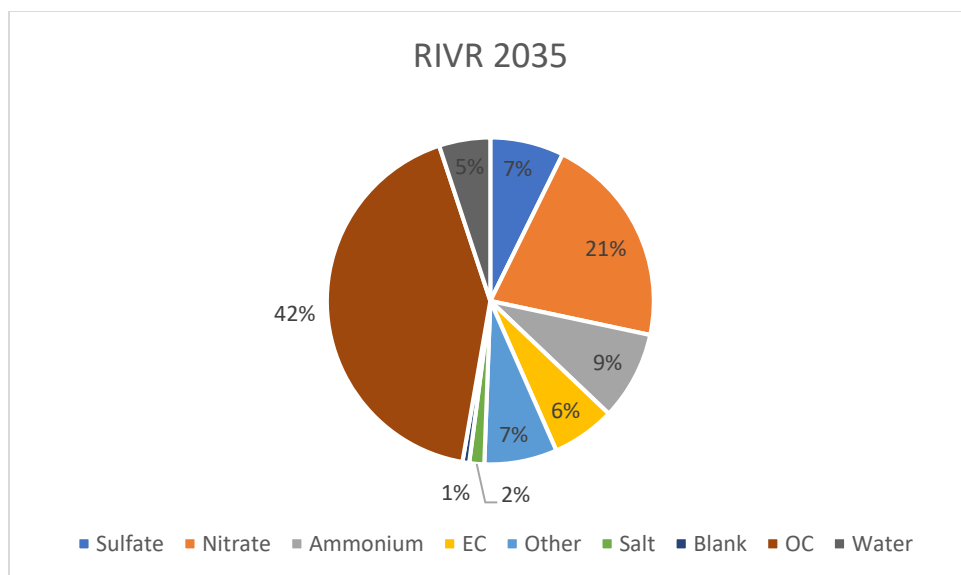


Figure 4-7: RRF-adjusted composition of 98<sup>th</sup> percentile PM<sub>2.5</sub> in 2035 at Riverside-Rubidoux (RIVR)

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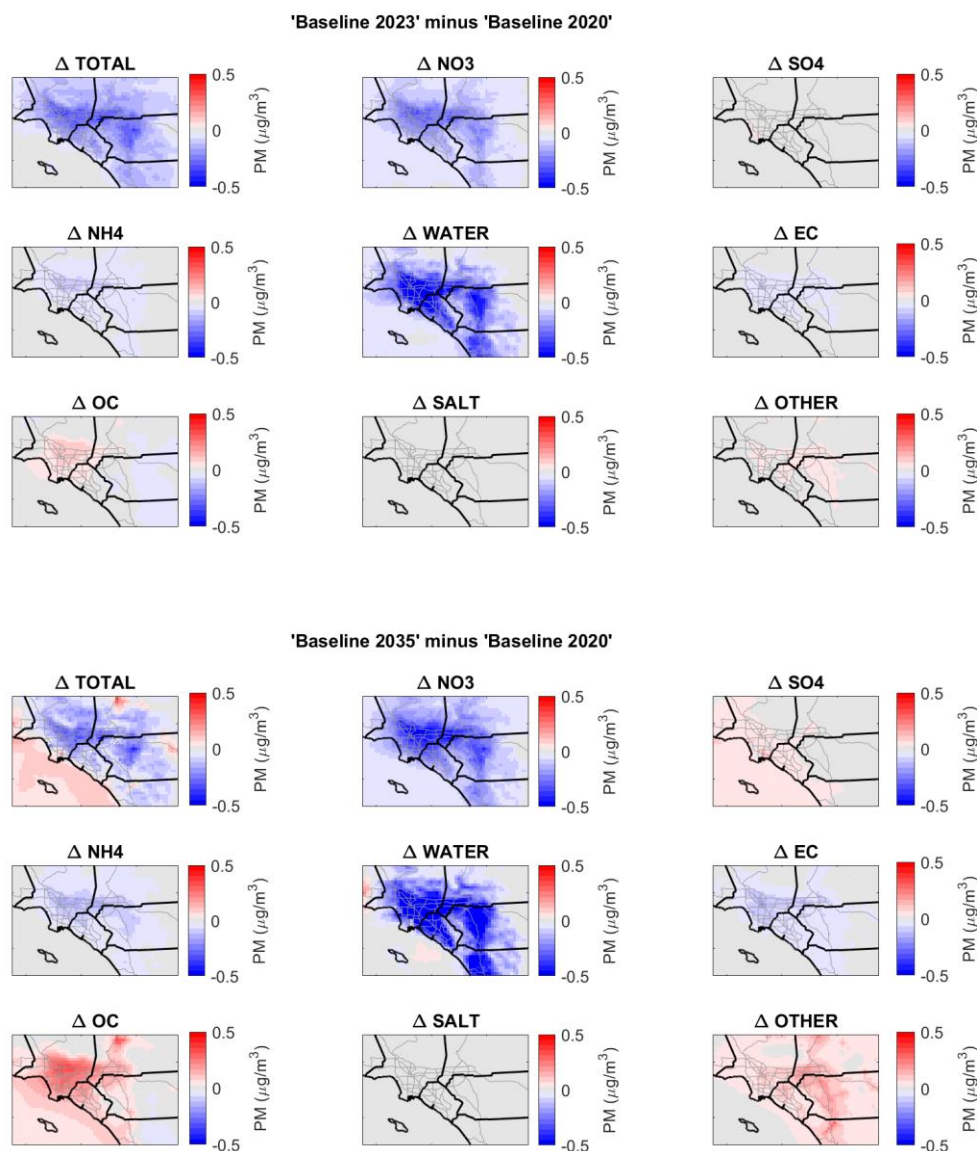


Figure 4-8: Annual averaged PM<sub>2.5</sub> composition differences in 2023 (top) and 2035 (bottom) compared to baseline

## **Future PM<sub>2.5</sub> design values**

CMAQ simulations were conducted for the 2023, 2031, and 2035 using baseline emissions scenarios to assess the 24-hour PM<sub>2.5</sub> attainment status in the Basin. Table 4-3 presents the future PM<sub>2.5</sub> design concentrations based on the modeling analysis. The highest PM<sub>2.5</sub> concentration in 2023 is projected to be 34.6  $\mu\text{g}/\text{m}^3$  at Long Beach-Route 710 Near Road. All other stations are forecast to be at least 1.0  $\mu\text{g}/\text{m}^3$  below the standard. Thus, the Basin is anticipated to maintain attainment in 2023 with the baseline emissions scenario. Long Beach-Route 710 Near Road station continues to have the highest daily PM<sub>2.5</sub> levels in 2031 and 2035. While peak daily PM<sub>2.5</sub> can appear at any location along

transportation corridor, heavily populated urban centers or areas impacted by nearby sources and dispersion, the emissions from ports of Los Angeles and Long Beach including ocean going vessels are projected to increase substantially in the future, which are predicted to raise ambient PM<sub>2.5</sub> levels in future years in the areas close to the ports and along the transportation corridors. In summary, 24-hour average PM<sub>2.5</sub> design values are predicted to be lower than or equal to 35 µg/m<sup>3</sup> in 2023, 2031 and 2035 for all stations within the Basin. It should be noted that this maintenance of attainment is demonstrated with the baseline emissions inventory, indicating no additional emission reductions are needed beyond reductions from already adopted regulations to maintain the attainment status through 2035. Further reductions in PM<sub>2.5</sub> precursor emissions to meet ozone NAAQS in the Basin will further reduce the future PM<sub>2.5</sub> concentrations.

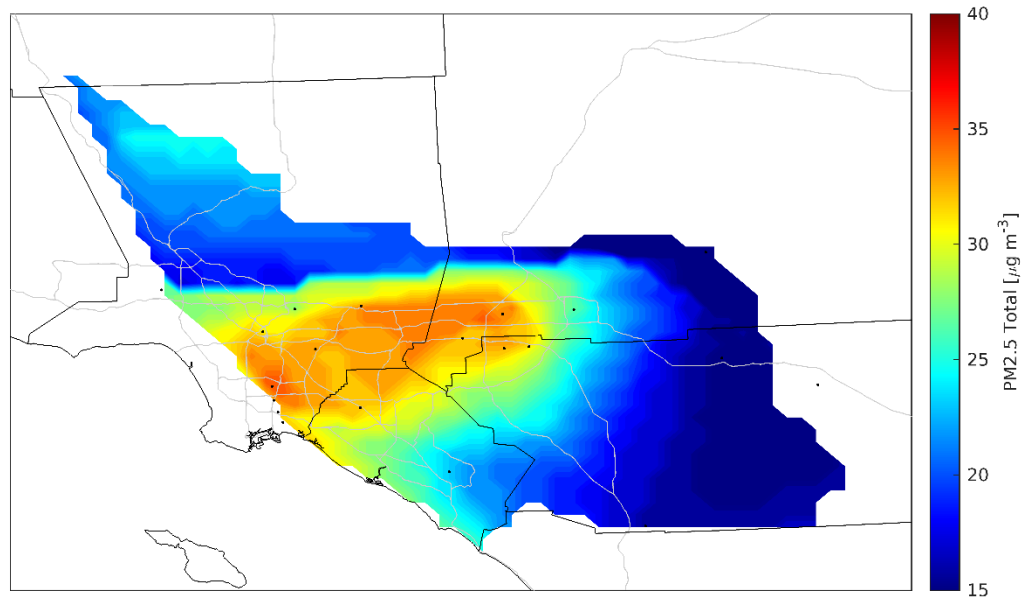
*Table 4-3: Future 24-hour PM<sub>2.5</sub> Design Values (µg/m<sup>3</sup>)*

Monitoring Site	2023 Design Value	2031 Design Value	2035 Design Value
Anaheim	32.1	32.0	32.2
Azusa	34.4	33.9	34.0
Big Bear	20.0	19.5	19.4
Compton	34.3	34.0	34.1
Fontana	33.9	33.7	33.8
Long Beach – North	32.9	33.5	33.7
Long Beach – South	31.7	31.9	32.1
Long Beach- Route 710 Near Road	34.6	34.9	35.0
Los Angeles- North Main Street	31.2	30.2	30.2
Mira Loma (Van Buren)	33.3	32.5	32.3
Mission Viejo	22.3	22.0	22.0
Ontario-Route 60 Near Road	32.3	31.1	31.0
Pasadena	28.4	27.2	26.9
Pico Rivera #2	32.6	31.7	31.4
Reseda	27.9	27.7	27.8
Riverside Rubidoux	31.8	30.8	30.7
San Bernardino	26.0	25.5	25.5

### Unmonitored Area Analysis

The U.S. EPA modeling guidance recommends that the attainment demonstration includes an analysis to confirm that all grid cells in the modeling domain meet the federal standard. While this “unmonitored area analysis” is not required for a maintenance plan, it is included in this Plan to ensure that the

standard is maintained in every grid cell within the Basin. Variance in the species profiles at selected locations coupled with the differing responses to emissions controls are expected to result in spatially variable impacts to PM2.5 air quality. Appendix IV of the 189(d) Plan describes this analysis in detail. Based on the unmonitored area analysis conducted for this Plan, attainment of the 2006 24-hour PM2.5 standard was confirmed to be maintained through 2035 at all locations within the Basin, with the highest 24-hour PM2.5 design concentrations near North Long Beach and Ontario. Figures 4-9 through 4-11 depict the design concentrations predicted by this analysis.



*Figure 4-9: 2023 24-hour PM2.5 design concentrations*



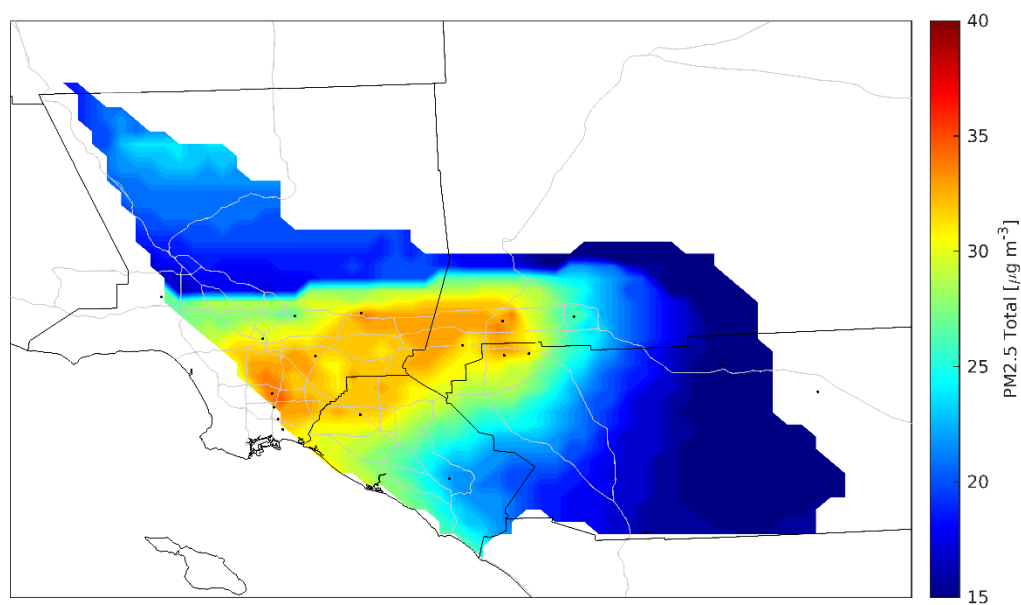


Figure 4-10: 2031 24-hour PM<sub>2.5</sub> design concentrations

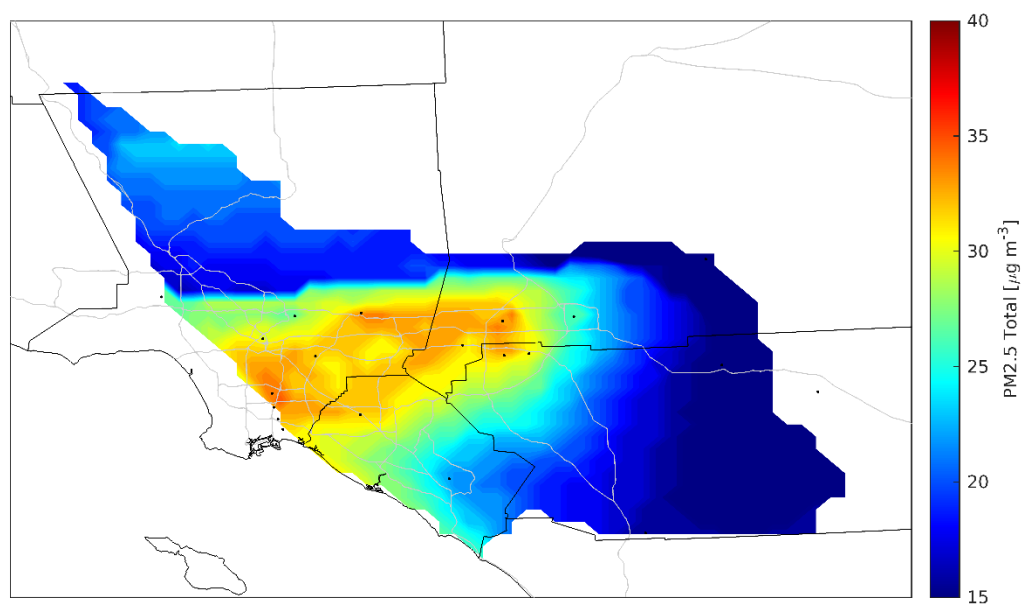


Figure 4-11: 2035 24-hour PM<sub>2.5</sub> design concentrations

#### 4.4. Weight of Evidence Analysis

##### Maintenance Demonstration using Emissions Inventory

South Coast Air Basin's total emissions of PM2.5 and its precursors are provided in Table 4-4. NOx emissions are expected to reduce substantially from 2020 to 2035 due to on-going implementation of already adopted rules and regulations. Directly emitted PM2.5 emissions are lower in interim years 2023 (60.1 tpd) and 2031 (60.7 tpd) than 2020 (61.0 tpd); a marginal increase (0.1 tpd) from 2020 to 2035 is expected. VOC emissions are lower in the future years than 2020. Emissions of SOx and NH3 grow in future years with only marginal increase in SOx, but their impact was predicted to be minor, as shown in CMAQ predictions. In all, the changes in emissions are expected to lower ambient PM2.5 levels slightly, which is consistent with the modeling results presented in the previous section.

Table 4-4: PM2.5 and its precursor emissions included in the PM2.5 maintenance plan. Units are tons per day

Species	2020	2023	2031	2035
PM2.5	61.0	60.1	60.7	61.1
NOx	337.7	276.4	247.7	239.1
VOC	385.2	373.0	370.5	373.3
SOx	14.9	15.0	15.0	15.4
NH3	75.8	77.5	80.9	82.3

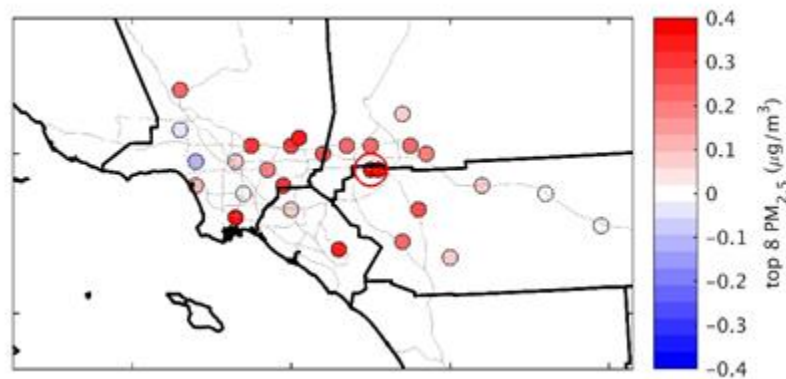
##### Impact of COVID-19

The Basin's attainment of the 24-hour PM2.5 NAAQS in 2020 coincided with the emergence of the COVID-19 pandemic, which led to widespread lockdowns that restricted travel and goods movement. An analysis is presented to demonstrate that attainment of the standard would have occurred regardless of the pandemic.

Several wildfires produced elevated SCAB PM2.5 levels in 2020. As described previously, a small subset of 24-hour PM2.5 measurements was excluded as a result of wildfire-related exceptional event demonstrations that were deemed regulatory significant (i.e., attainment would have been achieved if wildfire influence was excluded). Nevertheless, the impact of wildfires remains evident in the remaining measurements. For example, Azusa, a monitor heavily impacted by wildfire smoke, recorded a 98<sup>th</sup> percentile value in 2020 (53.1 µg/m<sup>3</sup>) that is more than 70% higher than values in the two previous years. A similar trend was observed across several sites in the Basin, as seen in Table 4-1.

Another aspect to consider is increases in PM2.5 emissions and precursors from anchored ocean-going vessels. Notably, the Ports of LA and Long Beach observed an increase in container cargo moves in the

fourth quarter of 2020, which led to increased congestion within and outside the ports. The OGV anchorage activities and corresponding emissions during the port congestion period (October 2020 to March 2021) were estimated to be about 3.89 times higher than the anchorage activities and emissions in the previous year. This estimate was developed based on a comparison of the actual anchorage hours during the port congestion period and the 2019 anchorage hours from IHS-Seaweb's Movement Module data. The anchorage emissions are calculated based on the anchorage hours, average auxiliary engine and boiler loads during anchorage, and the corresponding emission factors. The calculation methodology can be found in the San Pedro Bay Ports Emissions Inventory Methodology Report (2019)<sup>28</sup>. This increased anchorage activities resulted in NO<sub>x</sub>, SO<sub>x</sub> and PM emissions increases by about 11 tons per day, 1 ton per day and 0.3 ton per day, respectively. This increase in emissions was simulated to raise 24-hour PM<sub>2.5</sub> concentrations in almost all areas in the Basin, with the highest impact estimated to be 0.47 µg/m<sup>3</sup> at Mira Loma (Van Buren). Figure 4-12 shows the changes in the 98<sup>th</sup> percentile 24-hour PM<sub>2.5</sub> concentrations due to the increased anchorage activities.



*Figure 4-12: Modeled increase in PM<sub>2.5</sub> top 8<sup>th</sup> day (98<sup>th</sup> percentile) due to 3.9 times increase in anchorage activity. Maximum increase is 0.47 µg/m<sup>3</sup>, and occurs in Mira Loma (Van Buren) (circled station)*

California enacted the stay-at-home order on March 19, 2020 due to the COVID-19 pandemic. The effect of the order on heavy duty truck traffic volume can be visualized by comparing Basin averaged 2020 traffic flows from Caltrans' Performance Measurement System (PeMS), as depicted in Figure 4-13. Traffic flows from all sensors monitoring heavy duty vehicles within Los Angeles county are averaged and the daily flows are normalized by the annual average flow in 2018 for ease of comparison. While there might have been a marginal decrease in total freeway traffic in fall and winter 2021, heavy duty traffic was fully recovered to pre-pandemic levels by summer. Given that late fall and winter have high PM<sub>2.5</sub> levels, the reduced traffic that occurred during late spring to early summer is unlikely to have affected the attainment status.

<sup>28</sup> Available at <https://polb.com/environment/air#emissions-inventory>

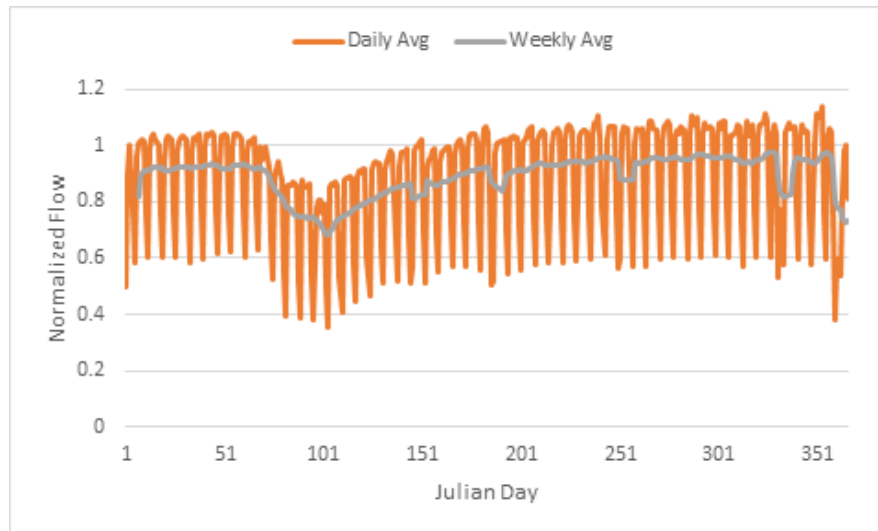


Figure 4-13: SCAB averaged traffic flow from Caltrans' PeMS. The data is normalized to 2018 traffic flow.

### 3-Year vs 5-Year Weighted Design Values

The U.S. EPA's guidance recommends the use of 5-year weighted design values instead of 3-year design values in the modeled attainment demonstration. This is to reduce the likelihood of selecting a period with unusually favorable or unfavorable meteorological conditions. The 5-year weighted design value is defined as the average of three of the 3-year design values over 5 consecutive years. The 2020 3-year design value (using 2018-2020 data) shows attainment of the 2006 24-hour PM<sub>2.5</sub> standard in the Basin. Since the Basin gradually progressed towards attainment, design values prior to 2020 did not attain, and therefore the 5-year weighted design value does not attain either. The intent of this Plan is to demonstrate continued maintenance of the attainment status, not to demonstrate attainment, therefore, the modeling approach relied on the 3-year design value that actually exhibits attainment. However, the effect of using 5-year weighted design values (based on 2016-2020 data) was examined and the results are shown in Table 4-5. Even if 5-year weighted design values were used, attainment of the 24-hour PM<sub>2.5</sub> standard is expected to be maintained through 2035, except in Compton where high design values were likely caused by abnormal episodic human activity in close proximity to the monitoring station. Details on the Compton exceedances were presented in the 189(d) Plan. In all, regardless of the choice of the attainment year's design value, maintenance of the 24-hour PM<sub>2.5</sub> standard is expected to continue through 2035.

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Table 4-5: Future 5-year Weighted Average 24-hour PM2.5 Design Values ( $\mu\text{g}/\text{m}^3$ )

Monitoring Site	2023 Design Value	2031 Design Value	2035 Design Value
Anaheim	29.5	29.1	29.3
Azusa	27.8	27.2	27.1
Big Bear	18.5	17.9	17.9
Compton	36.4	36.1	36.2
Fontana	29.6	29.2	29.1
Long Beach – North	30.2	30.4	30.4
Long Beach – South	29.8	29.9	30.0
Long Beach-Route 710 Near Road	33.2	33.3	33.3
Los Angeles-North Main Street	30.3	29.3	29.4
Mira Loma (Van Buren)	34.3	33.4	33.2
Mission Viejo	18.1	18.0	18.1
Ontario-Route 60 Near Road	32.3	31.1	31.0
Pasadena	28.4	27.2	26.9
Pico Rivera #2	32.6	31.7	31.4
Reseda	27.9	27.7	27.8
Riverside Rubidoux	31.8	30.8	30.7
San Bernardino	26.0	25.5	25.5

#### 4.5. Summary and Conclusion

A comprehensive chemical transport modeling system, WRF-SMOKE-MEGAN-CMAQ, was employed to demonstrate that the South Coast Air Basin will maintain attainment of the 1997 and 2006 24-hour PM2.5 standards through 2035. The South Coast Air Basin attained the 24-hour PM2.5 standard in 2020,

for which emissions inventory and chemical transport modeling predictions were presented in this Plan to characterize the ‘attainment’ condition. 2023 and 2031 years were also added to ensure the continued maintenance through 2035. CMAQ modeling predictions adjusted by RRF indicate that the attainment status will be maintained through 2035 with baseline emissions scenarios, which reflect on-going and expected emissions reductions from already adopted regulations. No additional emission reductions are required for maintaining attainment of the 1997 and 2006 24-hour PM<sub>2.5</sub> standards in the South Coast Air Basin.

## 5. Transportation Conformity

### 5.1. Introduction

The California Air Resources Board (CARB) has prepared the motor vehicle emissions budget (MVEB)<sup>29</sup> for the 24-hour average PM<sub>2.5</sub> National Ambient Air Quality Standard (NAAQS). Transportation conformity is the federal regulatory procedure for linking and coordinating the transportation and air quality planning processes. 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 State Implementation Plans (SIPs). Conformity with the SIP requires that transportation activities (1) not cause or contribute new air quality violations, (2) increase the frequency or severity of any existing violation, or (3) delay timely attainment of NAAQS. Therefore, the quantification and comparison of on-road motor vehicle emissions determine transportation conformity between air quality and transportation planning.

The MVEB is set for each criteria pollutant or its precursors for each milestone year and the last year of the maintenance plan. Subsequent transportation plans and programs produced by transportation planning agencies are required to conform to the SIP by demonstrating that the emissions from the proposed plan, program, or project do not exceed the MVEB levels established in the applicable SIP. The budgets established in this plan apply as a “ceiling” or limit on transportation emissions in the South Coast Air Basin for the years 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 South Coast Air Quality Management District or SCAQMD PM<sub>2.5</sub> Maintenance Plan, the milestone years and last year of the maintenance plan (also referred to as the plan analysis years) are 2023, 2031, and 2035 respectively.

### 5.2. Methodology

The MVEB for the PM<sub>2.5</sub> Maintenance Plan is established based on the guidance from 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 implementing amendments to the regulation as described below.

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<sup>29</sup> 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.

### **Direct PM<sub>2.5</sub> Emissions**

40 CFR Part 93.102(b)(1)<sup>30</sup> indicates that directly emitted PM<sub>2.5</sub> motor vehicle emissions from the tailpipe, brake wear, and tire wear must be considered in conformity determinations.

### **Re-Entrained Paved and Unpaved Road Dust PM<sub>2.5</sub> Emissions**

March 10, 2006, Transportation Conformity Final Rule amending the transportation conformity regulation to establish criteria for PM<sub>2.5</sub> and PM<sub>10</sub> conformity determinations (71 FR 12498)<sup>31</sup> indicates road dust must be included in regional conformity determinations: “EPA has intended for road dust emissions to be included in all conformity analyses of direct PM<sub>2.5</sub> emissions.”

### **Transportation-Related Construction Dust PM<sub>2.5</sub> Emissions**

Section 93.122(f) of the Conformity Regulation requires regional conformity determinations to include fugitive dust PM<sub>2.5</sub> emissions from highway and transit construction activities if these sources are deemed significant contributors to the PM<sub>2.5</sub> problem.

The PM<sub>2.5</sub> Maintenance Plan establishes the MVEB for primary emissions of PM<sub>2.5</sub> from motor vehicle exhaust, tire and brake wear, and the precursors of VOC and NO<sub>x</sub>. In addition, re-entrained road dust from paved and unpaved road travel and road construction dust is included. This section discusses budgets that have been set for annual average daily emissions in the analysis years 2023, 2031, and 2035. The MVEB presented below use emission rates from California’s motor vehicle emission model, EMFAC2017 (V.1.0.3)<sup>32</sup>, with Southern California Association of Governments (SCAG) activity data (VMT and speed distributions). The activity data are from SCAG’s 2020-2045 Regional Transportation Plan (also known as Connect SoCal, adopted by the SCAG Board on September 3, 2020)<sup>33</sup>. Thus, they are consistent with the maintenance demonstration for the SIP.

On August 15, 2019, the U.S. EPA approved EMFAC2017 for use in SIPs and demonstrating transportation conformity<sup>34</sup>. The EMFAC model estimates emissions from two combustion processes (running and start exhaust) and four evaporative processes (hot soak, running losses, diurnal, and resting losses). In addition, The Safer Affordable Fuel-Efficient (SAFE)<sup>35</sup> Vehicles Rule impacts some of the underlying assumptions in the EMFAC2017 model for model years 2021-2026 passenger cars and light trucks. Hence, the emissions output from the EMFAC2017 model was adjusted to account for the impacts of this rule<sup>36</sup>. Further, the estimated emissions were adjusted for the Advanced Clean Trucks

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30 <https://www.govinfo.gov/content/pkg/CFR-2004-title40-vol19/pdf/CFR-2004-title40-vol19-sec93-102.pdf>

31 And emissions from road construction if found significant (§ 93.122(f)(2))

32 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>

33 [https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocial-plan\\_0.pdf?1606001176](https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocial-plan_0.pdf?1606001176)

34 U.S. EPA approval of EMFAC2017 can be found at 84 FR 41717 <https://www.federalregister.gov/d/2019-17476>

35 Safer Affordable Fuel-Efficient Vehicle Rule for Model Years 2021-2026 Passenger Cars and Light Trucks;

<https://www.regulations.gov/document/NHTSA-2018-0067-2151>

36 EMFAC Off-Model Adjustment Factors to Account for the SAFE Vehicle Rule Part One,

[https://ww3.arb.ca.gov/msei/emfac\\_off\\_model\\_adjustment\\_factors\\_final\\_draft.pdf](https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_draft.pdf)

(ACT)<sup>37</sup> and Heavy-Duty Engine and Vehicle Omnibus Regulations<sup>38</sup>. The emissions for re-entrained paved road dust, unpaved road dust, and road construction dust are based on California Emissions Projection Analysis Model (CEPAM)<sup>39</sup>.

Budgets use emissions for an average annual day, consistent with the on-road emissions inventory and maintenance demonstration, using the following method:

- 1) Calculate the on-road motor vehicle emissions totals for the appropriate pollutants (VOC, NOx, and PM2.5) from EMFAC2017 and apply adjustments to account for SAFE vehicle rule, ACT, and Omnibus regulations.
- 2) Combine on-road vehicle emissions with re-entrained paved road dust, re-entrained unpaved road dust, and road construction dust emissions from CEPAM 2022 version 1.00 and round each total up to the nearest ton.

#### 5.2.1. PM2.5 Conformity Budgets

The MVEB in Table 5-1 was established in consultation with SCAG, South Coast AQMD, and U.S. EPA to satisfy the requirements established in 40 CFR Part 93, Section 118(e)(4)44F. The budgets apply as a “ceiling” or limit on transportation emissions in the South Coast region for the years they are defined and for all subsequent years until another year for which a different budget is defined (or until a SIP revision modifies the budget). The MVEB must be established for the attainment year for each NAAQS and the last year of the maintenance plan. For the South Coast AQMD PM2.5 Maintenance Plan, the plan period years 2023 to 2035. The MVEB, presented in the last row in Table 5-1, has been prepared consistent with the on-road emissions inventory by rounding the values up to the nearest ton. Average daily emissions are used in the plan consistent with how the PM2.5 standard is measured. Consequently, budgets were calculated in EMFAC2017 using annual average daily emissions for the analysis years listed above. In addition, the MVEB developed for this plan includes more recent travel activity projections provided by the SCAG.

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37 Advanced Clean Trucks, <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks>

38 Heavy-Duty Engine and Vehicle Omnibus Regulations,  
<https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox>

39 The most publicly available version of CEPAM is 2016 CEPAMv1.05  
[https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php?\\_ga=2.245358341.1032104163.1619818914-1897375236.1618598698](https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php?_ga=2.245358341.1032104163.1619818914-1897375236.1618598698)



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*Table 5-1: Motor Vehicle Emissions Budgets (MVEB) for PM<sub>2.5</sub> Maintenance Plan (Annual Season)*

South Coast (Tons/Day)	2023			2031			2035		
	ROG	NOx	PM <sub>2.5</sub>	ROG	NOx	PM <sub>2.5</sub>	ROG	NOx	PM <sub>2.5</sub>
Vehicular Exhaust <sup>a</sup> , (Includes Tire, and Brake Wear for PM <sub>2.5</sub> )	55.74	93.43	9.6	40.8	71.9	9.5	36.5	66.2	9.5
Re-Entrained Paved Road Dust (Total)	N/A	N/A	8.7	N/A	N/A	9.0	N/A	N/A	9.2
Re-Entrained Unpaved Road Dust (City and County Roads)	N/A	N/A	1.7	N/A	N/A	1.7	N/A	N/A	1.7
Road Construction Dust	N/A	N/A	0.3	N/A	N/A	0.3	N/A	N/A	0.3
Total <sup>b</sup>	55.74	93.43	20.27	40.84	71.94	20.43	36.52	66.23	20.61
<b>Motor Vehicle Emission Budget<sup>c</sup></b>	56	94	21	41	72	21	37	67	21

<sup>a</sup> This reflects the adjustment factor for SAFE Vehicle Rule, Heavy-Duty Engine and Vehicle Omnibus Regulation, and Advanced Clean Truck Regulation using CEPAM2022 v1.00

<sup>b</sup> Values from CEPAM2022 v1.00 may not add up due to rounding.

<sup>c</sup> Motor Vehicle Emission Budgets calculated are rounded up to the nearest ton.

Source: CEPAM2022 v1.00

## 6. Future Monitoring Network

U.S. EPA guidance states that once an area has been redesignated, the State should continue to operate an appropriate air quality monitoring network in accordance with 40 CFR Part 58 to verify the attainment status of the area. More specifically, the number of monitors required is dependent upon the most recent 3-year 24-hour design value, annual design value and metropolitan statistical area (MSA) population. The minimum sample frequency for each site is dependent upon the most recent 3-year 24-hour design value, annual design value, and concentration relative to the standard. South Coast AQMD operates a network of 24-hour PM2.5 FRM and continuous FEM monitors to meet this requirement.

The PM2.5 network consists of nineteen 24-hour PM2.5 FRM monitors at air quality monitoring stations. The network monitors operate on a daily, one-in-three, or one-in-six-day sample schedule to meet minimum sampling frequency requirements. Additionally, quality control collocated monitors are required at fifteen percent of sites. To meet this requirement, the South Coast AQMD operates collocated monitors at Los Angeles, Mira Loma, Pico Rivera and Rubidoux monitoring sites.

A network of continuous PM2.5 FEM BAM and Non-FEM BAM analyzers are also operated at seventeen sampling sites to meet daily sample frequency requirements and provide real time AQI information to the public.

South Coast AQMD PM2.5 monitoring network exceeds all minimum monitoring requirements for network design and operation. As described in the July 1, 2021 Annual Network Plan (<http://www.aqmd.gov/home/air-quality/clean-air-plans/monitoring-network-plan>). Additionally, South Coast AQMD is committed to continuous improvement of the PM2.5 monitoring network, as described in the July 1, 2020 Five Year Monitoring Network Assessment.

To implement improvements to the PM2.5 network, South Coast AQMD is in consultation with U.S. EPA to secure direct funding as part of the American Rescue Plan. U.S. EPA is expected to provide direct funding for improvements to the national criteria pollutant monitoring network during 2022. South Coast AQMD is requesting funds for PM2.5 FEM monitor upgrades to selectively transition to PM2.5 FEM as primary monitors for comparison to NAAQS. This modification will provide better resolution of PM2.5 data, continue to exceed all minimum monitoring network requirements, and verify attainment status. The transition will also increase the spatial resolution of real-time air quality index values, improve the accuracy of forecasting, and enhance the air quality advisories issued by the South Coast AQMD.

## 7. Verification of Continued Attainment

The U.S. EPA guidance<sup>40</sup> requires that air districts indicate how they will track the progress of their maintenance plans over time to ensure continued attainment. Two options suggested by the guidance include: 1) periodic updates to the emissions inventory, and 2) periodic review of the inputs and

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<sup>40</sup> United States Environmental Protection Agency. 1992. Procedures for Processing Requests to Redesignate Areas to Attainment. Memorandum from John Calcagni to USEPA Regional Directors. September 4. Available at: [https://www.epa.gov/sites/production/files/2016-03/documents/calcagni\\_memo\\_-\\_procedures\\_for\\_processing\\_requests\\_to\\_redesignate\\_areas\\_to\\_attainment\\_090492.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf).

assumptions used for the emission inventory and subsequent updates to the inventory if those inputs or assumptions have significantly changed. This guidance further requires air districts to monitor the indicators, or triggers, which will be used to determine when the implementation of contingency measures are required.

The regulatory emissions inventory is updated periodically. South Coast AQMD maintains reported emissions data from major facilities through the Annual Emissions Reporting program and submits the data to CARB every year. Traffic activity data, which is an essential input to estimate on-road mobile emissions, is updated every 4 years when Southern California Association of Governments (SCAG) develops a new regional transportation plan. On-Road motor vehicle emissions model, EMFAC is updated approximately every 3 years. South Coast AQMD develops and maintains emissions reductions resulting from regulations and programs impacting various stationary point and area sources and mobile sources. In collaboration with CARB and SCAG, the methodologies, input data, and assumptions used to develop the emissions inventory are reviewed and updated as new data and/or methods become available. These reviews and updates are conducted regularly. To this extent, South Coast AQMD is committing to the second of the two above options to verify continued attainment. South Coast AQMD will review the inputs and assumptions used for the emission inventory when new information becomes available. If South Coast AQMD finds that these inputs have changed significantly, South Coast AQMD will update the existing inventory in coordination with CARB, evaluate the revised inventory against the inventories presented in this maintenance plan, and evaluate the potential impacts. In addition, on a regular basis, South Coast AQMD will analyze the PM<sub>2.5</sub> ambient air quality data collected from its monitoring network. Specifically, the 24-hour average PM<sub>2.5</sub> concentrations from monitoring stations that are comparable with the NAAQS will be compared with the 2006 24-hour average PM<sub>2.5</sub> NAAQS on a quarterly basis (see chapter 8). Comparison with the 2006 NAAQS also ensures that the 1997 NAAQS continues to be attained because the level of the 2006 NAAQS is less than the 1997 NAAQS.

## 8. Contingency Plan

CAA Section 175A(d) requires maintenance plans to identify contingency provisions to offset any unexpected increases in emissions and ensure maintenance of the standard. A contingency plan should identify control measures that may be implemented as a contingency in the event of emission increases, a schedule and procedure to implement the measures, and a time limit for action by the State. The contingency plan should also identify the indicators or triggers that will determine when contingency measures should be implemented. These elements are discussed next.

### 8.1. Contingency Plan Trigger

A contingency plan trigger can be based on indicators such as measured concentrations, updates of emissions inventories or modeled concentrations. A trigger based on measured exceedances of the 2006 NAAQS is used for the PM<sub>2.5</sub> maintenance plan. The South Coast AQMD commits to the following:

Establish a trigger to implement a contingency action; whereby; if the 24-hour average PM<sub>2.5</sub> design value (98<sup>th</sup> percentile averaged over three consecutive years) at a station with a PM<sub>2.5</sub> FRM monitor or FEM monitor that is included for comparison with the NAAQS exceeds the level of the 2006 24-hour PM<sub>2.5</sub> NAAQS in the South Coast Air Basin, excluding exceptional events; then, the South Coast AQMD will trigger the contingency actions specified in section 8.2 of this maintenance plan.

FEM monitors that are included for comparison are those for which evaluation of FRM/FEM collocated comparison data shows the FEM is comparable with the NAAQS. South Coast AQMD requests waivers from U.S. EPA to exclude FEM data that is not comparable with the NAAQS.

Since the contingency plan trigger is based on a violation of the 2006 24-hour average PM2.5 NAAQS, the trigger will also capture any violation of the 1997 24-hour average PM2.5 NAAQS. This is because the level of the 2006 24-hour average PM2.5 NAAQS is less than the level of the 1997 24-hour average PM2.5 NAAQS. Thus, the contingency plan ensures maintenance of both the 2006 and 1997 NAAQS.

In order to provide advance notice of a violation of the PM2.5 NAAQS, design values will be calculated quarterly. For calculations with data that does not yet include an entire calendar year, South Coast AQMD will assume that the sampling schedule will continue throughout the remainder of the year and no samples will be missed.<sup>41</sup> The measured concentrations are representative of actual emissions conditions and thus capture the effect of any unexpected and expected increases of emissions. If implementation of the contingency measures adequately addresses the cause of the violation of the NAAQS then a SIP revision may not be needed<sup>42</sup>.

A fraction of the exceedances of the 2006 24-hour average PM2.5 NAAQS in the South Coast Air Basin are attributed to exceptional events, usually caused by wildfires and fireworks. The measurements during exceptional events are removed from design value calculations if the criteria for designation as an exceptional event can be demonstrated. Thus, the South Coast AQMD has developed a weight-of-evidence data analysis methodology to identify exceedances that were not due to exceptional events to avoid unnecessarily triggering the contingency action.

When a potential exceptional event is recorded, South Coast AQMD will first determine whether the exceedance would cause a violation of the 2006 NAAQS. Since this evaluation will occur before the entire year's data is available, for the purposes of this calculation, South Coast AQMD will assume that the sampling schedule will remain the same throughout the remainder of the year. If inclusion of the event in the design value calculation would cause a violation of the standard and the South Coast AQMD staff believes that the event meets the criteria for an exceptional event, staff will provide CARB and U.S. EPA a weight-of-evidence analysis of the exceedance supporting this assertion. If CARB or U.S. EPA do not agree that the event would likely be considered exceptional, the event would trigger the contingency measures. Further details of this process are in section 8.3. The criteria used for the analysis are similar to those that are used to demonstrate exceptional events, but would be less resource intensive for all three agencies. Other types of data and analysis not listed in the sections below may be used depending on the nature of the PM2.5 exceedance and the available data.

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<sup>41</sup> For the purposes of the 98<sup>th</sup> percentile value determination without a complete year of data, the South Coast AQMD will assume that all scheduled samples for the remainder of the year will be completed successfully. For example, if a monitor samples daily, the 98<sup>th</sup> percentile concentration after only the first two quarters of data are collected will be assigned as the 8<sup>th</sup> highest value.

<sup>42</sup> United States Environmental Protection Agency. 1992. Procedures for Processing Requests to Redesignate Areas to Attainment. Memorandum from John Calcagni to USEPA Regional Directors. September 4. Available at: [https://www.epa.gov/sites/production/files/2016-03/documents/calcagni\\_memo\\_-\\_procedures\\_for\\_processing\\_requests\\_to\\_redesignate\\_areas\\_to\\_attainment\\_090492.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf)

### 8.1.1. Wildfires

Wildfires are common causes of exceedances of the 2006 24-hour PM<sub>2.5</sub> standard in the South Coast Air Basin. South Coast AQMD will use a weight of evidence approach to exclude exceedances from the contingency plan that were caused by wildfires. In general, South Coast AQMD will use the following criteria to determine if wildfires could have caused the exceedance:

Analysis/Product	Criteria
South Coast AQMD advisories	South Coast AQMD has issued a smoke or ash advisory due to wildfire
Hourly or 24-hour PM <sub>2.5</sub> measurements	Simultaneous increase of hourly or 24-hour PM <sub>2.5</sub> measurements with the beginning of the fire
Low-Cost sensor measurements such as PurpleAir	Increase of PM <sub>2.5</sub> measured at low-cost sensors consistent with the wildfire location and pollutant transport
Fire reports such as <a href="https://inciweb.nwcg.gov/">https://inciweb.nwcg.gov/</a>	Fires reported that may influence the monitor
Operational smoke models such as BlueSky and HRRR-Smoke	Models show transport of smoke from fire to the monitor
Satellite Imagery (i.e. MODIS, GOES)	Satellite shows presence of smoke at monitored area or transport of smoke
Webcam Imagery	Webcam images show presence of smoke at monitored area or transport of smoke
Back trajectory	Models show transport occurred from smoke-producing wildfire
Wind roses and pollution roses	Measured or modeled wind directions indicate that the wildfire is upwind of the measurement station
Emission and transport/dispersion modeling	Modeled concentrations that take into account wildfire emissions exceed level of the NAAQS. Uncertainty of model and data inputs are taken into account to determine a range of model estimates.
Social Media	Monitoring for reports of wildfire smoke through social media accounts such as from the National Weather Service, US Forest Service, Caltrans, etc.
History of exceedances in the same month that the exceedance was recorded	Over the past five years, the vast majority of exceedances that were not caused by wildfires or cultural events have occurred in the November through February period.

### 8.1.2. Fireworks

Exceedances of the 24-hour PM<sub>2.5</sub> NAAQS can occur on July 4<sup>th</sup> or 5<sup>th</sup> because of smoke emissions from fireworks. Exceedances are also possible in select areas on January 1<sup>st</sup> due to fireworks on New Year's Eve. According to Title 40 in the Code of Federal Regulations<sup>43</sup>, fireworks that are significantly integral to traditional national, ethnic, or other cultural events are considered exceptional events. If the measured PM<sub>2.5</sub> exceedance occurs on January 1<sup>st</sup>, July 4<sup>th</sup> or July 5<sup>th</sup> then South Coast AQMD will conduct investigation to determine if fireworks emissions could have caused the exceedance. South Coast AQMD

<sup>43</sup> 40 CFR § 50.14 Treatment of air quality monitoring data influenced by exceptional events

will analyze the hourly PM<sub>2.5</sub> measurements to determine if there is a simultaneous increase of measured PM<sub>2.5</sub> with the occurrence of observed or reported fireworks. If hourly PM<sub>2.5</sub> measurements are not available, then nearby PM<sub>2.5</sub> monitors or low-cost sensor measurements of PM<sub>2.5</sub> may be used for this evaluation. South Coast AQMD may also analyze nearby webcams and the composition of filter-based or real-time PM<sub>2.5</sub> speciation measurements and evaluate whether the composition is characteristic of fireworks emissions. July 4<sup>th</sup> and 5<sup>th</sup> exceedances are common each year due to commercial and “backyard” fireworks displays. PM<sub>2.5</sub> measurements on adjacent days typically record concentrations well below the standard, as it is expected for the summer months. January 1<sup>st</sup> exceedances that are caused by fireworks are more challenging to identify as unrelated exceedances are common that time of year and residential wood combustion, which is common in winter months, typically occurs at the same time of day as January 1<sup>st</sup> fireworks. A more extensive weight of evidence discussion will be required to exclude exceedances on January 1<sup>st</sup> that are influenced by fireworks.

## 8.2. Contingency Action

South Coast AQMD will review available data to determine the causes of the 24-hour PM<sub>2.5</sub> exceedance. This review may involve an analysis of speciation data, source attribution studies, meteorological data, etc. Causes of the exceedance may include local and regional primary PM<sub>2.5</sub> emission sources and secondary particulate matter formation. If the causes of the exceedance can be determined, the South Coast AQMD will use this information when evaluating potential actions to target emission reductions for the emission sources that caused the exceedance.

South Coast AQMD will take the following actions in the order listed to reduce emissions. South Coast AQMD will consider the emission sources that may have contributed to the exceedance when evaluating whether these actions will effectively mitigate the cause of the exceedance:

1. Consult with the regulated industry to determine if voluntary or incentive-based control measures could reduce emissions, if feasible.
2. Evaluate whether changes to enforcement of existing rules could reduce emissions.
3. Evaluate amending Rules 444 and 445 to further strengthen prohibitions on particulate emissions (Table 8-1).
4. Propose new rules to reduce particulate emissions, if needed.

*Table 8-1: Potential rules to be evaluated as part of Contingency Plan*

<b>Rule Name</b>	<b>South Coast AQMD Rule</b>
Wood-Burning Devices	445
Open Burning	444

## 8.3. Schedule for Implementation

The contingency plan trigger and schedule for implementation is illustrated in Figure 8-1.

After an exceedance is recorded in the South Coast Air Basin, the South Coast AQMD will calculate the three-year design value, which is the 98<sup>th</sup> percentile of the 24-hour average PM<sub>2.5</sub> concentrations recorded at a monitoring site, averaged over three consecutive years, using the most recent three years data including the year that the exceedance was recorded. For the purposes of this calculation, South

Coast AQMD will assume that the sampling schedule will continue throughout the remainder of the year and no samples will be missed.

South Coast AQMD will evaluate the criteria to exclude measurements that would result in a violation of the 2006 NAAQS from the contingency trigger. If evidence indicates that the exceedance is not likely an exceptional event, the contingency action will be triggered within the data exploration timeline. The data exploration timeline is the period from the exceedance until one month following the end of the quarter after the quarter the exceedance was recorded<sup>44</sup>. This allows for the collection, analysis, and validation of any FRM data, which is typically not completed until several months after the end of the quarter that the data was recorded.

On the other hand, if evidence indicates that the exceedance is likely an exceptional event, the South Coast AQMD will initiate the following procedure:

- 1) South Coast AQMD notifies CARB and U.S. EPA of the intention to exclude the exceedance from the contingency measure trigger calculation.
- 2) U.S. EPA confers with South Coast AQMD to determine what information should be submitted to U.S. EPA.
- 3) South Coast AQMD submits an initial notification of the exceptional event along with the information determined in step two to U.S. EPA.
- 4) South Coast AQMD provides additional information if requested by U.S. EPA.
- 5) If U.S. EPA does not agree that the event is exceptional, South Coast AQMD may submit an exceptional event demonstration to U.S. EPA.

At this point, the contingency actions will not be triggered until one of the following conditions are met:

- U.S. EPA does not agree that the exceedance is likely an exceptional event and South Coast AQMD does not submit an exceptional event demonstration. In this case the contingency measures are triggered.
- In step five of the above procedure, South Coast AQMD prepares a formal exceptional event demonstration. If U.S. EPA does not concur with the formal demonstration, then contingency actions are triggered.

South Coast AQMD will also recalculate the design values within one month after the final data is available for the entire year to ensure that any missed samples recorded after the last exceedance do not result in a change in the design value. If it is determined that the design value does not violate the standard due to a change in sampling schedule or unforeseen circumstances, any pending contingency actions for the specific violation will be abandoned. On the other hand, if a recalculated design value at year end results in a violation of the 2006 NAAQS that was not previously evident, the South Coast AQMD will initiate the process outlined above and in Figure 8-1: Contingency plan trigger and schedule for implementationFigure 8-1 for any exceedances leading to a violation of the 2006 NAAQS.

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<sup>44</sup> For example, if an exceedance was recorded on November 15<sup>th</sup>, the South Coast AQMD will complete the evaluate of the exceedance by May 1<sup>st</sup>. This allows for approximately one month of analysis time after the data is finalized.

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Once contingency actions are triggered, the South Coast AQMD will further evaluate the cause of exceedances and take appropriate action to address the nature of the exceedance within 18 months.

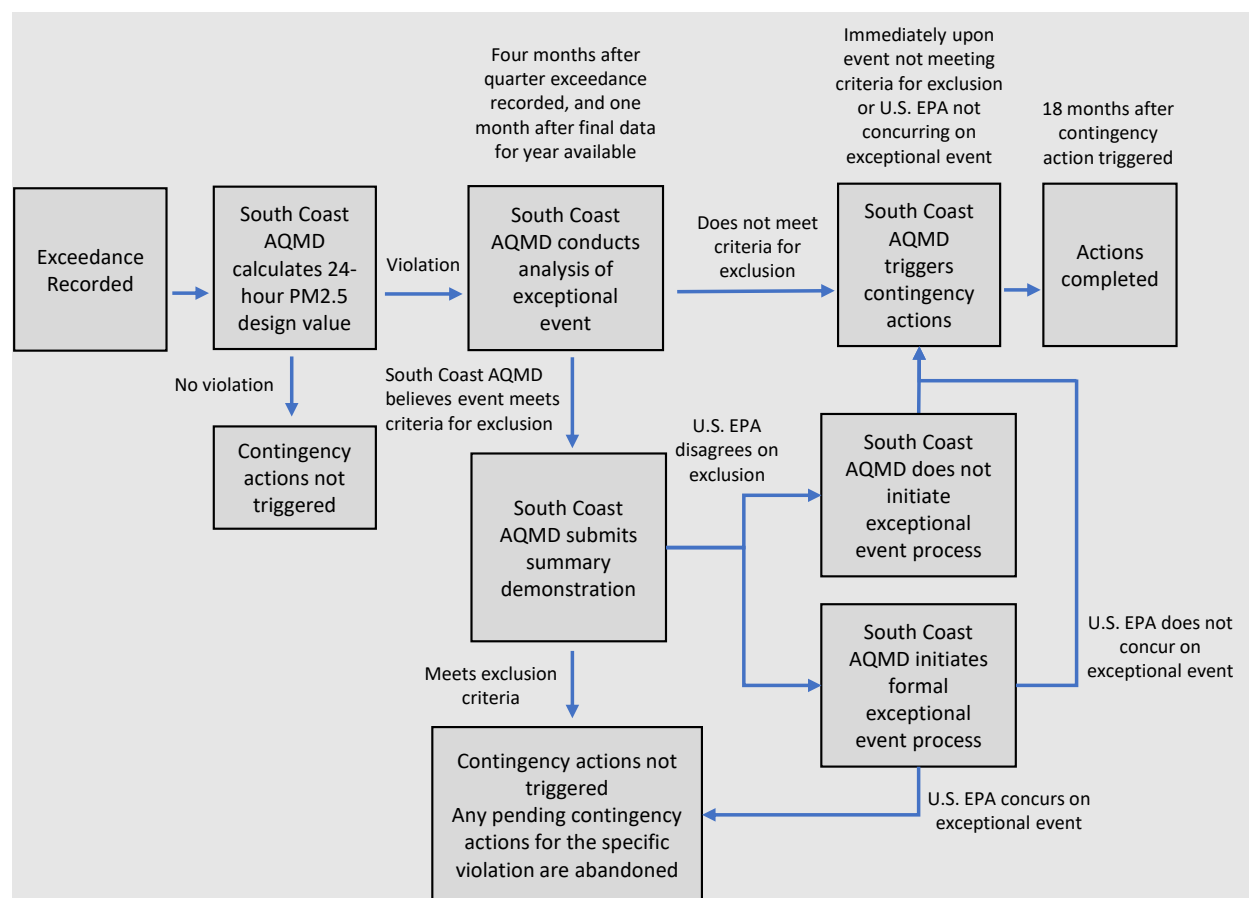


Figure 8-1: Contingency plan trigger and schedule for implementation



#### 8.4. Authority

The CARB has the authority to set vehicle emissions standards and fuel formulation for California.

The South Coast AQMD has the authority and is the agency responsible for developing and enforcing air pollution control rules in the South Coast Air Basin for stationary and areawide sources.

### 9. Summary Checklist

As described in section 2, PM2.5 design values in the South Coast Air Basin have not exceeded the 2006 24-hour average PM2.5 NAAQS or the 1997 24-hour average PM2.5 NAAQS during the 2018 – 2020 period after removing exceptional events for which South Coast AQMD is preparing demonstrations.

Table 9-1 summarizes the status of the elements that need to be satisfied in order to meet CAA requirements as well as conform to the guidance documents prepared by the U.S. EPA. Section 4 demonstrates maintenance of attainment of both the 2006 and 1997 24-hour PM2.5 NAAQS through 2035. Section 6 commits South Coast AQMD to maintain a future PM2.5 monitoring network. Section 7 commits South Coast AQMD to verify continued attainment of both the 2006 and 1997 24-hour average PM2.5 NAAQS by reviewing inputs and assumptions used for the emission inventory when new information becomes available. If South Coast AQMD finds that these inputs have changed significantly, South Coast AQMD will update the existing inventory in coordination with CARB, evaluate the revised inventory against the inventory presented in this maintenance plan, and evaluate the potential impacts. Section 8 commits to establish a contingency plan that is triggered by a measured violation of the 2006 24-hour average PM2.5 NAAQS.

*Table 9-1: Summary Checklist of Document References*

<b>CAA/U.S. EPA Requirements</b>	<b>Status</b>	<b>Document Reference</b>
Attainment inventory	Conditions met	Section 3
Maintenance demonstration	Conditions met	Section 4
Monitoring network	Commitment established	Section 6
Verification of continued attainment	Commitment established	Section 7
Contingency Plan	Commitment established	Section 8

# Appendix I

PM2.5 and Precursor Emissions by Major Source Category in South Coast Air Basin (Tons per Day)

1. 2018 Annual Average Emissions
2. 2020 Annual Average Emissions
3. 2023 Annual Average Emissions
4. 2031 Annual Average Emissions
5. 2035 Annual Average Emissions

**2018 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)**

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
<b>Fuel Combustion</b>										
10	Electric Utilities	2.70	0.32	0.63	4.27	0.23	0.53	0.53	0.53	0.69
20	Cogeneration	0.03	0.02	0.02	0.11	0.00	0.02	0.01	0.01	0.17
30	Oil and Gas Production (combustion)	1.01	0.12	0.58	0.57	0.01	0.09	0.09	0.09	0.17
40	Petroleum Refining (Combustion)	6.48	1.33	0.00	4.87	0.01	1.78	1.77	1.77	1.50
50	Manufacturing and Industrial	4.20	0.91	6.39	48.45	1.03	1.44	1.35	1.31	2.27
52	Food and Agricultural Processing	0.07	0.03	0.11	0.34	0.00	0.03	0.03	0.03	0.04
60	Service and Commercial	4.93	1.96	10.47	20.86	0.74	1.21	1.20	1.20	2.69
99	Other (Fuel Combustion)	1.00	0.64	2.92	1.47	0.07	0.45	0.42	0.40	0.26
<b>Total Fuel Combustion</b>		<b>20.43</b>	<b>5.33</b>	<b>21.12</b>	<b>80.93</b>	<b>2.09</b>	<b>5.54</b>	<b>5.42</b>	<b>5.35</b>	<b>7.79</b>
<b>Waste Disposal</b>										
110	Sewage Treatment	0.37	0.27	0.00	0.00	0.00	0.02	0.00	0.00	0.21
120	Landfills	621.84	8.63	0.45	0.39	0.37	0.20	0.20	0.20	3.97
130	Incineration	0.19	0.04	0.98	0.25	0.07	0.12	0.06	0.05	0.23
140	Soil Remediation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	71.24	5.73	0.01	0.01	0.00	0.00	0.00	0.00	1.34
<b>Total Waste Disposal</b>		<b>693.64</b>	<b>14.67</b>	<b>1.44</b>	<b>0.65</b>	<b>0.44</b>	<b>0.34</b>	<b>0.26</b>	<b>0.25</b>	<b>5.74</b>
<b>Cleaning and Surface Coatings</b>										
210	Laundering	3.41	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	66.43	12.51	0.00	0.00	0.00	0.02	0.02	0.02	0.01
230	Coatings and Related Processes	18.06	17.67	0.00	0.00	0.00	1.51	1.45	1.40	0.09
240	Printing	0.67	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.04
250	Adhesives and Sealants	5.79	5.12	0.00	0.00	0.00	0.02	0.02	0.02	0.00
299	Other (Cleaning and Surface Coatings)	1.09	0.88	0.01	0.11	0.00	0.02	0.02	0.02	0.00
<b>Total Cleaning and Surface Coatings</b>		<b>95.44</b>	<b>36.98</b>	<b>0.01</b>	<b>0.12</b>	<b>0.00</b>	<b>1.57</b>	<b>1.51</b>	<b>1.45</b>	<b>0.14</b>
<b>Petroleum Production and Marketing</b>										
310	Oil and Gas Production	5.10	2.34	0.01	0.02	0.06	0.04	0.03	0.02	0.00
320	Petroleum Refining	6.35	4.43	0.23	2.39	0.24	1.87	1.25	0.88	0.07
330	Petroleum Marketing	53.80	12.80	0.00	0.23	0.00	0.01	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.04	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
<b>Total Petroleum Production and Marketing</b>		<b>65.29</b>	<b>19.61</b>	<b>0.25</b>	<b>2.65</b>	<b>0.30</b>	<b>1.92</b>	<b>1.28</b>	<b>0.91</b>	<b>0.07</b>
<b>Industrial Processes</b>										
410	Chemical	4.23	4.13	0.03	0.12	0.05	0.45	0.39	0.37	0.01
420	Food and Agriculture	0.51	0.49	0.00	0.01	0.00	0.21	0.09	0.04	0.00
430	Mineral Processes	0.35	0.31	0.02	0.29	0.04	8.07	3.51	0.90	0.06
440	Metal Processes	0.11	0.09	0.05	0.25	0.03	0.35	0.27	0.20	0.00
450	Wood and Paper	0.19	0.19	0.00	0.00	0.00	6.42	4.49	2.70	0.00
460	Glass and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
470	Electronics	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
499	Other (Industrial Processes)	6.56	5.00	0.01	0.01	0.00	1.48	0.81	0.51	9.06
<b>Total Industrial Processes</b>		<b>11.97</b>	<b>10.23</b>	<b>0.11</b>	<b>0.67</b>	<b>0.13</b>	<b>16.97</b>	<b>9.58</b>	<b>4.71</b>	<b>9.14</b>
<b>Solvent Evaporation</b>										
510	Consumer Products	135.77	107.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	10.62	10.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.34	1.34	0.00	0.00	0.00	0.00	0.00	0.00	1.25
540	Asphalt Paving/Roofing	1.06	0.98	0.00	0.00	0.00	0.03	0.02	0.02	0.00
<b>Total Solvent Evaporation</b>		<b>148.78</b>	<b>120.31</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.02</b>	<b>1.25</b>

(Continued)

## 2018 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Process										
610	Residential Fuel Combustion	19.57	8.88	19.10	47.62	0.33	7.32	6.96	6.77	0.11
620	Farming Operations	17.80	1.48	0.00	0.00	0.00	1.66	1.12	0.75	8.17
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	46.32	22.66	2.27	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	123.36	56.40	8.46	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	28.17	16.74	1.67	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.20	1.62	0.23	0.00
660	Fires	0.34	0.29	0.08	3.02	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	1.03	0.85	0.10	12.00	0.06	1.18	1.14	0.97	0.12
690	Cooking	2.73	1.08	0.00	0.00	0.01	11.44	11.44	11.44	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.98
	RECLAIM			17.76		5.48				
<b>Total Miscellaneous Processes</b>		<b>41.47</b>	<b>12.59</b>	<b>37.04</b>	<b>62.65</b>	<b>5.88</b>	<b>223.10</b>	<b>118.54</b>	<b>32.97</b>	<b>34.39</b>
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	30.97	28.03	22.90	290.19	0.70	11.33	11.10	4.66	7.05
722	Light Duty Trucks 1 (T1)	6.79	6.19	4.91	48.11	0.07	0.96	0.94	0.41	0.71
723	Light Duty Trucks 2 (T2)	17.33	15.71	16.77	149.95	0.33	4.12	4.03	1.70	2.67
724	Medium Duty Trucks (T3)	14.09	12.72	13.97	121.44	0.26	2.64	2.59	1.10	1.73
732	Light Heavy Duty Gas Trucks 1 (T4)	2.23	2.10	1.93	8.20	0.03	0.31	0.31	0.13	0.16
733	Light Heavy Duty Gas Trucks 2 (T5)	0.46	0.44	0.43	1.51	0.01	0.08	0.08	0.03	0.04
734	Medium Heavy Duty Gas Trucks (T6)	0.46	0.40	0.79	4.53	0.01	0.12	0.12	0.05	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.20	0.16	0.67	4.77	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.33	0.29	8.92	1.91	0.01	0.33	0.32	0.17	0.39
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.13	0.12	3.38	0.74	0.01	0.16	0.16	0.08	0.18
744	Medium Heavy Duty Diesel Truck (T6)	1.38	1.21	25.43	4.47	0.06	1.70	1.68	1.14	0.80
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.45	2.27	60.49	12.81	0.16	1.96	1.94	1.28	1.73
750	Motorcycles (MCY)	9.88	8.70	2.43	47.12	0.00	0.04	0.04	0.02	0.02
760	Diesel Urban Buses (UB)	5.12	0.25	2.02	24.41	0.00	0.07	0.07	0.03	0.60
762	Gas Urban Buses (UB)	0.02	0.02	0.09	0.19	0.01	0.04	0.04	0.01	0.00
771	Gas School Buses (SB)	0.05	0.04	0.05	0.42	0.00	0.06	0.06	0.03	0.00
772	Diesel School Buses (SB)	0.04	0.03	2.21	0.12	0.00	0.18	0.18	0.08	0.02
777	Gas Other Buses (OB)	0.16	0.14	0.34	1.67	0.01	0.06	0.06	0.02	0.02
778	Motor Coaches	0.07	0.06	1.11	0.25	0.00	0.05	0.04	0.03	0.02
779	Diesel Other Buses (OB)	0.09	0.08	1.39	0.26	0.00	0.08	0.08	0.06	0.04
780	Motor Homes (MH)	0.08	0.07	0.62	1.22	0.01	0.08	0.07	0.04	0.03
<b>Total On-Road Motor Vehicles</b>		<b>93.34</b>	<b>79.03</b>	<b>170.85</b>	<b>724.31</b>	<b>1.68</b>	<b>24.37</b>	<b>23.91</b>	<b>11.06</b>	<b>16.25</b>
Other Mobile Sources										
810	Aircraft	3.42	3.30	17.08	34.34	1.59	0.80	0.78	0.69	0.00
820	Trains	0.82	0.68	15.02	3.54	0.01	0.37	0.37	0.34	0.01
833	Ocean Going Vessels	11.71	10.01	33.82	3.20	1.90	0.59	0.59	0.51	0.03
835	Commercial Harbor Crafts	0.42	0.36	6.26	1.34	0.00	0.26	0.26	0.24	0.00
840	Recreational Boats	17.12	15.92	3.00	51.77	0.00	1.00	0.90	0.68	0.01
850	Off-Road Recreational Vehicles	1.32	1.29	0.04	2.12	0.00	0.01	0.01	0.01	0.00
860	Off-Road Equipment	66.22	60.47	58.13	769.22	0.11	3.35	3.22	2.78	0.13
870	Farm Equipment	0.59	0.52	2.08	5.02	0.00	0.14	0.14	0.12	0.00
890	Fuel Storage and Handling	5.48	5.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Other Mobile Sources</b>		<b>107.10</b>	<b>98.03</b>	<b>135.44</b>	<b>870.55</b>	<b>3.61</b>	<b>6.51</b>	<b>6.25</b>	<b>5.36</b>	<b>0.17</b>
Total Stationary and Area Sources		1077.04	219.72	59.97	147.67	8.84	249.47	136.60	45.67	58.52
Total On-Road Vehicles		93.34	79.03	170.85	724.31	1.68	24.37	23.91	11.06	16.25
Total Other Mobile		107.10	98.03	135.44	870.55	3.61	6.51	6.25	5.36	0.17
<b>Total</b>		<b>1277.48</b>	<b>396.78</b>	<b>366.26</b>	<b>1742.52</b>	<b>14.12</b>	<b>280.35</b>	<b>166.77</b>	<b>62.10</b>	<b>74.94</b>

**2020 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)**

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
<b>Fuel Combustion</b>										
10	Electric Utilities	2.89	0.34	0.67	4.52	0.24	0.57	0.57	0.57	0.74
20	Cogeneration	0.03	0.02	0.02	0.12	0.00	0.02	0.01	0.01	0.18
30	Oil and Gas Production (combustion)	1.10	0.13	0.62	0.61	0.01	0.10	0.10	0.10	0.19
40	Petroleum Refining (Combustion)	6.48	1.33	0.00	4.88	0.01	1.78	1.77	1.77	1.50
50	Manufacturing and Industrial	3.79	0.90	6.24	47.40	1.03	1.43	1.35	1.31	2.23
52	Food and Agricultural Processing	0.08	0.03	0.11	0.35	0.00	0.04	0.04	0.04	0.04
60	Service and Commercial	4.96	1.97	10.33	20.44	0.75	1.20	1.19	1.19	2.59
99	Other (Fuel Combustion)	0.97	0.62	2.44	1.36	0.07	0.44	0.41	0.39	0.27
<b>Total Fuel Combustion</b>		<b>20.30</b>	<b>5.34</b>	<b>20.43</b>	<b>79.67</b>	<b>2.11</b>	<b>5.57</b>	<b>5.45</b>	<b>5.37</b>	<b>7.74</b>
<b>Waste Disposal</b>										
110	Sewage Treatment	0.38	0.27	0.00	0.00	0.00	0.02	0.00	0.00	0.21
120	Landfills	631.76	8.77	0.46	0.40	0.37	0.20	0.20	0.20	4.03
130	Incineration	0.19	0.04	0.98	0.25	0.07	0.12	0.06	0.05	0.23
140	Soil Remediation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	71.81	5.78	0.01	0.01	0.00	0.00	0.00	0.00	1.38
<b>Total Waste Disposal</b>		<b>704.15</b>	<b>14.86</b>	<b>1.45</b>	<b>0.65</b>	<b>0.44</b>	<b>0.34</b>	<b>0.26</b>	<b>0.25</b>	<b>5.85</b>
<b>Cleaning and Surface Coatings</b>										
210	Laundering	3.45	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	66.95	12.62	0.00	0.00	0.00	0.02	0.02	0.02	0.01
230	Coatings and Related Processes	18.39	17.99	0.00	0.00	0.00	1.54	1.47	1.42	0.09
240	Printing	0.69	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.04
250	Adhesives and Sealants	5.57	4.92	0.00	0.00	0.00	0.02	0.02	0.02	0.00
299	Other (Cleaning and Surface Coatings)	1.10	0.89	0.01	0.11	0.00	0.02	0.02	0.02	0.00
<b>Total Cleaning and Surface Coatings</b>		<b>96.15</b>	<b>37.25</b>	<b>0.01</b>	<b>0.12</b>	<b>0.00</b>	<b>1.60</b>	<b>1.54</b>	<b>1.48</b>	<b>0.14</b>
<b>Petroleum Production and Marketing</b>										
310	Oil and Gas Production	5.61	2.57	0.01	0.02	0.07	0.04	0.03	0.02	0.00
320	Petroleum Refining	6.35	4.43	0.23	2.39	0.24	1.87	1.25	0.88	0.07
330	Petroleum Marketing	54.88	12.29	0.00	0.22	0.00	0.01	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.04	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
<b>Total Petroleum Production and Marketing</b>		<b>66.88</b>	<b>19.33</b>	<b>0.25</b>	<b>2.65</b>	<b>0.30</b>	<b>1.92</b>	<b>1.28</b>	<b>0.91</b>	<b>0.07</b>
<b>Industrial Processes</b>										
410	Chemical	4.27	4.17	0.03	0.12	0.05	0.45	0.39	0.37	0.01
420	Food and Agriculture	0.50	0.49	0.00	0.01	0.00	0.21	0.09	0.04	0.00
430	Mineral Processes	0.36	0.32	0.02	0.29	0.05	8.10	3.52	0.91	0.06
440	Metal Processes	0.11	0.09	0.05	0.26	0.03	0.36	0.29	0.21	0.00
450	Wood and Paper	0.20	0.20	0.00	0.00	0.00	6.65	4.65	2.79	0.00
460	Glass and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
470	Electronics	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
499	Other (Industrial Processes)	6.60	5.03	0.01	0.01	0.00	1.49	0.83	0.52	9.06
<b>Total Industrial Processes</b>		<b>12.06</b>	<b>10.31</b>	<b>0.11</b>	<b>0.68</b>	<b>0.13</b>	<b>17.28</b>	<b>9.79</b>	<b>4.84</b>	<b>9.14</b>
<b>Solvent Evaporation</b>										
510	Consumer Products	137.33	108.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	10.87	10.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.35	1.35	0.00	0.00	0.00	0.00	0.00	0.00	1.24
540	Asphalt Paving/Roofing	1.08	0.99	0.00	0.00	0.00	0.03	0.02	0.02	0.00
<b>Total Solvent Evaporation</b>		<b>150.64</b>	<b>121.84</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.02</b>	<b>1.24</b>

(Continued)

## 2020 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Process										
610	Residential Fuel Combustion	19.89	9.02	20.77	48.76	0.34	7.46	7.11	6.92	0.11
620	Farming Operations	15.91	1.33	0.00	0.00	0.00	1.57	1.04	0.67	7.29
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	47.02	23.00	2.30	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	124.58	56.96	8.55	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	28.17	16.74	1.67	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.14	1.60	0.23	0.00
660	Fires	0.34	0.29	0.08	3.02	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	0.24	0.21	0.09	2.85	0.03	0.33	0.32	0.28	0.03
690	Cooking	2.76	1.10	0.00	0.00	0.01	11.58	11.58	11.58	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.37
	RECLAIM			20.17		6.08				
<b>Total Miscellaneous Processes</b>		<b>39.14</b>	<b>11.94</b>	<b>41.10</b>	<b>54.64</b>	<b>6.46</b>	<b>224.30</b>	<b>118.79</b>	<b>32.60</b>	<b>33.81</b>
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	26.68	24.36	18.64	252.72	0.67	11.41	11.17	4.68	7.58
722	Light Duty Trucks 1 (T1)	5.61	5.14	3.84	38.97	0.06	0.94	0.92	0.40	0.71
723	Light Duty Trucks 2 (T2)	15.39	14.08	13.42	129.56	0.31	4.16	4.07	1.71	2.86
724	Medium Duty Trucks (T3)	12.00	10.91	10.89	99.18	0.24	2.56	2.51	1.06	1.75
732	Light Heavy Duty Gas Trucks 1 (T4)	1.82	1.72	1.53	6.33	0.03	0.27	0.27	0.11	0.14
733	Light Heavy Duty Gas Trucks 2 (T5)	0.40	0.38	0.37	1.24	0.01	0.08	0.07	0.03	0.03
734	Medium Heavy Duty Gas Trucks (T6)	0.38	0.34	0.62	3.60	0.01	0.12	0.12	0.05	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.14	0.11	0.54	3.84	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.29	0.25	7.03	1.62	0.01	0.32	0.31	0.16	0.45
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.12	0.10	2.72	0.65	0.01	0.16	0.16	0.08	0.22
744	Medium Heavy Duty Diesel Truck (T6)	0.92	0.81	20.03	3.21	0.06	1.51	1.49	0.93	0.99
746	Heavy Heavy Duty Diesel Trucks (HHD)	2.97	1.78	53.69	12.47	0.16	1.75	1.73	1.03	2.03
750	Motorcycles (MCY)	10.00	8.76	2.48	46.59	0.00	0.04	0.04	0.02	0.02
760	Diesel Urban Buses (UB)	4.23	0.15	1.13	24.92	0.00	0.06	0.06	0.02	0.61
762	Gas Urban Buses (UB)	0.02	0.02	0.09	0.19	0.01	0.04	0.04	0.02	0.00
771	Gas School Buses (SB)	0.05	0.04	0.05	0.42	0.00	0.07	0.07	0.03	0.00
772	Diesel School Buses (SB)	0.03	0.03	2.07	0.12	0.00	0.18	0.18	0.08	0.02
777	Gas Other Buses (OB)	0.16	0.14	0.30	1.51	0.01	0.06	0.06	0.02	0.02
778	Motor Coaches	0.04	0.04	0.86	0.19	0.00	0.04	0.04	0.02	0.03
779	Diesel Other Buses (OB)	0.06	0.05	1.07	0.17	0.00	0.07	0.07	0.04	0.05
780	Motor Homes (MH)	0.06	0.05	0.53	0.86	0.01	0.07	0.07	0.03	0.03
<b>Total On-Road Motor Vehicles</b>		<b>81.38</b>	<b>69.27</b>	<b>141.91</b>	<b>628.36</b>	<b>1.60</b>	<b>23.90</b>	<b>23.45</b>	<b>10.52</b>	<b>17.59</b>
Other Mobile Sources										
810	Aircraft	3.58	3.45	18.14	35.66	1.69	0.81	0.78	0.69	0.00
820	Trains	0.80	0.67	15.30	3.68	0.01	0.36	0.36	0.33	0.01
833	Ocean Going Vessels	11.89	10.16	34.95	3.36	1.97	0.62	0.62	0.54	0.03
835	Commercial Harbor Crafts	0.42	0.35	6.21	1.32	0.00	0.26	0.26	0.23	0.00
840	Recreational Boats	15.64	14.55	2.92	51.48	0.00	0.91	0.82	0.62	0.01
850	Off-Road Recreational Vehicles	1.26	1.24	0.04	2.17	0.00	0.01	0.01	0.01	0.00
860	Off-Road Equipment	64.76	59.07	52.93	807.73	0.11	3.04	2.91	2.50	0.13
870	Farm Equipment	0.53	0.47	1.90	4.97	0.00	0.12	0.12	0.11	0.00
890	Fuel Storage and Handling	5.09	5.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Other Mobile Sources</b>		<b>103.97</b>	<b>95.05</b>	<b>132.38</b>	<b>910.37</b>	<b>3.79</b>	<b>6.13</b>	<b>5.89</b>	<b>5.04</b>	<b>0.18</b>
Total Stationary and Area Sources		1089.31	220.88	63.36	138.40	9.45	251.02	137.12	45.47	57.99
Total On-Road Vehicles		81.38	69.27	141.91	628.36	1.60	23.90	23.45	10.52	17.59
Total Other Mobile		103.97	95.05	132.38	910.37	3.79	6.13	5.89	5.04	0.18
<b>Total</b>		<b>1274.66</b>	<b>385.20</b>	<b>337.65</b>	<b>1677.13</b>	<b>14.85</b>	<b>281.06</b>	<b>166.45</b>	<b>61.03</b>	<b>75.76</b>

**2023 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)**

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	2.81	0.33	0.65	4.40	0.23	0.56	0.55	0.55	0.72
20	Cogeneration	0.04	0.02	0.02	0.12	0.00	0.02	0.01	0.01	0.18
30	Oil and Gas Production (combustion)	1.22	0.14	0.67	0.66	0.01	0.10	0.10	0.10	0.21
40	Petroleum Refining (Combustion)	6.48	1.33	0.00	4.88	0.01	1.78	1.77	1.77	1.50
50	Manufacturing and Industrial	3.77	0.91	6.20	46.99	1.03	1.44	1.36	1.32	2.22
52	Food and Agricultural Processing	0.08	0.03	0.12	0.36	0.00	0.04	0.04	0.04	0.04
60	Service and Commercial	5.06	2.02	10.40	20.60	0.76	1.21	1.20	1.20	2.58
99	Other (Fuel Combustion)	0.99	0.63	2.45	1.38	0.07	0.46	0.43	0.41	0.28
<b>Total Fuel Combustion</b>		<b>20.45</b>	<b>5.41</b>	<b>20.51</b>	<b>79.37</b>	<b>2.12</b>	<b>5.60</b>	<b>5.47</b>	<b>5.39</b>	<b>7.73</b>
Waste Disposal										
110	Sewage Treatment	0.38	0.27	0.00	0.00	0.00	0.02	0.00	0.00	0.21
120	Landfills	645.50	8.96	0.42	0.40	0.37	0.21	0.20	0.20	4.11
130	Incineration	0.20	0.04	0.98	0.25	0.07	0.12	0.06	0.05	0.23
140	Soil Remediation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	72.72	5.85	0.01	0.01	0.00	0.00	0.00	0.00	1.47
<b>Total Waste Disposal</b>		<b>718.80</b>	<b>15.12</b>	<b>1.41</b>	<b>0.66</b>	<b>0.45</b>	<b>0.34</b>	<b>0.27</b>	<b>0.25</b>	<b>6.02</b>
Cleaning and Surface Coatings										
210	Laundering	3.52	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	67.97	12.84	0.00	0.00	0.00	0.02	0.02	0.02	0.01
230	Coatings and Related Processes	18.93	18.52	0.00	0.00	0.00	1.58	1.52	1.46	0.10
240	Printing	0.72	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.04
250	Adhesives and Sealants	5.15	4.55	0.00	0.00	0.00	0.02	0.02	0.02	0.00
299	Other (Cleaning and Surface Coatings)	1.12	0.91	0.01	0.12	0.00	0.02	0.02	0.02	0.00
<b>Total Cleaning and Surface Coatings</b>		<b>97.41</b>	<b>37.69</b>	<b>0.01</b>	<b>0.12</b>	<b>0.00</b>	<b>1.65</b>	<b>1.58</b>	<b>1.52</b>	<b>0.15</b>
Petroleum Production and Marketing										
310	Oil and Gas Production	6.42	2.94	0.01	0.02	0.08	0.04	0.03	0.02	0.00
320	Petroleum Refining	6.35	4.43	0.22	2.39	0.24	1.87	1.25	0.88	0.07
330	Petroleum Marketing	52.97	11.61	0.00	0.21	0.00	0.01	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.04	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
<b>Total Petroleum Production and Marketing</b>		<b>65.79</b>	<b>19.02</b>	<b>0.25</b>	<b>2.64</b>	<b>0.31</b>	<b>1.92</b>	<b>1.28</b>	<b>0.91</b>	<b>0.07</b>
Industrial Processes										
410	Chemical	4.35	4.24	0.03	0.12	0.05	0.46	0.40	0.38	0.01
420	Food and Agriculture	0.52	0.51	0.00	0.01	0.00	0.21	0.10	0.04	0.00
430	Mineral Processes	0.37	0.33	0.02	0.30	0.05	8.17	3.56	0.92	0.06
440	Metal Processes	0.11	0.10	0.05	0.27	0.03	0.39	0.31	0.22	0.00
450	Wood and Paper	0.20	0.20	0.00	0.00	0.00	7.02	4.91	2.95	0.00
460	Glass and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
470	Electronics	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00
499	Other (Industrial Processes)	6.66	5.09	0.01	0.01	0.00	1.51	0.84	0.52	9.06
<b>Total Industrial Processes</b>		<b>12.23</b>	<b>10.48</b>	<b>0.11</b>	<b>0.71</b>	<b>0.13</b>	<b>17.76</b>	<b>10.11</b>	<b>5.03</b>	<b>9.14</b>
Solvent Evaporation										
510	Consumer Products	141.42	111.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	11.23	11.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.37	1.37	0.00	0.00	0.00	0.00	0.00	0.00	1.22
540	Asphalt Paving/Roofing	1.11	1.02	0.00	0.00	0.00	0.03	0.03	0.02	0.00
<b>Total Solvent Evaporation</b>		<b>155.13</b>	<b>125.58</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>	<b>0.03</b>	<b>0.02</b>	<b>1.22</b>

(Continued)

## 2023 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Process										
610	Residential Fuel Combustion	19.77	8.97	18.97	48.33	0.34	7.31	6.96	6.77	0.11
620	Farming Operations	13.49	1.13	0.00	0.00	0.00	1.46	0.94	0.56	6.17
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	48.22	23.59	2.36	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	126.94	58.04	8.71	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	28.16	16.74	1.67	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.07	1.56	0.22	0.00
660	Fires	0.34	0.29	0.08	3.02	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	0.24	0.21	0.09	2.85	0.03	0.33	0.32	0.28	0.03
690	Cooking	2.81	1.12	0.00	0.00	0.01	11.79	11.79	11.79	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.90
	RECLAIM			14.28		6.08				
<b>Total Miscellaneous Processes</b>		<b>36.66</b>	<b>11.72</b>	<b>33.41</b>	<b>54.21</b>	<b>6.45</b>	<b>227.73</b>	<b>120.38</b>	<b>32.78</b>	<b>33.21</b>
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	21.01	19.51	13.11	204.46	0.62	11.53	11.30	4.70	8.34
722	Light Duty Trucks 1 (T1)	4.04	3.75	2.44	27.02	0.06	0.91	0.89	0.38	0.71
723	Light Duty Trucks 2 (T2)	12.84	11.92	9.03	103.23	0.29	4.23	4.14	1.72	3.14
724	Medium Duty Trucks (T3)	9.19	8.49	6.80	69.75	0.21	2.45	2.40	1.00	1.78
732	Light Heavy Duty Gas Trucks 1 (T4)	1.26	1.20	1.00	3.90	0.02	0.22	0.22	0.09	0.11
733	Light Heavy Duty Gas Trucks 2 (T5)	0.31	0.30	0.28	0.90	0.01	0.07	0.07	0.03	0.03
734	Medium Heavy Duty Gas Trucks (T6)	0.29	0.26	0.39	2.42	0.01	0.12	0.11	0.05	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.07	0.05	0.38	2.78	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.23	0.20	4.51	1.22	0.01	0.31	0.31	0.15	0.53
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.10	0.09	1.84	0.52	0.01	0.17	0.17	0.08	0.26
744	Medium Heavy Duty Diesel Truck (T6)	0.07	0.06	10.62	0.74	0.06	1.09	1.07	0.48	1.34
746	Heavy Heavy Duty Diesel Trucks (HHD)	1.90	0.74	36.60	11.75	0.16	1.47	1.45	0.70	2.68
750	Motorcycles (MCY)	10.14	8.83	2.55	45.90	0.00	0.04	0.04	0.02	0.02
760	Diesel Urban Buses (UB)	3.22	0.05	0.22	24.53	0.00	0.05	0.05	0.02	0.62
762	Gas Urban Buses (UB)	0.02	0.02	0.07	0.19	0.01	0.04	0.04	0.02	0.00
771	Gas School Buses (SB)	0.06	0.04	0.05	0.42	0.00	0.08	0.08	0.03	0.00
772	Diesel School Buses (SB)	0.03	0.03	1.85	0.12	0.00	0.18	0.17	0.08	0.03
777	Gas Other Buses (OB)	0.16	0.15	0.25	1.30	0.01	0.06	0.06	0.03	0.02
778	Motor Coaches	0.01	0.01	0.47	0.11	0.00	0.03	0.03	0.01	0.04
779	Diesel Other Buses (OB)	0.00	0.00	0.57	0.04	0.00	0.05	0.05	0.02	0.07
780	Motor Homes (MH)	0.04	0.03	0.40	0.41	0.01	0.06	0.06	0.03	0.03
<b>Total On-Road Motor Vehicles</b>		<b>65.00</b>	<b>55.74</b>	<b>93.43</b>	<b>501.69</b>	<b>1.49</b>	<b>23.15</b>	<b>22.71</b>	<b>9.64</b>	<b>19.80</b>
Other Mobile Sources										
810	Aircraft	3.82	3.68	19.71	37.63	1.84	0.81	0.79	0.71	0.00
820	Trains	0.82	0.69	16.05	3.89	0.01	0.37	0.37	0.34	0.01
833	Ocean Going Vessels	12.19	10.40	36.14	3.59	2.08	0.66	0.66	0.58	0.03
835	Commercial Harbor Crafts	0.42	0.36	6.23	1.32	0.00	0.26	0.26	0.24	0.00
840	Recreational Boats	13.76	12.81	2.82	51.47	0.00	0.80	0.72	0.55	0.01
850	Off-Road Recreational Vehicles	1.14	1.12	0.04	2.25	0.00	0.01	0.01	0.01	0.00
860	Off-Road Equipment	63.89	58.21	44.67	855.62	0.12	2.59	2.46	2.08	0.14
870	Farm Equipment	0.46	0.40	1.60	5.00	0.00	0.11	0.11	0.10	0.00
890	Fuel Storage and Handling	4.62	4.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Other Mobile Sources</b>		<b>101.12</b>	<b>92.30</b>	<b>127.26</b>	<b>960.78</b>	<b>4.05</b>	<b>5.61</b>	<b>5.37</b>	<b>4.59</b>	<b>0.19</b>
Total Stationary and Area Sources		1106.47	225.01	55.71	137.71	9.48	255.02	139.11	45.92	57.54
Total On-Road Vehicles		65.00	55.74	93.43	501.69	1.49	23.15	22.71	9.64	19.80
Total Other Mobile		101.12	92.30	127.26	960.78	4.05	5.61	5.37	4.59	0.19
<b>Total</b>		<b>1272.59</b>	<b>373.04</b>	<b>276.40</b>	<b>1600.18</b>	<b>15.02</b>	<b>283.79</b>	<b>167.19</b>	<b>60.15</b>	<b>77.53</b>



**2031 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)**

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	2.17	0.25	0.47	3.54	0.20	0.43	0.43	0.42	0.53
20	Cogeneration	0.04	0.02	0.01	0.12	0.00	0.02	0.01	0.01	0.17
30	Oil and Gas Production (combustion)	1.52	0.17	0.82	0.78	0.01	0.11	0.11	0.11	0.25
40	Petroleum Refining (Combustion)	6.48	1.33	0.00	4.88	0.01	1.78	1.77	1.77	1.50
50	Manufacturing and Industrial	3.66	0.90	5.99	44.75	1.02	1.45	1.36	1.32	2.15
52	Food and Agricultural Processing	0.08	0.03	0.12	0.37	0.00	0.04	0.04	0.04	0.04
60	Service and Commercial	5.14	2.06	10.00	18.90	0.80	1.16	1.15	1.14	2.26
99	Other (Fuel Combustion)	1.03	0.66	2.45	1.39	0.08	0.49	0.46	0.43	0.29
<b>Total Fuel Combustion</b>		<b>20.11</b>	<b>5.42</b>	<b>19.86</b>	<b>74.73</b>	<b>2.13</b>	<b>5.46</b>	<b>5.33</b>	<b>5.25</b>	<b>7.20</b>
Waste Disposal										
110	Sewage Treatment	0.40	0.28	0.00	0.00	0.00	0.02	0.00	0.00	0.22
120	Landfills	679.57	9.43	0.39	0.41	0.38	0.21	0.21	0.21	4.29
130	Incineration	0.21	0.04	1.01	0.26	0.07	0.12	0.06	0.05	0.24
140	Soil Remediation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	74.88	6.03	0.01	0.01	0.00	0.00	0.00	0.00	1.68
<b>Total Waste Disposal</b>		<b>755.05</b>	<b>15.78</b>	<b>1.41</b>	<b>0.69</b>	<b>0.46</b>	<b>0.36</b>	<b>0.27</b>	<b>0.26</b>	<b>6.42</b>
Cleaning and Surface Coatings										
210	Laundering	3.70	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	69.35	13.17	0.00	0.00	0.00	0.02	0.02	0.02	0.01
230	Coatings and Related Processes	20.05	19.62	0.00	0.00	0.00	1.66	1.59	1.54	0.10
240	Printing	0.78	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.04
250	Adhesives and Sealants	5.28	4.66	0.00	0.00	0.00	0.02	0.02	0.02	0.00
299	Other (Cleaning and Surface Coatings)	1.16	0.94	0.01	0.12	0.00	0.02	0.02	0.02	0.00
<b>Total Cleaning and Surface Coatings</b>		<b>100.33</b>	<b>39.33</b>	<b>0.01</b>	<b>0.12</b>	<b>0.00</b>	<b>1.73</b>	<b>1.66</b>	<b>1.60</b>	<b>0.16</b>
Petroleum Production and Marketing										
310	Oil and Gas Production	8.55	3.91	0.01	0.03	0.10	0.04	0.03	0.02	0.00
320	Petroleum Refining	6.35	4.43	0.21	2.39	0.24	1.87	1.25	0.88	0.07
330	Petroleum Marketing	47.59	10.30	0.00	0.18	0.00	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.05	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
<b>Total Petroleum Production and Marketing</b>		<b>62.54</b>	<b>18.68</b>	<b>0.24</b>	<b>2.62</b>	<b>0.34</b>	<b>1.92</b>	<b>1.28</b>	<b>0.91</b>	<b>0.07</b>
Industrial Processes										
410	Chemical	4.44	4.32	0.03	0.12	0.05	0.47	0.41	0.39	0.01
420	Food and Agriculture	0.55	0.54	0.00	0.01	0.00	0.22	0.10	0.04	0.00
430	Mineral Processes	0.39	0.34	0.02	0.31	0.05	8.28	3.61	0.95	0.07
440	Metal Processes	0.12	0.11	0.06	0.31	0.03	0.44	0.35	0.25	0.00
450	Wood and Paper	0.21	0.21	0.00	0.00	0.00	7.70	5.39	3.23	0.00
460	Glass and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
470	Electronics	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.00
499	Other (Industrial Processes)	6.79	5.22	0.01	0.01	0.00	1.52	0.84	0.53	9.06
<b>Total Industrial Processes</b>		<b>12.52</b>	<b>10.75</b>	<b>0.11</b>	<b>0.76</b>	<b>0.14</b>	<b>18.64</b>	<b>10.71</b>	<b>5.39</b>	<b>9.15</b>
Solvent Evaporation										
510	Consumer Products	155.01	123.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	11.96	11.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.40	1.40	0.00	0.00	0.00	0.00	0.00	0.00	1.18
540	Asphalt Paving/Roofing	1.19	1.09	0.00	0.00	0.00	0.03	0.03	0.03	0.00
<b>Total Solvent Evaporation</b>		<b>169.56</b>	<b>137.59</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>	<b>0.03</b>	<b>0.03</b>	<b>1.18</b>

(Continued)

## 2031 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Process										
610	Residential Fuel Combustion	19.50	8.86	14.81	47.33	0.32	7.12	6.77	6.58	0.11
620	Farming Operations	12.93	1.07	0.00	0.00	0.00	1.43	0.91	0.55	6.08
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	51.26	25.08	2.51	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	130.96	59.88	8.98	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	28.16	16.73	1.67	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	2.91	1.49	0.21	0.00
660	Fires	0.34	0.29	0.08	3.02	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	0.24	0.21	0.09	2.85	0.03	0.33	0.32	0.28	0.03
690	Cooking	2.95	1.17	0.00	0.00	0.01	12.37	12.37	12.37	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.18
	RECLAIM			16.42		5.54				
<b>Total Miscellaneous Processes</b>		<b>35.96</b>	<b>11.60</b>	<b>31.39</b>	<b>53.20</b>	<b>5.90</b>	<b>234.99</b>	<b>124.00</b>	<b>33.56</b>	<b>34.40</b>
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	14.31	13.60	8.43	153.58	0.51	11.45	11.23	4.59	9.29
722	Light Duty Trucks 1 (T1)	2.09	1.99	1.04	15.11	0.05	0.86	0.84	0.35	0.72
723	Light Duty Trucks 2 (T2)	9.11	8.65	4.84	77.27	0.23	4.27	4.19	1.72	3.57
724	Medium Duty Trucks (T3)	5.71	5.42	2.90	42.86	0.15	2.29	2.25	0.92	1.85
732	Light Heavy Duty Gas Trucks 1 (T4)	0.66	0.64	0.41	1.73	0.01	0.15	0.14	0.06	0.08
733	Light Heavy Duty Gas Trucks 2 (T5)	0.18	0.18	0.16	0.61	0.01	0.06	0.06	0.03	0.03
734	Medium Heavy Duty Gas Trucks (T6)	0.21	0.19	0.19	1.55	0.01	0.11	0.11	0.05	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.05	0.03	0.27	2.72	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.15	0.13	1.53	0.74	0.01	0.29	0.29	0.13	0.64
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.08	0.07	0.75	0.37	0.01	0.17	0.17	0.08	0.32
744	Medium Heavy Duty Diesel Truck (T6)	0.08	0.07	10.84	0.88	0.06	1.17	1.15	0.52	1.49
746	Heavy Heavy Duty Diesel Trucks (HHD)	2.10	0.78	35.32	14.30	0.16	1.68	1.66	0.80	3.15
750	Motorcycles (MCY)	10.15	8.80	2.58	44.59	0.00	0.04	0.04	0.02	0.02
760	Diesel Urban Buses (UB)	2.50	0.04	0.10	19.06	0.00	0.04	0.04	0.02	0.65
762	Gas Urban Buses (UB)	0.02	0.02	0.05	0.22	0.01	0.04	0.04	0.02	0.00
771	Gas School Buses (SB)	0.07	0.05	0.04	0.45	0.00	0.09	0.09	0.04	0.00
772	Diesel School Buses (SB)	0.02	0.02	1.03	0.11	0.00	0.17	0.16	0.07	0.04
777	Gas Other Buses (OB)	0.16	0.15	0.15	0.99	0.01	0.06	0.06	0.03	0.02
778	Motor Coaches	0.01	0.01	0.48	0.14	0.00	0.03	0.03	0.01	0.04
779	Diesel Other Buses (OB)	0.00	0.00	0.60	0.05	0.00	0.06	0.06	0.02	0.08
780	Motor Homes (MH)	0.01	0.01	0.23	0.10	0.00	0.06	0.05	0.02	0.03
<b>Total On-Road Motor Vehicles</b>		<b>47.67</b>	<b>40.84</b>	<b>71.94</b>	<b>377.44</b>	<b>1.24</b>	<b>23.11</b>	<b>22.69</b>	<b>9.50</b>	<b>22.07</b>
Other Mobile Sources										
810	Aircraft	4.06	3.92	22.41	41.61	2.11	0.87	0.84	0.76	0.00
820	Trains	0.85	0.71	17.69	4.53	0.02	0.38	0.38	0.35	0.01
833	Ocean Going Vessels	13.16	11.16	39.84	4.54	2.54	0.78	0.78	0.68	0.04
835	Commercial Harbor Crafts	0.40	0.34	6.14	1.26	0.00	0.25	0.25	0.23	0.00
840	Recreational Boats	10.10	9.42	2.65	53.28	0.00	0.60	0.54	0.41	0.01
850	Off-Road Recreational Vehicles	0.81	0.79	0.05	2.46	0.00	0.01	0.01	0.01	0.00
860	Off-Road Equipment	65.95	60.01	36.67	937.03	0.12	2.13	2.00	1.66	0.16
870	Farm Equipment	0.34	0.30	1.07	5.12	0.00	0.07	0.07	0.06	0.00
890	Fuel Storage and Handling	3.91	3.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Other Mobile Sources</b>		<b>99.59</b>	<b>90.56</b>	<b>126.51</b>	<b>1049.83</b>	<b>4.79</b>	<b>5.09</b>	<b>4.87</b>	<b>4.15</b>	<b>0.22</b>
Total Stationary and Area Sources		1156.07	239.15	53.03	132.12	8.98	263.12	143.27	47.00	58.59
Total On-Road Vehicles		47.67	40.84	71.94	377.44	1.24	23.11	22.69	9.50	22.07
Total Other Mobile		99.59	90.56	126.51	1049.83	4.79	5.09	4.87	4.15	0.22
<b>Total</b>		<b>1303.33</b>	<b>370.55</b>	<b>251.48</b>	<b>1559.39</b>	<b>15.01</b>	<b>291.31</b>	<b>170.83</b>	<b>60.65</b>	<b>80.88</b>

**2035 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)**

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	2.14	0.25	0.47	3.50	0.20	0.42	0.42	0.42	0.52
20	Cogeneration	0.04	0.02	0.01	0.11	0.00	0.02	0.01	0.01	0.17
30	Oil and Gas Production (combustion)	1.62	0.19	0.83	0.83	0.01	0.12	0.12	0.12	0.27
40	Petroleum Refining (Combustion)	6.48	1.33	0.00	4.88	0.01	1.78	1.77	1.77	1.50
50	Manufacturing and Industrial	3.57	0.89	5.83	43.41	1.02	1.44	1.36	1.32	2.10
52	Food and Agricultural Processing	0.08	0.03	0.12	0.37	0.00	0.04	0.04	0.04	0.04
60	Service and Commercial	5.18	2.08	9.89	18.41	0.82	1.14	1.13	1.12	2.17
99	Other (Fuel Combustion)	1.03	0.66	2.45	1.39	0.08	0.49	0.46	0.44	0.29
<b>Total Fuel Combustion</b>		<b>20.14</b>	<b>5.43</b>	<b>19.59</b>	<b>72.90</b>	<b>2.15</b>	<b>5.44</b>	<b>5.30</b>	<b>5.23</b>	<b>7.06</b>
Waste Disposal										
110	Sewage Treatment	0.41	0.29	0.00	0.00	0.00	0.02	0.00	0.00	0.23
120	Landfills	694.51	9.63	0.39	0.42	0.39	0.22	0.21	0.21	4.37
130	Incineration	0.21	0.04	1.03	0.26	0.08	0.12	0.06	0.05	0.24
140	Soil Remediation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	75.38	6.07	0.01	0.01	0.00	0.00	0.00	0.00	1.71
<b>Total Waste Disposal</b>		<b>770.50</b>	<b>16.03</b>	<b>1.43</b>	<b>0.70</b>	<b>0.47</b>	<b>0.36</b>	<b>0.28</b>	<b>0.26</b>	<b>6.55</b>
Cleaning and Surface Coatings										
210	Laundering	3.79	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	68.46	13.03	0.00	0.00	0.00	0.02	0.02	0.02	0.01
230	Coatings and Related Processes	20.26	19.82	0.00	0.00	0.00	1.66	1.59	1.53	0.10
240	Printing	0.79	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.04
250	Adhesives and Sealants	5.22	4.62	0.00	0.00	0.00	0.02	0.02	0.02	0.00
299	Other (Cleaning and Surface Coatings)	1.16	0.94	0.01	0.11	0.00	0.02	0.02	0.02	0.00
<b>Total Cleaning and Surface Coatings</b>		<b>99.68</b>	<b>39.35</b>	<b>0.01</b>	<b>0.12</b>	<b>0.00</b>	<b>1.73</b>	<b>1.66</b>	<b>1.60</b>	<b>0.16</b>
Petroleum Production and Marketing										
310	Oil and Gas Production	9.35	4.27	0.01	0.04	0.11	0.04	0.03	0.02	0.00
320	Petroleum Refining	6.35	4.43	0.21	2.39	0.24	1.87	1.25	0.88	0.07
330	Petroleum Marketing	46.39	10.06	0.00	0.18	0.00	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.05	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
<b>Total Petroleum Production and Marketing</b>		<b>62.14</b>	<b>18.81</b>	<b>0.24</b>	<b>2.61</b>	<b>0.35</b>	<b>1.92</b>	<b>1.28</b>	<b>0.91</b>	<b>0.07</b>
Industrial Processes										
410	Chemical	4.38	4.26	0.03	0.12	0.05	0.47	0.41	0.38	0.01
420	Food and Agriculture	0.56	0.55	0.00	0.01	0.00	0.22	0.10	0.04	0.00
430	Mineral Processes	0.39	0.35	0.02	0.31	0.05	8.29	3.62	0.95	0.06
440	Metal Processes	0.13	0.11	0.06	0.32	0.03	0.45	0.36	0.26	0.00
450	Wood and Paper	0.21	0.21	0.00	0.00	0.00	7.71	5.40	3.24	0.00
460	Glass and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
470	Electronics	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.00	0.00
499	Other (Industrial Processes)	6.84	5.27	0.01	0.01	0.00	1.52	0.85	0.53	9.06
<b>Total Industrial Processes</b>		<b>12.53</b>	<b>10.76</b>	<b>0.11</b>	<b>0.77</b>	<b>0.14</b>	<b>18.67</b>	<b>10.73</b>	<b>5.41</b>	<b>9.15</b>
Solvent Evaporation										
510	Consumer Products	161.82	128.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	12.29	12.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.42	1.42	0.00	0.00	0.00	0.00	0.00	0.00	1.17
540	Asphalt Paving/Roofing	1.23	1.13	0.00	0.00	0.00	0.03	0.03	0.03	0.00
<b>Total Solvent Evaporation</b>		<b>176.76</b>	<b>143.59</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.03</b>	<b>0.03</b>	<b>0.03</b>	<b>1.17</b>

(Continued)

## 2035 Annual Average Emissions by Source Category in South Coast Air Basin (tons/day)

CODE	Source Category	TOG	VOC	NOx	CO	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Process										
610	Residential Fuel Combustion	19.48	8.85	13.81	47.28	0.32	7.11	6.76	6.57	0.11
620	Farming Operations	12.72	1.05	0.00	0.00	0.00	1.42	0.91	0.54	6.03
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	52.66	25.77	2.58	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	133.53	61.05	9.16	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	28.15	16.73	1.67	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	2.85	1.47	0.21	0.00
660	Fires	0.34	0.29	0.08	3.02	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	0.24	0.21	0.09	2.85	0.03	0.33	0.32	0.28	0.03
690	Cooking	3.02	1.20	0.00	0.00	0.01	12.64	12.64	12.64	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.79
	RECLAIM			16.39		5.54				
<b>Total Miscellaneous Processes</b>		<b>35.80</b>	<b>11.60</b>	<b>30.37</b>	<b>53.15</b>	<b>5.90</b>	<b>239.14</b>	<b>126.08</b>	<b>34.06</b>	<b>34.97</b>
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	12.50	11.95	7.91	145.59	0.48	11.51	11.30	4.59	9.56
722	Light Duty Trucks 1 (T1)	1.58	1.51	0.80	12.87	0.04	0.86	0.84	0.34	0.73
723	Light Duty Trucks 2 (T2)	7.65	7.29	4.03	72.12	0.22	4.29	4.21	1.72	3.68
724	Medium Duty Trucks (T3)	4.86	4.64	2.37	39.34	0.14	2.30	2.26	0.92	1.90
732	Light Heavy Duty Gas Trucks 1 (T4)	0.37	0.35	0.31	1.49	0.01	0.13	0.13	0.05	0.07
733	Light Heavy Duty Gas Trucks 2 (T5)	0.14	0.14	0.13	0.59	0.01	0.06	0.06	0.03	0.03
734	Medium Heavy Duty Gas Trucks (T6)	0.20	0.18	0.16	1.50	0.01	0.11	0.11	0.05	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.05	0.03	0.26	2.89	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.13	0.12	0.92	0.66	0.01	0.29	0.28	0.13	0.68
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.07	0.06	0.51	0.35	0.01	0.17	0.17	0.08	0.34
744	Medium Heavy Duty Diesel Truck (T6)	0.08	0.07	10.45	0.93	0.06	1.18	1.16	0.52	1.57
746	Heavy Heavy Duty Diesel Trucks (HHD)	2.11	0.78	33.55	15.26	0.16	1.75	1.73	0.82	3.38
750	Motorcycles (MCY)	10.51	9.12	2.65	45.50	0.01	0.04	0.04	0.02	0.02
760	Diesel Urban Buses (UB)	2.37	0.03	0.04	18.04	0.00	0.04	0.04	0.01	0.67
762	Gas Urban Buses (UB)	0.03	0.02	0.02	0.23	0.01	0.04	0.04	0.02	0.00
771	Gas School Buses (SB)	0.07	0.05	0.03	0.44	0.00	0.10	0.09	0.04	0.00
772	Diesel School Buses (SB)	0.01	0.01	0.71	0.11	0.00	0.16	0.16	0.07	0.04
777	Gas Other Buses (OB)	0.16	0.15	0.12	0.94	0.01	0.06	0.06	0.03	0.02
778	Motor Coaches	0.01	0.01	0.46	0.14	0.00	0.03	0.03	0.01	0.05
779	Diesel Other Buses (OB)	0.00	0.00	0.59	0.05	0.00	0.06	0.06	0.03	0.09
780	Motor Homes (MH)	0.01	0.01	0.19	0.08	0.00	0.05	0.05	0.02	0.03
<b>Total On-Road Motor Vehicles</b>		<b>42.89</b>	<b>36.52</b>	<b>66.23</b>	<b>359.12</b>	<b>1.19</b>	<b>23.24</b>	<b>22.83</b>	<b>9.50</b>	<b>22.91</b>
Other Mobile Sources										
810	Aircraft	4.29	4.15	23.36	43.81	2.24	0.89	0.86	0.78	0.00
820	Trains	0.80	0.67	16.85	4.88	0.02	0.34	0.34	0.32	0.02
833	Ocean Going Vessels	13.68	11.59	38.69	5.06	2.77	0.88	0.88	0.76	0.05
835	Commercial Harbor Crafts	0.38	0.32	6.00	1.22	0.00	0.25	0.25	0.23	0.00
840	Recreational Boats	8.85	8.26	2.60	54.81	0.01	0.53	0.48	0.36	0.01
850	Off-Road Recreational Vehicles	0.69	0.68	0.05	2.59	0.00	0.01	0.01	0.01	0.00
860	Off-Road Equipment	67.55	61.44	36.37	969.33	0.13	2.08	1.95	1.61	0.16
870	Farm Equipment	0.31	0.27	0.89	5.23	0.00	0.06	0.06	0.05	0.00
890	Fuel Storage and Handling	3.81	3.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Other Mobile Sources</b>		<b>100.36</b>	<b>91.19</b>	<b>124.82</b>	<b>1086.93</b>	<b>5.17</b>	<b>5.03</b>	<b>4.82</b>	<b>4.11</b>	<b>0.23</b>
Total Stationary and Area Sources		1177.57	245.56	51.75	130.24	9.01	267.28	145.35	47.49	59.12
Total On-Road Vehicles		42.89	36.52	66.23	359.12	1.19	23.24	22.83	9.50	22.91
Total Other Mobile		100.36	91.19	124.82	1086.93	5.17	5.03	4.82	4.11	0.23
<b>Total</b>		<b>1320.82</b>	<b>373.27</b>	<b>242.79</b>	<b>1576.30</b>	<b>15.36</b>	<b>295.56</b>	<b>173.00</b>	<b>61.10</b>	<b>82.26</b>

## Appendix II

Primary, Condensable and Filterable PM<sub>2.5</sub> emissions by Major Source Category in South Coast Air Basin (Tons per Day)

1. 2018 Annual Average Emissions
2. 2020 Annual Average Emissions
3. 2023 Annual Average Emissions
4. 2031 Annual Average Emissions
5. 2035 Annual Average Emissions

**2018 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)**

<b>CODE</b>	<b>Source Category</b>	<b>PM2.5 Total</b>	<b>PM2.5 Condensable</b>	<b>PM2.5 Filterable</b>
<b>Fuel Combustion</b>				
10	Electric Utilities	0.53	0.24	0.29
20	Cogeneration	0.01	0	0.01
30	Oil and Gas Production (Combustion)	0.09	0.03	0.06
40	Petroleum Refining (Combustion)	1.77	1	0.77
50	Manufacturing and Industrial	1.31	0.73	0.59
52	Food and Agricultural Processing	0.03	0.02	0.01
60	Service and Commercial	1.2	0.64	0.56
99	Other (Fuel Combustion)	0.4	0.01	0.39
<b>Total Fuel Combustion</b>		<b>5.34</b>	<b>2.66</b>	<b>2.68</b>
<b>Waste Disposal</b>				
110	Sewage Treatment	0	0	0
120	Landfills	0.2	0.02	0.18
130	Incineration	0.05	0.02	0.03
140	Soil Remediation	0	0	0
199	Other (Water Disposal)	0	0	0
<b>Total Waste Disposal</b>		<b>0.25</b>	<b>0.04</b>	<b>0.21</b>
<b>Cleaning and Surface Coatings</b>				
210	Laundering	0	0	0
220	Degreasing	0.02	0	0.02
230	Coatings and Related Processes	1.39	0	1.39
240	Printing	0	0	0
250	Adhesives and Sealants	0.02	0	0.02
299	Other (Cleaning and Surface Coatings)	0.02	0	0.02
<b>Total Cleaning and Surface Coatings</b>		<b>1.45</b>	<b>0</b>	<b>1.45</b>
<b>Petroleum Production and Marketing</b>				
310	Oil and Gas Production	0.02	0	0.02
320	Petroleum Refining	0.88	0.14	0.74
330	Petroleum Marketing	0	0	0
399	Other (Petroleum Production and Marketing)	0	0	0
<b>Total Petroleum Production and Marketing</b>		<b>0.91</b>	<b>0.14</b>	<b>0.77</b>
<b>Industrial Processes</b>				
410	Chemical	0.37	0.01	0.36
420	Food and Agriculture	0.04	0.01	0.03
430	Mineral Processes	0.9	0.03	0.87
440	Metal Processes	0.2	0.09	0.11
450	Wood and Paper	2.7	0	2.69
460	Glass and Related Products	0	0	0
470	Electronics	0	0	0
499	Other (Industrial Processes)	0.51	0.02	0.48
<b>Total Industrial Processes</b>		<b>4.71</b>	<b>0.16</b>	<b>4.55</b>
<b>Solvent Evaporation</b>				
510	Consumer Products	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0
530	Pesticides/Fertilizers	0	0	0
540	Asphalt Paving/Roofing	0.02	0	0.02
<b>Total Solvent Evaporation</b>		<b>0.02</b>	<b>0</b>	<b>0.02</b>

(Continued)

## 2018 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)

CODE	Source Category	PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Miscellaneous Processes				
610	Residential Fuel Combustion	6.77	0.79	5.98
620	Farming Operations	0.75	0	0.75
630	Construction and Demolition	2.27	0	2.27
640	Paved Road Dust	8.46	0	8.46
645	Unpaved Road Dust	1.67	0	1.67
650	Fugitive Windblown Dust	0.23	0	0.23
660	Fires	0.41	0	0.41
670	Waste Burning and Disposal	0.97	0	0.97
690	Cooking	11.44	11.4	0.04
699	Other (Miscellaneous Processes)	0	0	0
<b>Total Miscellaneous Processes</b>		<b>32.98</b>	<b>12.19</b>	<b>20.79</b>
On-Road Motor Vehicles (EMFAC2017 PC version using SCAG's link data)				
710	Light Duty Passenger Auto (LDA)	4.66	--	--
722	Light Duty Trucks 1 (T1)	0.41	--	--
723	Light Duty Trucks 2 (T2)	1.7	--	--
724	Medium Duty Trucks (T3)	1.1	--	--
732	Light Heavy Duty Gas Trucks 1 (T4)	0.13	--	--
733	Light Heavy Duty Gas Trucks 2 (T5)	0.03	--	--
734	Medium Heavy Duty Gas Trucks (T6)	0.05	--	--
736	Heavy Heavy Duty Gas Trucks (HHD)	0	--	--
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.17	--	--
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.08	--	--
744	Medium Heavy Duty Diesels Truck (T6)	1.14	--	--
746	Heavy Heavy Duty Diesel Trucks (HHD)	1.28	--	--
750	Motorcycles (MCY)	0.02	--	--
760	Diesel Urban Buses (UB)	0.03	--	--
762	Gas Urban Buses (UB)	0.02	--	--
771	Gas School Buses (SB)	0.03	--	--
772	Diesel School Buses (SB)	0.08	--	--
777	Gas Other Buses (OB)	0.02	--	--
778/779	Motor Coaches / Diesel Other Buses (OB)	0.09	--	--
780	Motor Homes (MH)	0.04	--	--
<b>Total On-Road Motor Vehicles</b>		<b>11.06</b>	--	--
Other Mobile Sources				
810	Aircraft	0.69	--	--
820	Trains	0.34	--	--
833	Ocean Going Vessels	0.51	--	--
835	Commercial Harbor Crafts	0.24	--	--
840	Recreational Boats	0.68	--	--
850	Off-Road Recreation Vehicles	0.01	--	--
860	Off-Road Equipment	2.78	--	--
870	Farm Equipment	0.12	--	--
890	Fuel Storage and Handling	0	--	--
<b>Total Other Mobile Sources</b>		<b>5.36</b>	--	--
Total Stationary and Area Sources		<b>45.66</b>	<b>15.19</b>	<b>30.48</b>
Total On-Road Vehicles		11.06	--	--
Total Other Mobile		5.36	--	--
<b>Total</b>		<b>62.10</b>	--	--

**2020 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)**

CODE	Source Category		PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Fuel Combustion					
	10	Electric Utilities	0.57	0.25	0.32
	20	Cogeneration	0.01	0	0.01
	30	Oil and Gas Production (Combustion)	0.1	0.04	0.06
	40	Petroleum Refining (Combustion)	1.77	1	0.77
	50	Manufacturing and Industrial	1.31	0.72	0.59
	52	Food and Agricultural Processing	0.04	0.02	0.01
	60	Service and Commercial	1.19	0.63	0.56
	99	Other (Fuel Combustion)	0.39	0.01	0.38
Total Fuel Combustion			5.37	2.67	2.69
Waste Disposal					
	110	Sewage Treatment	0	0	0
	120	Landfills	0.2	0.02	0.18
	130	Incineration	0.05	0.02	0.03
	140	Soil Remediation	0	0	0
	199	Other (Water Disposal)	0	0	0
Total Waste Disposal			0.25	0.04	0.21
Cleaning and Surface Coatings					
	210	Laundering	0	0	0
	220	Degreasing	0.02	0	0.02
	230	Coatings and Related Processes	1.42	0	1.42
	240	Printing	0	0	0
	250	Adhesives and Sealants	0.02	0	0.02
	299	Other (Cleaning and Surface Coatings)	0.02	0	0.02
Total Cleaning and Surface Coatings			1.48	0	1.48
Petroleum Production and Marketing					
	310	Oil and Gas Production	0.02	0	0.02
	320	Petroleum Refining	0.88	0.14	0.74
	330	Petroleum Marketing	0	0	0
	399	Other (Petroleum Production and Marketing)	0	0	0
Total Petroleum Production and Marketing			0.91	0.14	0.77
Industrial Processes					
	410	Chemical	0.37	0.01	0.37
	420	Food and Agriculture	0.04	0.01	0.03
	430	Mineral Processes	0.91	0.03	0.88
	440	Metal Processes	0.21	0.1	0.11
	450	Wood and Paper	2.79	0	2.79
	460	Glass and Related Products	0	0	0
	470	Electronics	0	0	0
	499	Other (Industrial Processes)	0.52	0.02	0.49
Total Industrial Processes			4.84	0.16	4.67
Solvent Evaporation					
	510	Consumer Products	0	0	0
	520	Architectural Coatings and Related Solvent	0	0	0
	530	Pesticides/Fertilizers	0	0	0
	540	Asphalt Paving/Roofing	0.02	0	0.02
Total Solvent Evaporation			0.02	0	0.02



(Continued)

## 2020 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)

CODE	Source Category	PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Miscellaneous Processes				
610	Residential Fuel Combustion	6.92	0.85	6.07
620	Farming Operations	0.67	0	0.67
630	Construction and Demolition	2.3	0	2.3
640	Paved Road Dust	8.55	0	8.55
645	Unpaved Road Dust	1.67	0	1.67
650	Fugitive Windblown Dust	0.23	0	0.23
660	Fires	0.41	0	0.41
670	Waste Burning and Disposal	0.28	0	0.28
690	Cooking	11.58	11.53	0.04
699	Other (Miscellaneous Processes)	0	0	0
<b>Total Miscellaneous Processes</b>		<b>32.6</b>	<b>12.38</b>	<b>20.22</b>
On-Road Motor Vehicles (EMFAC2017 PC version using SCAG's link data)				
710	Light Duty Passenger Auto (LDA)	4.68	--	--
722	Light Duty Trucks 1 (T1)	0.4	--	--
723	Light Duty Trucks 2 (T2)	1.71	--	--
724	Medium Duty Trucks (T3)	1.06	--	--
732	Light Heavy Duty Gas Trucks 1 (T4)	0.11	--	--
733	Light Heavy Duty Gas Trucks 2 (T5)	0.03	--	--
734	Medium Heavy Duty Gas Trucks (T6)	0.05	--	--
736	Heavy Heavy Duty Gas Trucks (HHD)	0	--	--
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.15	--	--
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.08	--	--
744	Medium Heavy Duty Diesels Truck (T6)	0.93	--	--
746	Heavy Heavy Duty Diesel Trucks (HHD)	1.03	--	--
750	Motorcycles (MCY)	0.02	--	--
760	Diesel Urban Buses (UB)	0.02	--	--
762	Gas Urban Buses (UB)	0.02	--	--
771	Gas School Buses (SB)	0.03	--	--
772	Diesel School Buses (SB)	0.08	--	--
777	Gas Other Buses (OB)	0.02	--	--
778/779	Motor Coaches / Diesel Other Buses (OB)	0.07	--	--
780	Motor Homes (MH)	0.03	--	--
<b>Total On-Road Motor Vehicles</b>		<b>10.51</b>	<b>--</b>	<b>--</b>
Other Mobile Sources				
810	Aircraft	0.69	--	--
820	Trains	0.33	--	--
833	Ocean Going Vessels	0.54	--	--
835	Commercial Harbor Crafts	0.23	--	--
840	Recreational Boats	0.62	--	--
850	Off-Road Recreation Vehicles	0.01	--	--
860	Off-Road Equipment	2.50	--	--
870	Farm Equipment	0.11	--	--
890	Fuel Storage and Handling	0	--	--
<b>Total Other Mobile Sources</b>		<b>5.04</b>	<b>--</b>	<b>--</b>
<b>Total Stationary and Area Sources</b>		<b>45.46</b>	<b>15.4</b>	<b>30.06</b>
Total On-Road Vehicles		10.51	--	--
Total Other Mobile		5.04	--	--
<b>Total</b>		<b>61.03</b>	<b>--</b>	<b>--</b>

**2023 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)**

CODE	Source Category		PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Fuel Combustion					
	10	Electric Utilities	0.55	0.25	0.31
	20	Cogeneration	0.01	0	0.01
	30	Oil and Gas Production (Combustion)	0.1	0.04	0.06
	40	Petroleum Refining (Combustion)	1.77	1	0.77
	50	Manufacturing and Industrial	1.32	0.73	0.59
	52	Food and Agricultural Processing	0.04	0.02	0.02
	60	Service and Commercial	1.2	0.63	0.56
	99	Other (Fuel Combustion)	0.41	0.01	0.39
Total Fuel Combustion			5.39	2.67	2.71
Waste Disposal					
	110	Sewage Treatment	0	0	0
	120	Landfills	0.2	0.02	0.18
	130	Incineration	0.05	0.02	0.03
	140	Soil Remediation	0	0	0
	199	Other (Water Disposal)	0	0	0
Total Waste Disposal			0.25	0.04	0.21
Cleaning and Surface Coatings					
	210	Laundering	0	0	0
	220	Degreasing	0.02	0	0.02
	230	Coatings and Related Processes	1.46	0	1.46
	240	Printing	0	0	0
	250	Adhesives and Sealants	0.02	0	0.02
	299	Other (Cleaning and Surface Coatings)	0.02	0	0.02
Total Cleaning and Surface Coatings			1.52	0	1.52
Petroleum Production and Marketing					
	310	Oil and Gas Production	0.02	0	0.02
	320	Petroleum Refining	0.88	0.14	0.74
	330	Petroleum Marketing	0	0	0
	399	Other (Petroleum Production and Marketing)	0	0	0
Total Petroleum Production and Marketing			0.91	0.14	0.77
Industrial Processes					
	410	Chemical	0.38	0.01	0.37
	420	Food and Agriculture	0.04	0.01	0.03
	430	Mineral Processes	0.92	0.03	0.89
	440	Metal Processes	0.22	0.1	0.12
	450	Wood and Paper	2.95	0	2.94
	460	Glass and Related Products	0	0	0
	470	Electronics	0	0	0
	499	Other (Industrial Processes)	0.52	0.02	0.5
Total Industrial Processes			5.03	0.17	4.86
Solvent Evaporation					
	510	Consumer Products	0	0	0
	520	Architectural Coatings and Related Solvent	0	0	0
	530	Pesticides/Fertilizers	0	0	0
	540	Asphalt Paving/Roofing	0.02	0	0.02
Total Solvent Evaporation			0.02	0	0.02

(Continued)

## 2023 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)

CODE	Source Category	PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Miscellaneous Processes				
610	Residential Fuel Combustion	6.77	0.82	5.95
620	Farming Operations	0.56	0	0.56
630	Construction and Demolition	2.36	0	2.36
640	Paved Road Dust	8.71	0	8.71
645	Unpaved Road Dust	1.67	0	1.67
650	Fugitive Windblown Dust	0.22	0	0.22
660	Fires	0.41	0	0.41
670	Waste Burning and Disposal	0.28	0	0.28
690	Cooking	11.79	11.75	0.05
699	Other (Miscellaneous Processes)	0	0	0
<b>Total Miscellaneous Processes</b>		<b>32.78</b>	<b>12.57</b>	<b>20.21</b>
On-Road Motor Vehicles (EMFAC2017 PC version using SCAG's link data)				
710	Light Duty Passenger Auto (LDA)	4.7	--	--
722	Light Duty Trucks 1 (T1)	0.38	--	--
723	Light Duty Trucks 2 (T2)	1.72	--	--
724	Medium Duty Trucks (T3)	1	--	--
732	Light Heavy Duty Gas Trucks 1 (T4)	0.09	--	--
733	Light Heavy Duty Gas Trucks 2 (T5)	0.03	--	--
734	Medium Heavy Duty Gas Trucks (T6)	0.05	--	--
736	Heavy Heavy Duty Gas Trucks (HHD)	0	--	--
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.15	--	--
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.08	--	--
744	Medium Heavy Duty Diesels Truck (T6)	0.48	--	--
746	Heavy Heavy Duty Diesel Trucks (HHD)	0.7	--	--
750	Motorcycles (MCY)	0.02	--	--
760	Diesel Urban Buses (UB)	0.02	--	--
762	Gas Urban Buses (UB)	0.02	--	--
771	Gas School Buses (SB)	0.03	--	--
772	Diesel School Buses (SB)	0.08	--	--
777	Gas Other Buses (OB)	0.03	--	--
778/779	Motor Coaches / Diesel Other Buses (OB)	0.04	--	--
780	Motor Homes (MH)	0.03	--	--
<b>Total On-Road Motor Vehicles</b>		<b>9.64</b>	--	--
Other Mobile Sources				
810	Aircraft	0.71	--	--
820	Trains	0.34	--	--
833	Ocean Going Vessels	0.58	--	--
835	Commercial Harbor Crafts	0.24	--	--
840	Recreational Boats	0.55	--	--
850	Off-Road Recreation Vehicles	0.01	--	--
860	Off-Road Equipment	2.08	--	--
870	Farm Equipment	0.1	--	--
890	Fuel Storage and Handling	0	--	--
<b>Total Other Mobile Sources</b>		<b>4.59</b>	--	--
<b>Total Stationary and Area Sources</b>		<b>45.91</b>	<b>15.6</b>	<b>30.31</b>
Total On-Road Vehicles		9.64	--	--
Total Other Mobile		4.59	--	--
<b>Total</b>		<b>60.15</b>	--	--

**2031 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)**

CODE	Source Category	PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Fuel Combustion				
10	Electric Utilities	0.42	0.19	0.23
20	Cogeneration	0.01	0	0.01
30	Oil and Gas Production (Combustion)	0.11	0.04	0.07
40	Petroleum Refining (Combustion)	1.77	1	0.77
50	Manufacturing and Industrial	1.32	0.73	0.6
52	Food and Agricultural Processing	0.04	0.02	0.02
60	Service and Commercial	1.14	0.59	0.55
99	Other (Fuel Combustion)	0.43	0.01	0.42
<b>Total Fuel Combustion</b>		<b>5.24</b>	<b>2.58</b>	<b>2.66</b>
Waste Disposal				
110	Sewage Treatment	0	0	0
120	Landfills	0.21	0.02	0.19
130	Incineration	0.05	0.02	0.03
140	Soil Remediation	0	0	0
199	Other (Water Disposal)	0	0	0
<b>Total Waste Disposal</b>		<b>0.26</b>	<b>0.04</b>	<b>0.22</b>
Cleaning and Surface Coatings				
210	Laundering	0	0	0
220	Degreasing	0.02	0	0.02
230	Coatings and Related Processes	1.53	0	1.53
240	Printing	0	0	0
250	Adhesives and Sealants	0.02	0	0.02
299	Other (Cleaning and Surface Coatings)	0.02	0	0.02
<b>Total Cleaning and Surface Coatings</b>		<b>1.6</b>	<b>0</b>	<b>1.6</b>
Petroleum Production and Marketing				
310	Oil and Gas Production	0.03	0	0.02
320	Petroleum Refining	0.88	0.14	0.74
330	Petroleum Marketing	0	0	0
399	Other (Petroleum Production and Marketing)	0	0	0
<b>Total Petroleum Production and Marketing</b>		<b>0.91</b>	<b>0.14</b>	<b>0.77</b>
Industrial Processes				
410	Chemical	0.39	0.01	0.38
420	Food and Agriculture	0.04	0.01	0.04
430	Mineral Processes	0.95	0.03	0.91
440	Metal Processes	0.25	0.12	0.13
450	Wood and Paper	3.23	0	3.23
460	Glass and Related Products	0	0	0
470	Electronics	0	0	0
499	Other (Industrial Processes)	0.53	0.03	0.5
<b>Total Industrial Processes</b>		<b>5.39</b>	<b>0.19</b>	<b>5.2</b>
Solvent Evaporation				
510	Consumer Products	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0
530	Pesticides/Fertilizers	0	0	0
540	Asphalt Paving/Roofing	0.03	0	0.03
<b>Total Solvent Evaporation</b>		<b>0.03</b>	<b>0</b>	<b>0.03</b>

(Continued)

## 2031 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)

CODE	Source Category	PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Miscellaneous Processes				
610	Residential Fuel Combustion	6.58	0.77	5.82
620	Farming Operations	0.55	0	0.55
630	Construction and Demolition	2.51	0	2.51
640	Paved Road Dust	8.98	0	8.98
645	Unpaved Road Dust	1.67	0	1.67
650	Fugitive Windblown Dust	0.21	0	0.21
660	Fires	0.41	0	0.41
670	Waste Burning and Disposal	0.28	0	0.28
690	Cooking	12.37	12.32	0.05
699	Other (Miscellaneous Processes)	0	0	0
<b>Total Miscellaneous Processes</b>		<b>33.56</b>	<b>13.08</b>	<b>20.48</b>
On-Road Motor Vehicles (EMFAC2017 PC version using SCAG's link data)				
710	Light Duty Passenger Auto (LDA)	4.6	--	--
722	Light Duty Trucks 1 (T1)	0.35	--	--
723	Light Duty Trucks 2 (T2)	1.72	--	--
724	Medium Duty Trucks (T3)	0.92	--	--
732	Light Heavy Duty Gas Trucks 1 (T4)	0.06	--	--
733	Light Heavy Duty Gas Trucks 2 (T5)	0.03	--	--
734	Medium Heavy Duty Gas Trucks (T6)	0.05	--	--
736	Heavy Heavy Duty Gas Trucks (HHD)	0	--	--
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.13	--	--
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.08	--	--
744	Medium Heavy Duty Diesels Truck (T6)	0.52	--	--
746	Heavy Heavy Duty Diesel Trucks (HHD)	0.8	--	--
750	Motorcycles (MCY)	0.02	--	--
760	Diesel Urban Buses (UB)	0.02	--	--
762	Gas Urban Buses (UB)	0.02	--	--
771	Gas School Buses (SB)	0.04	--	--
772	Diesel School Buses (SB)	0.07	--	--
777	Gas Other Buses (OB)	0.03	--	--
778/779	Motor Coaches / Diesel Other Buses (OB)	0.04	--	--
780	Motor Homes (MH)	0.02	--	--
<b>Total On-Road Motor Vehicles</b>		<b>9.5</b>	<b>--</b>	<b>--</b>
Other Mobile Sources				
810	Aircraft	0.76	--	--
820	Trains	0.35	--	--
833	Ocean Going Vessels	0.68	--	--
835	Commercial Harbor Crafts	0.23	--	--
840	Recreational Boats	0.41	--	--
850	Off-Road Recreation Vehicles	0.01	--	--
860	Off-Road Equipment	1.66	--	--
870	Farm Equipment	0.06	--	--
890	Fuel Storage and Handling	0	--	--
<b>Total Other Mobile Sources</b>		<b>4.15</b>	<b>--</b>	<b>--</b>
Total Stationary and Area Sources		<b>47</b>	<b>16.05</b>	<b>30.95</b>
Total On-Road Vehicles		9.5	--	--
Total Other Mobile		4.15	--	--
<b>Total</b>		<b>60.65</b>	<b>--</b>	<b>--</b>

**2035 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)**

<b>CODE</b>	<b>Source Category</b>	<b>PM2.5 Total</b>	<b>PM2.5 Condensable</b>	<b>PM2.5 Filterable</b>
Fuel Combustion				
10	Electric Utilities	0.42	0.19	0.23
20	Cogeneration	0.01	0	0.01
30	Oil and Gas Production (Combustion)	0.12	0.04	0.07
40	Petroleum Refining (Combustion)	1.77	1	0.77
50	Manufacturing and Industrial	1.31	0.72	0.59
52	Food and Agricultural Processing	0.04	0.02	0.02
60	Service and Commercial	1.12	0.58	0.54
99	Other (Fuel Combustion)	0.44	0.01	0.42
<b>Total Fuel Combustion</b>		<b>5.22</b>	<b>2.56</b>	<b>2.66</b>
Waste Disposal				
110	Sewage Treatment	0	0	0
120	Landfills	0.21	0.02	0.19
130	Incineration	0.05	0.02	0.03
140	Soil Remediation	0	0	0
199	Other (Water Disposal)	0	0	0
<b>Total Waste Disposal</b>		<b>0.26</b>	<b>0.04</b>	<b>0.22</b>
Cleaning and Surface Coatings				
210	Laundering	0	0	0
220	Degreasing	0.02	0	0.02
230	Coatings and Related Processes	1.53	0	1.53
240	Printing	0	0	0
250	Adhesives and Sealants	0.02	0	0.02
299	Other (Cleaning and Surface Coatings)	0.02	0	0.02
<b>Total Cleaning and Surface Coatings</b>		<b>1.6</b>	<b>0</b>	<b>1.6</b>
Petroleum Production and Marketing				
310	Oil and Gas Production	0.02	0	0.02
320	Petroleum Refining	0.88	0.14	0.74
330	Petroleum Marketing	0	0	0
399	Other (Petroleum Production and Marketing)	0	0	0
<b>Total Petroleum Production and Marketing</b>		<b>0.91</b>	<b>0.14</b>	<b>0.77</b>
Industrial Processes				
410	Chemical	0.38	0.01	0.38
420	Food and Agriculture	0.04	0.01	0.04
430	Mineral Processes	0.95	0.03	0.92
440	Metal Processes	0.26	0.12	0.13
450	Wood and Paper	3.24	0	3.24
460	Glass and Related Products	0	0	0
470	Electronics	0	0	0
499	Other (Industrial Processes)	0.53	0.03	0.5
<b>Total Industrial Processes</b>		<b>5.4</b>	<b>0.2</b>	<b>5.21</b>
Solvent Evaporation				
510	Consumer Products	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0
530	Pesticides/Fertilizers	0	0	0
540	Asphalt Paving/Roofing	0.03	0	0.03
<b>Total Solvent Evaporation</b>		<b>0.03</b>	<b>0</b>	<b>0.03</b>

(Continued)

## 2035 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons per Day)

CODE	Source Category	PM2.5 Total	PM2.5 Condensable	PM2.5 Filterable
Miscellaneous Processes				
610	Residential Fuel Combustion	6.57	0.76	5.81
620	Farming Operations	0.54	0	0.54
630	Construction and Demolition	2.58	0	2.58
640	Paved Road Dust	9.16	0	9.16
645	Unpaved Road Dust	1.67	0	1.67
650	Fugitive Windblown Dust	0.21	0	0.21
660	Fires	0.41	0	0.41
670	Waste Burning and Disposal	0.28	0	0.28
690	Cooking	12.64	12.59	0.05
699	Other (Miscellaneous Processes)	0	0	0
<b>Total Miscellaneous Processes</b>		<b>34.06</b>	<b>13.35</b>	<b>20.71</b>
On-Road Motor Vehicles (EMFAC2017 PC version using SCAG's link data)				
710	Light Duty Passenger Auto (LDA)	4.59	--	--
722	Light Duty Trucks 1 (T1)	0.34	--	--
723	Light Duty Trucks 2 (T2)	1.72	--	--
724	Medium Duty Trucks (T3)	0.92	--	--
732	Light Heavy Duty Gas Trucks 1 (T4)	0.05	--	--
733	Light Heavy Duty Gas Trucks 2 (T5)	0.03	--	--
734	Medium Heavy Duty Gas Trucks (T6)	0.05	--	--
736	Heavy Heavy Duty Gas Trucks (HHD)	0	--	--
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.13	--	--
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.08	--	--
744	Medium Heavy Duty Diesels Truck (T6)	0.52	--	--
746	Heavy Heavy Duty Diesel Trucks (HHD)	0.82	--	--
750	Motorcycles (MCY)	0.02	--	--
760	Diesel Urban Buses (UB)	0.01	--	--
762	Gas Urban Buses (UB)	0.02	--	--
771	Gas School Buses (SB)	0.04	--	--
772	Diesel School Buses (SB)	0.07	--	--
777	Gas Other Buses (OB)	0.03	--	--
778/779	Motor Coaches / Diesel Other Buses (OB)	0.04	--	--
780	Motor Homes (MH)	0.02	--	--
<b>Total On-Road Motor Vehicles</b>		<b>9.5</b>	<b>--</b>	<b>--</b>
Other Mobile Sources				
810	Aircraft	0.78	--	--
820	Trains	0.32	--	--
833	Ocean Going Vessels	0.76	--	--
835	Commercial Harbor Crafts	0.23	--	--
840	Recreational Boats	0.36	--	--
850	Off-Road Recreation Vehicles	0.01	--	--
860	Off-Road Equipment	1.61	--	--
870	Farm Equipment	0.05	--	--
890	Fuel Storage and Handling	0	--	--
<b>Total Other Mobile Sources</b>		<b>4.11</b>	<b>--</b>	<b>--</b>
Total Stationary and Area Sources		<b>47.49</b>	<b>16.3</b>	<b>31.19</b>
Total On-Road Vehicles		9.5	--	--
Total Other Mobile		4.11	--	--
<b>Total</b>		<b>61.10</b>	<b>--</b>	<b>--</b>