SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

~~Draft~~ Final 2021 Redesignation Request and Maintenance Plan for the 2006 and 1997 24-Hour PM2.5 Standards for South Coast Air Basin

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Deputy Executive Officer
Planning, Rule Development and Area Sources
Sarah Rees, Ph.D.

Assistant Deputy Executive Officer
Planning, Rule Development and Area Sources
Ian MacMillan

Planning and Rules Manager
Planning, Rule Development, and Area Sources
Zorik Pirveysian

Authors:	Nico Schulte, Ph.D. – Air Quality Specialist, South Coast AQMD Scott Epstein, Ph.D. – Program Supervisor, South Coast AQMD Sang-Mi Lee, Ph.D. – Program Supervisor, South Coast AQMD Marc Carreras Sospedra, Ph.D. - Air Quality Specialist, South Coast AQMD Eric Praske, Ph.D. - Air Quality Specialist, South Coast AQMD Rui Zhang, Ph.D. - Air Quality Specialist, South Coast AQMD Rene Bermudez - Atmospheric Measurements Manager, South Coast AQMD Xiang Li, Ph.D. – Air Quality Specialist, South Coast AQMD Nesamani Kalandiyur, Manager, Transportation Analysis Section, California Air Resources Board
Contributors:	Kendra Reif ~~Xiang Li, Ph.D.~~ – Air Quality Specialist, South Coast AQMD Elham Baranizadeh, Ph.D. – Air Quality Specialist, South Coast AQMD Cui Ge, Ph.D. – Air Quality Specialist, South Coast AQMD Kalam Cheung, Ph.D. - Program Supervisor, South Coast AQMD
Reviewed by:	Barbara Baird – Chief Deputy Counsel, South Coast AQMD

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
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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 µg m^{-3} to 35 µg m^{-3} since the 2005 – 2007 period when the SCAB was initially designated as a moderate nonattainment area for the 2006 PM2.5 NAAQS. The U.S. EPA determined, effective August 24, 2016, that the SCAB attained the 1997 24-hour PM2.5 NAAQS based on data for years 2011 through 2013. The SCAB has continued to attain the 1997 PM2.5 NAAQS since 2013. In the three-year period from 2018 to 2020 the design value was 35 µg m^{-3}, subject to the U.S. EPA approval of an exceptional event demonstration showing that exceedances recorded from September 11th to 16th 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 24-hour average 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 methods, demonstrate that meteorology during 2018 – 2020 was not more conducive to lower PM2.5 concentrations, providing evidence that ~~concentration~~ reductions in PM2.5 levels 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 PM2.5 concentrations. Future PM2.5 design values are less than or equal to the NAAQS limit of 35 µg m^{-3}, with the highest predicted PM2.5 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 PM2.5 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 PM2.5 standard or the 1997 24-Hour PM2.5 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 PM2.5 National Ambient Air Quality Standard (NAAQS) and a moderate nonattainment area for the 1997 24-hour average PM2.5 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, PM2.5 concentrations in the SCAB have decreased over the last two decades. Design values have decreased from 55 $\mu g\ m^{-3}$ to 35 $\mu g\ m^{-3}$ since the 2005 – 2007 period when the SCAB was initially designated as a moderate nonattainment area for the 2006 24-hour PM2.5 NAAQS. In the three-year period from 2018 to 2020 the design value was 35 $\mu g\ m^{-3}$, subject to the U.S. EPA approval of an exceptional event demonstration showing that exceedances recorded from September 11th to 16th were the result of the Bobcat and El Dorado Fires. This design value is equal to the 2006 24-hour PM2.5 NAAQS limit, and the SCAB is thus in attainment with the 2006 24-hour average PM2.5 NAAQS. The design value in the three-year period from 2018 to 2020 is also less than the 1997 24-hour average PM2.5 NAAQS limit of 65 $\mu g\ m^{-3}$, and the SCAB is thus also in attainment with the 1997 24-hour average PM2.5 NAAQS. This is confirmed by the U.S. EPA determination, effective August 24, 2016, that the SCAB attained the 1997 24-hour PM2.5 NAAQS based on 2011-2013 data[1].

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 24-hour average PM2.5 standard and the 1997 24-hour average PM2.5 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 PM2.5 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 PM2.5 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

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

PM2.5 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 PM2.5 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 PM2.5 NAAQS through 2035, a commitment to maintain a future PM2.5 monitoring network, a commitment to verify continued attainment of the NAAQS, and a contingency plan in case the 2006 24-Hour PM2.5 standard or the 1997 24-Hour PM2.5 standard is violated in the future.

Both the 2006 and 1997 PM2.5 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 PM2.5 NAAQS is attained if the design value is less than or equal to 35 µg m^{-3}, and the 1997 24-hour average PM2.5 NAAQS is attained if the design value is less than or equal to 65 µg m^{-3}. The design value for both standards is calculated by determining the 98th percentile of the 24-hour average PM2.5 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 PM2.5 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 PM2.5 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 PM2.5 monitors that have operated in the SCAB since 2018. Table 2-1 lists the monitors along with the type (FRM or FEM BAM).

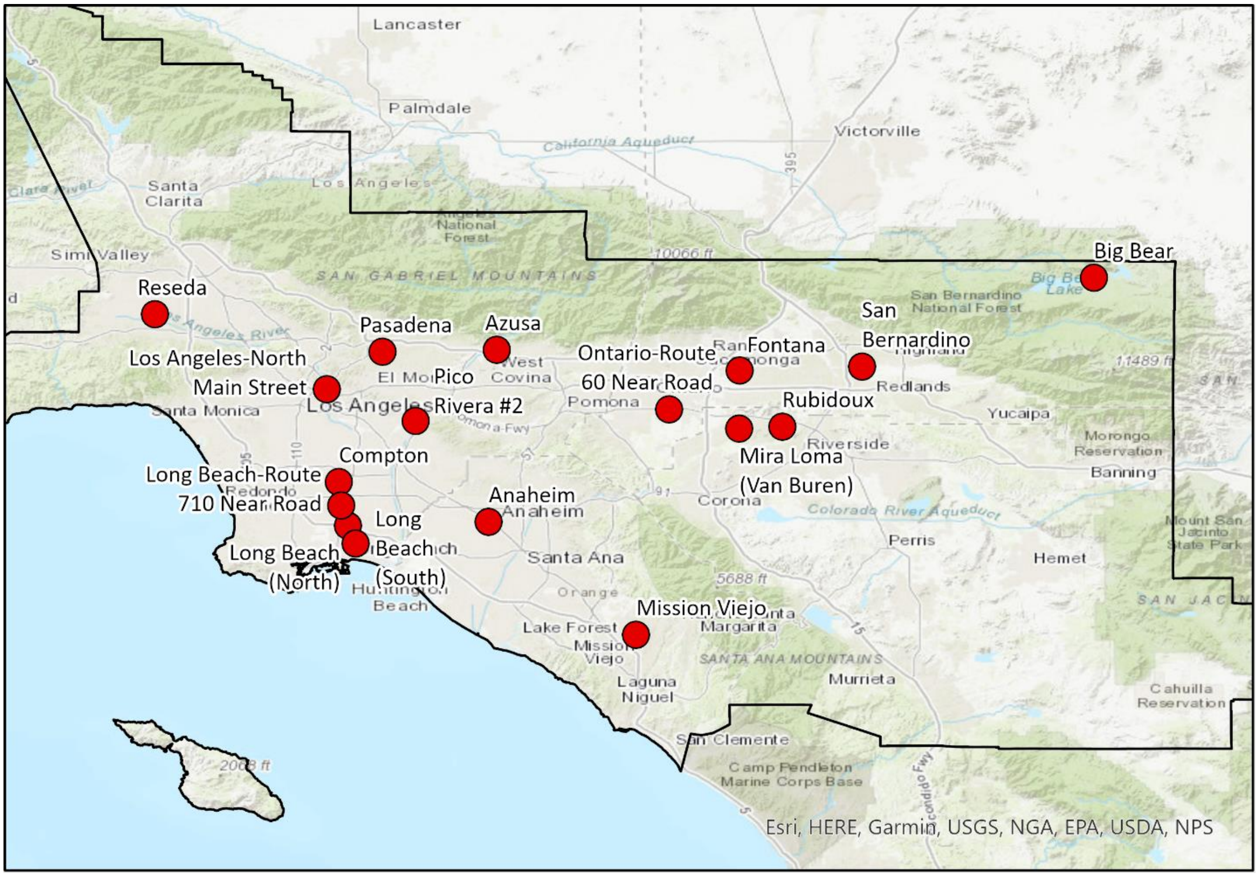

Figure 2-1: PM2.5 monitoring sites that have operated in the SCAB since 2018.

Table 2-1: PM2.5 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 PM2.5 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 PM2.5, 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:. All of the following must be met to satisfy the criteria for 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

2. 3. It is a natural event or an event caused by human activity that is unlikely to recur at a particular location

According to Title 40 in the Code of Federal Regulations[2], fireworks that are significantly integral to traditional national, ethnic, or other cultural events are also considered exceptional events. 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 PM2.5 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 PM2.5 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 PM2.5 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 by trained analysts from GOES East and GOES West satellite imagery[3]. Then we flagged suspected exceptional events when a monitor was inside the smoke plume outlines on each day and the 24-hour average PM2.5 measurement also exceeded 35 $\mu g\ m^{-3}$. The smoke plumes determined from satellite imagery are

[2] 40 CFR § 50.14 Treatment of air quality monitoring data influenced by exceptional events

[3] Shapefiles were downloaded from https://www.ospo.noaa.gov/Products/land/hms.html

indicative of conditions when high ground level PM2.5 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.

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.

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.

Date	Station	24-hr PM2.5 (μg/m^3) (POC)	Likely Cause	Meets Screening Criteria	Preparing Demonstration
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

Date	Station	24-hr PM2.5 (µg/m^3) (POC)	Likely Cause	Meets Screening Criteria	Preparing Demonstration
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

Date	Station	24-hr PM2.5 (µg/m³) (POC)	Likely Cause	Meets Screening Criteria	Preparing Demonstration
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

Date	Station	24-hr PM2.5 (µg/m^3) (POC)	Likely Cause	Meets Screening Criteria	Preparing Demonstration
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 PM2.5 design value in the SCAB is 35 µg m^{-3} at Mira Loma (Van Buren), Compton, Azusa, Fontana, and Long Beach-Route 710 Near Road. Thus the SCAB ~~attained~~met the 2006 24-hour average PM2.5 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[4] then the maximum design value would be 35 µg m^{-3} at Mira Loma (Van Buren) and the second highest design value would be 33 µg m^{-3} at Ontario-Route 60 Near Road and Compton.

The design values are less than the 1997 24-hour average PM2.5 NAAQS (65 µg m^{-3}) before or after removing regulatory significant exceptional events. The SCAB thus also ~~attained~~met the 1997 24-hour average PM2.5 NAAQS during 2018 – 2020. On July 25, 2016 U.S. EPA finalized a determination that the SCAB attained the 1997 24-hour PM2.5 NAAQS, effective August 24, 2016[5]. 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 PM2.5 NAAQS.

[4] This scenario is hypothetical as U.S. EPA will only review exceptional event demonstrations that are considered regulatory significant.
[5] https://www.federalregister.gov/documents/2016/07/25/2016-17410/clean-data-determination-for-1997-pm25

Table 2-3: Design values for both the 2006 and 1997 24-hour average PM2.5 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 PM2.5 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 Basin design values, resulting in the design value of 35 µg m^{-3} at Mira Loma (Van Buren). Maximum PM2.5 design values in the Basin have decreased by 34% since 2008 and 54% since 2001.

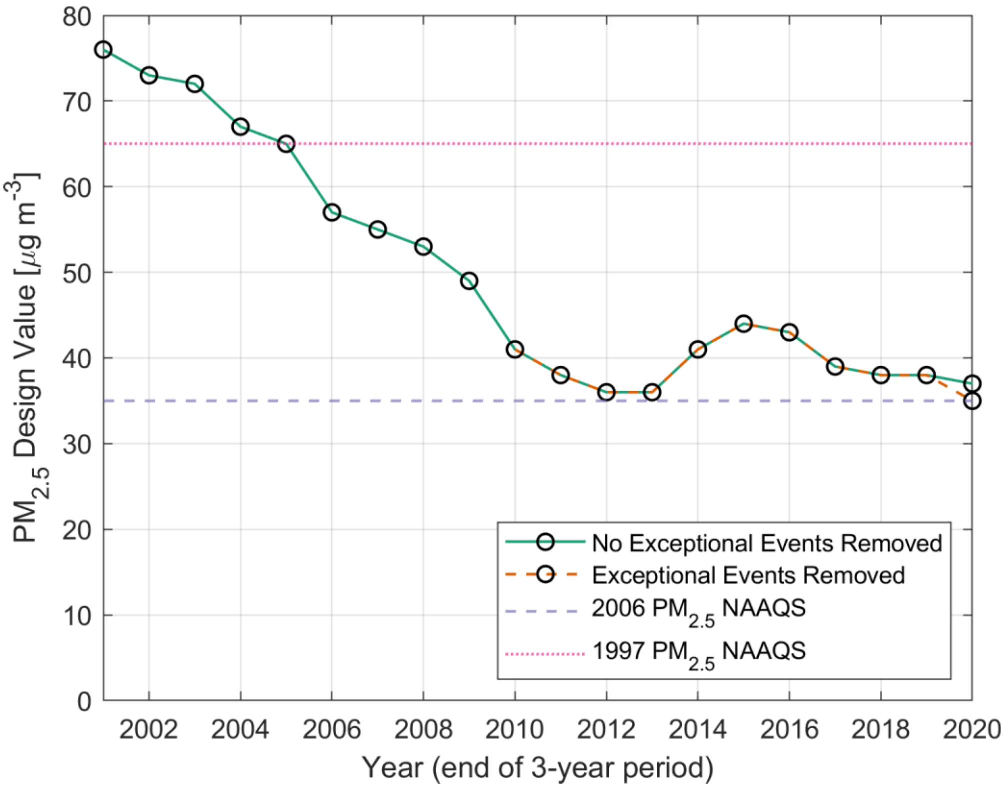

Figure 2-2: Trend of 24-hour average PM2.5 design values in the Basin from 2001 – 2020 before and after removing suspected exceptional events.

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[6,7]. 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^{-3}) 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.

[6] In 2017, FRM measurements were conducted in a 1 in ~~6~~3 day schedule at Compton.

[7] Additional information about these measurements are presented in the Final 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/2-final-attainment-plan-for-2006-24-hour-pm2-5-standard-for-the-south-coast-air-basin.pdf?sfvrsn=6

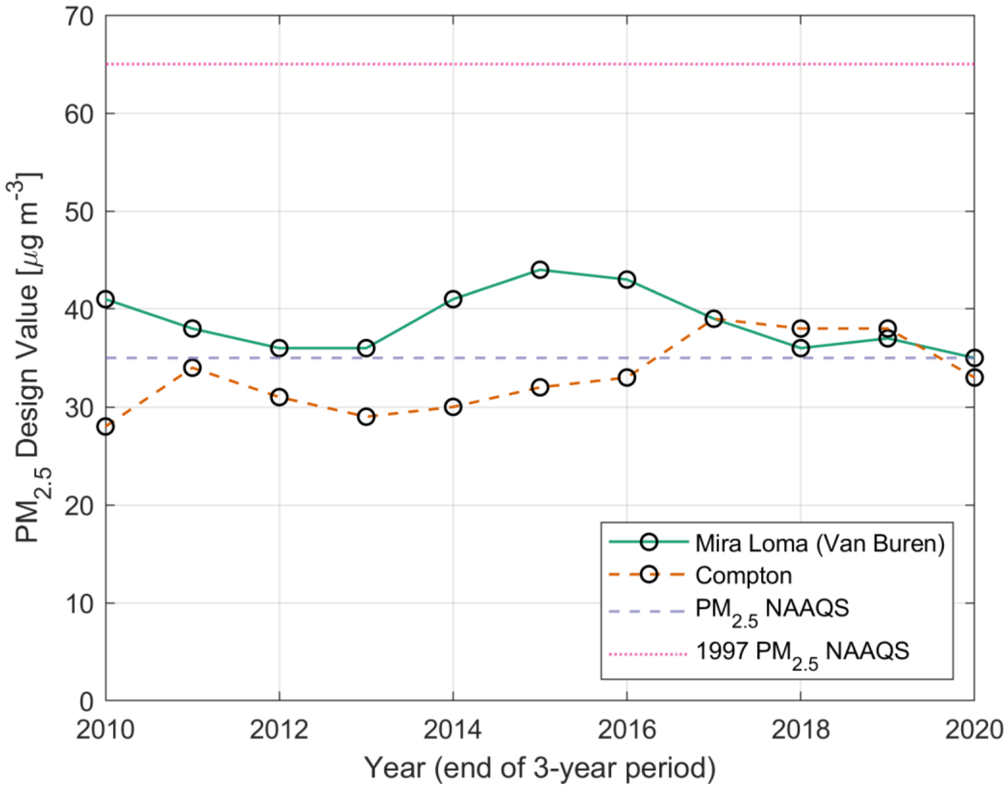

Figure 2-3: Trend of 24-hour average PM2.5 design values in the Basin at Mira Loma (Van Buren) and Compton from 2010 – 2020 after removing suspected exceptional events.[8]

2.2. Permanent and Enforceable Emission Reductions

The improvement in PM2.5 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[9]. PM2.5 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[10], and 2020, the attainment year in this redesignation request. For the 1997 24-hour PM2.5 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 PM2.5 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

[8] No monitors meet quarterly data completeness requirements for design value calculations in 2014. However valid design values were calculated by using data substitution tests.

[9] 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.

[10] Federal Register: Air Quality Designations for the 2006 24-Hour Fine Particle (PM2.5. 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 NOx and SOx emissions, which have been reduced by 67% and ~~78~~77%, respectively, since the initial designation of nonattainment status for the 1997 NAAQS. Corresponding emissions reductions are ~~48~~54% NOx and ~~59~~74% SOx, 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 NOx and SOx emissions from facilities belonging to the Regional Clean Air Incentives Market (RECLAIM).

Table 2-4: Reduction of Annual Average Basin Total Emissions of PM2.5 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 (%)
PM2.5	82	76	61	26	~~19~~20
NOx	1027	729	338	67	54
VOC	828	571	385	~~53~~54	~~32~~33
SOx	66	57	15	~~78~~77	74
NH3	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 PM2.5 Standard[11] and the SIP enforceable rules are available from the U.S. EPA[12]. There are many South Coast AQMD rules that regulate emissions of PM2.5 and PM2.5 precursors; selected rules that regulate primary particulate matter (PM) are listed in Table 2-5. In addition, regulations of PM2.5 precursor emissions such as NOx, SOx and VOC brought permanent and enforceable emission reductions.

[11] 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

[12] 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 (PM10 and PM2.5).

Emission Sources	South Coast AQMD Rule Number
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
PM10 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 PM2.5. 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 PM2.5 such as mixing heights, wind speeds, and precipitation. There were some emission reductions resulting from changes in human behavior during the early months (March through June) 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 98th percentile standard is a function of the highest days each year, temporary emission reductions from reduced activity in March and the 2nd 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 σ_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[13], in which concentrations are inversely proportional to the product of wind speed and vertical plume spread, σ_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, σ_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[14]. 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 $\sigma_w^2 = 0.35 w_*^2 + 0.8 u_*^2$, taken from the AERMOD formulation for the vertical profiles of U and σ_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 – 20122021. 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 (σ_w). Both indices increased over time at both Compton and Mira Loma (Van Buren), the stations with the highest PM2.5 98th percentile values in recent years, relative to the baseline period of 2008 – 20122021. 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.

[13] See equation 59 of the AERMOD model formulation document https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermodhttps://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod

[14] https://www.epa.gov/scram/meteorological-processors-and-accessory-programs https://www.epa.gov/scram/meteorological-processors-and-accessory-programs

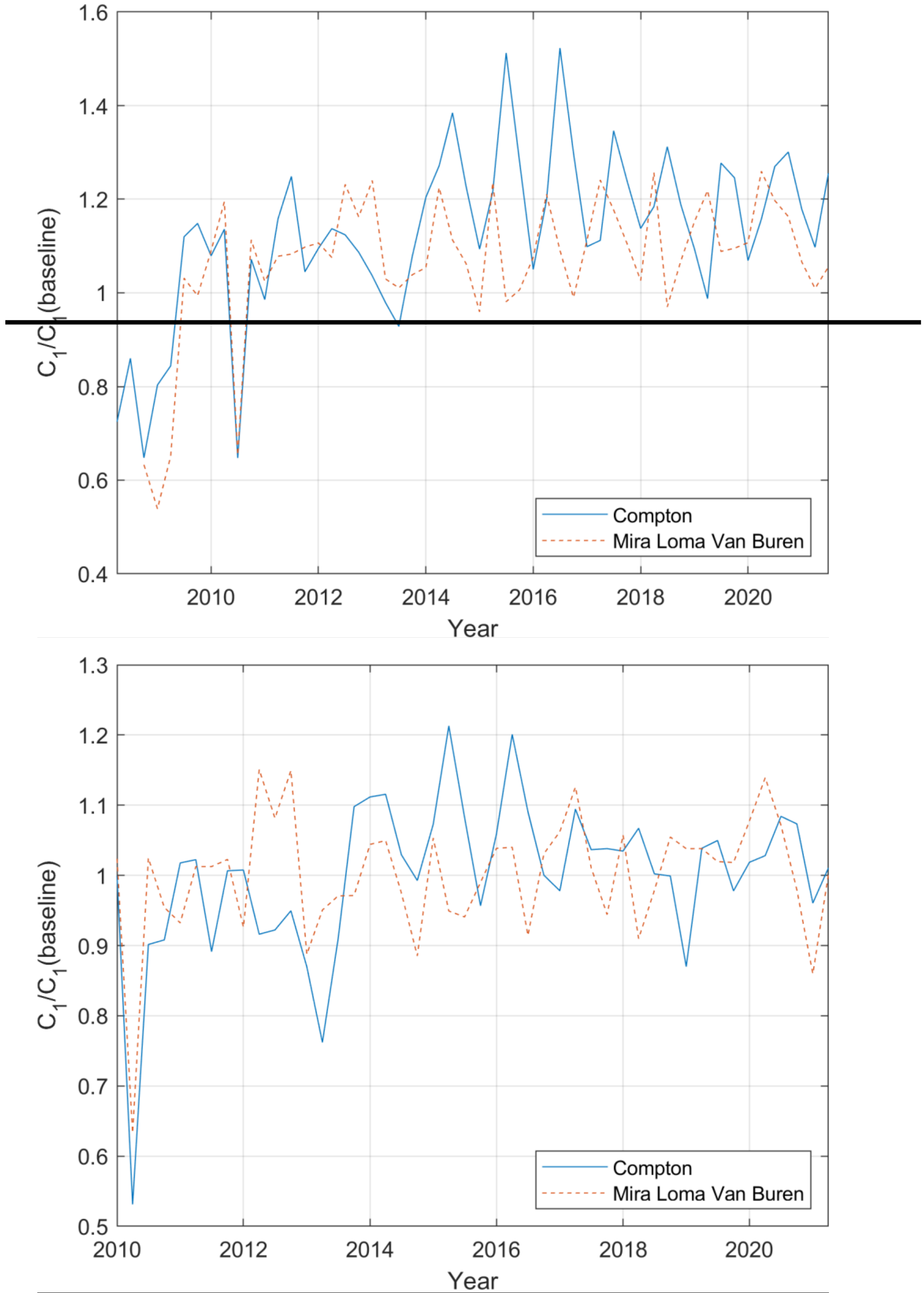

Figure 2-4: Trend of dispersion index (hU) at Compton and Mira Loma (Van Buren).

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

The indexesThe next section demonstrates that the dispersion indexes of equations 1 and 2 are useful for quantifying the influence of meteorology on concentrations. To do this, we analyzed the relationship between hourly PM2.5 concentrations measured at Mira Loma (Van Buren) and the indices. Variability of emission rates dominates the variation of measured PM2.5 concentrations; therefore, a model that could accommodate the variability was required for this analysis. We fit an empirical model using data from 2010 to 2020 after removing suspected exceptional events, with the hourly indicies as independent variables and the measured concentrations as the dependent variable:

$$PM2.5 = A + (1 - B \times (year - 2010))Q_m(Q_{1h}\, C_1 + Q_{2h} C_2) \qquad (3)$$

where PM2.5 is the measured hourly concentration and *A*, *B*, Q_m, Q_{1h} and Q_{2h} are empirical parameters of the model. Q_{1h} and Q_{2h} are each sets of 24 parameters that are indexed by the hour of the day, *h*, and Q_m is a set of 12 parameters that is indexed by the month, *m*. The parameter *B* allows for the year-to-year decrease of PM2.5 concentrations that is observed due to emission reductions, Q_{1h} and Q_{2h} allow for diurnal variation of concentrations, which may in part be caused by emission variations over the day, and Q_m allows for seasonal variation of concentrations, which may in part be caused by emission variations over the year. Note that C_1 and C_2 are the dispersion indices developed in equations 1 and 2, respectively. The model in equation 3 was fit using the nonlinear fitting function least_squares in the Python scipy.optimize package, where lower bounds of *A*, Q_{1h}, Q_{2h}, *and* Q_m were set to a small number, the upper bound of *A* was set to 15 μg m^{-3}, and the upper bound of *B* was set to 0.05. The resulting standard error of the estimate was 11.0 μg m^{-3} and the parameters *A* and *B* were 10.4 μg m^{-3} and 0.05, respectively.

We calculated monthly averages of the predicted PM2.5 using equation 3 (over the 2010 – 2020 period) and then compared the averages with the measured monthly average PM2.5 after removing suspected exceptional events. We first "normalized" the measured and predicted monthly PM2.5 by as $Normalized\ PM2.5 = (PM2.5 - A)/((1 - B \times (year - 2010))Q_m))$. This normalization process isolates the influence of C_1 and C_2 on the concentrations and thus enables us to determine their relationship with the measured PM2.5. A linear regression model fit to the monthly averaged normalized data had intercept and slope of -8.45 μg m^{-3} ($p<0.01$) and 2.53 ($p<0.01$) and coefficient of determination $r^2 = 0.43$ (Figure 2-6). The coefficient of determination indicates that the predicted PM2.5 can explain a moderate amount of variation of the measured monthly average PM2.5. Variability of emission rates and the influence of atmospheric chemistry, transport, emission release heights, and terrain all contribute to additional variation of the measured PM2.5. However, the reason we use the dispersion index is to isolate the contribution of several meteorological factors on concentrations. This analysis demonstrates that the meteorological indices C_1 and C_2 are useful for the purpose of determining the influence of meteorological factors that govern atmospheric transport and dispersion on PM2.5 concentrations and supports the conclusion that transport and dispersion related meteorological conditions during the design value period (2018 – 2020) were not unusually favorable to lower concentrations.

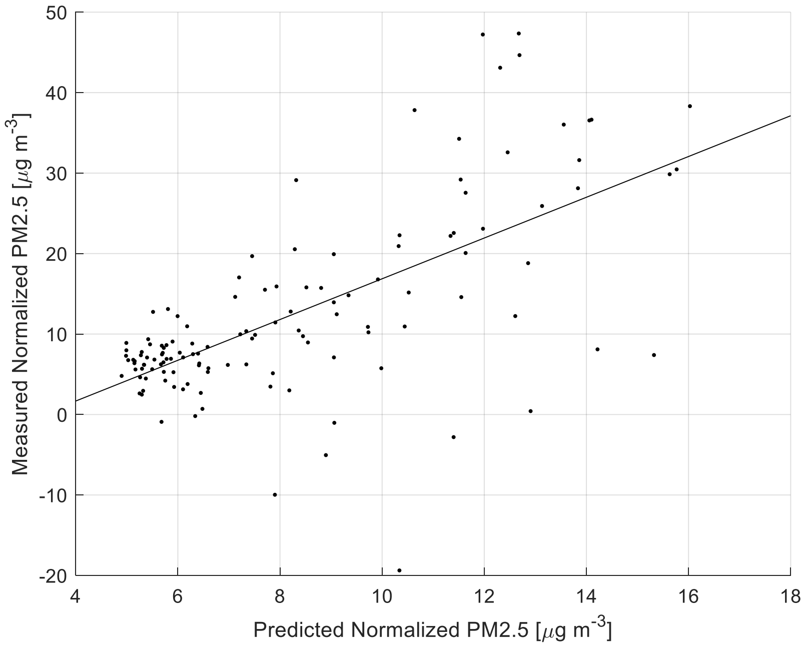

Figure 2-6: Comparison of monthly average PM2.5 predicted by equation 3 with measured values from 2010 to 2020. The line is a linear regression line.

The model parameters Q_{1h} and Q_{2h} for each hour of the day are shown in Figure 2-7. The parameters are related to emission rates but cannot be interpreted as emissions because the model we used does not account for chemistry that relates precursor emissions with PM2.5, among other sources of variability.

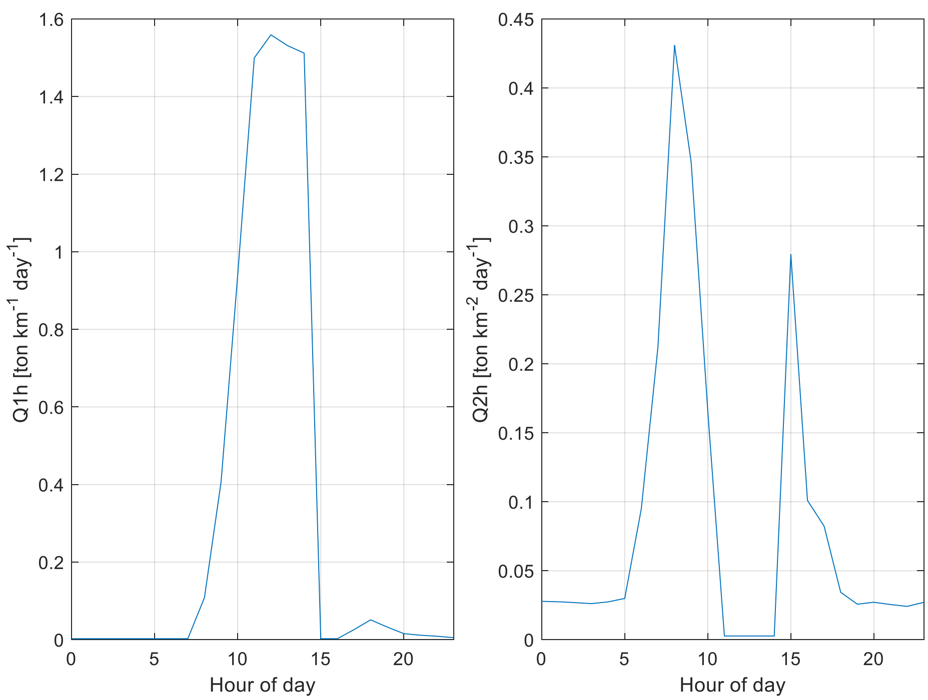

Figure 2-7: Fitted model parameters Q_{1h} and Q_{2h} for each hour of the day.

The indices 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 PM2.5 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 in 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 PM2.5 concentrations (less wet deposition), thus providing evidence that precipitation was not favorable to lower PM2.5 concentrations in the design value period.

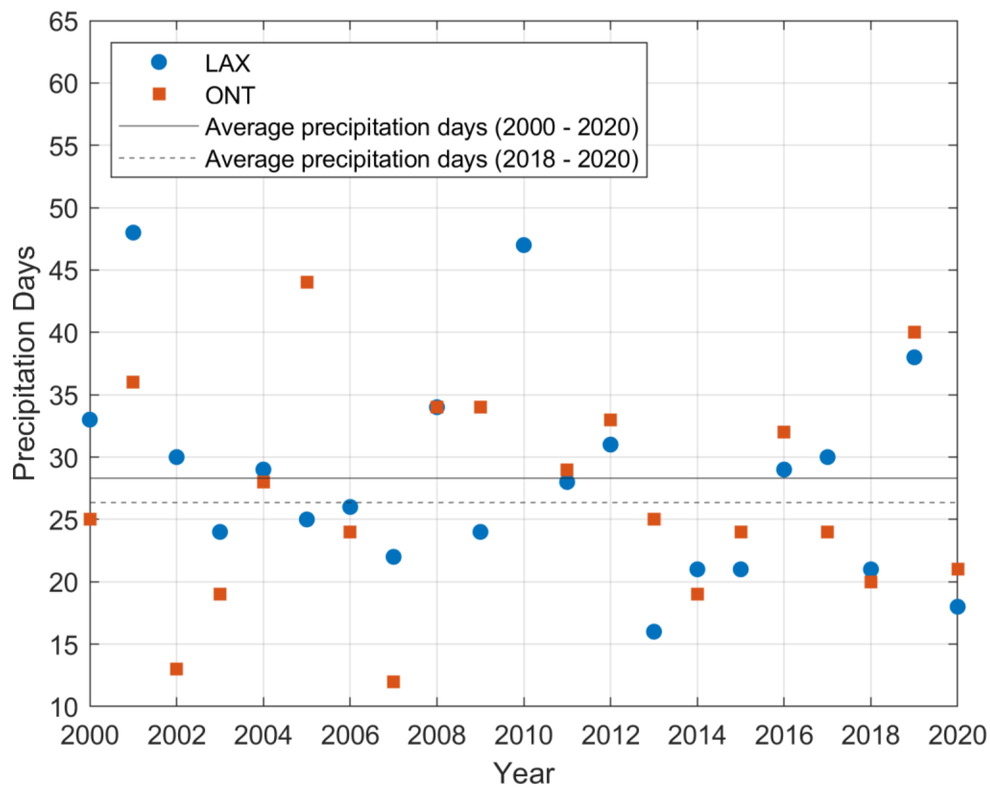

Figure 2-8: Trends of number of days with precipitation greater than 0.01 inches. The average number of precipitation days from 2000 – 2020 and 2018 – 2020 are shown as horizontal lines.

2.3. Basin PM2.5 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 PM2.5 NAAQS. The 2012 and 2016 AQMP included control measures for PM2.5 and PM2.5 precursor emissions addressing the 2006 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.[15] 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 98th percentile PM2.5 measurements taken during 2018 to 2020. The U.S. EPA's 1994 guidance[16] 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. A brief description of the methodology to estimate criteria air pollutants emissions is provided in Appendix I of this Plan. 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[17]
- South Coast Air Basin Attainment Plan for 2006 24-Hour PM2.5 Standard (hereafter, referred as 189(d) Plan)[18]
- 2021 PM10 Maintenance Plan for the South Coast Air Basin[19]

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[15] 84 FR 3305 (effective March 14, 2019).

[16] 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

[17] 2016 Air Quality Management Plan, available at: http://www.aqmd.gov/home/air-quality/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp

[18] 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

[19] 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

- 2022 Air Quality Management Plan preliminary inventory

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[20].

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.

[20] 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[21].

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.

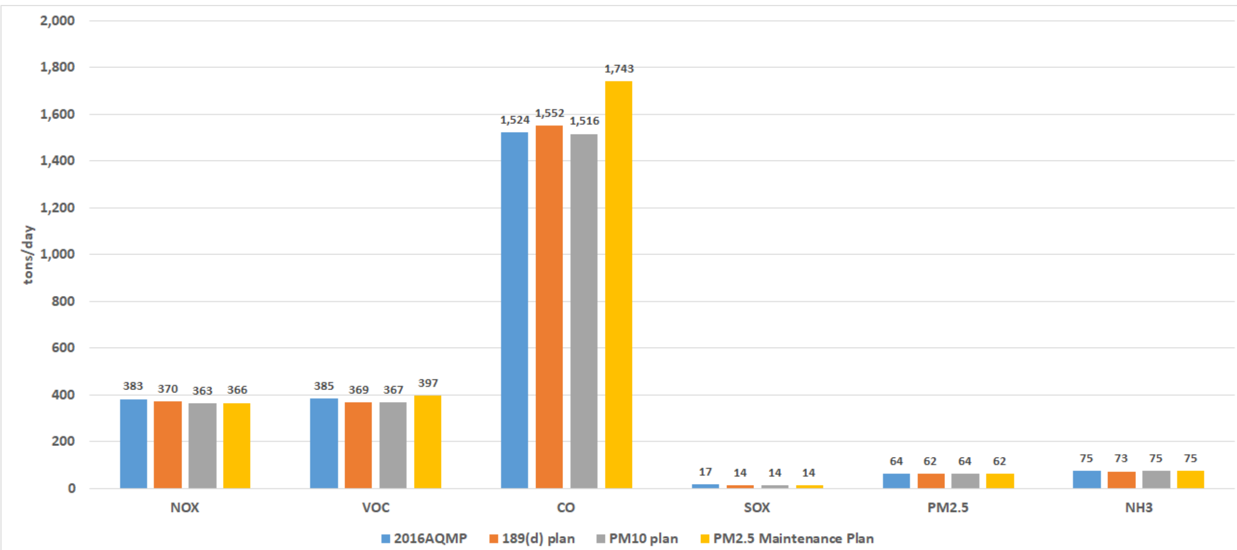

Figure 3-1. South Coast Air Basin Total Emissions from 2016 AQMP (blue), 189(d) Plan (orange), PM10 Maintenance Plan (grey) and PM2.5 Maintenance Plan (yellow) for 2018.

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.

[21] 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

The largest sources of PM2.5 emissions in the Basin include cooking, paved road dust, residential fuel combustion, light duty passenger vehicles, and paper and wood industrial processes. Detailed emissions inventories by major source categories are provided in Appendix II of this Plan.

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

OURCESOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
STATIONARY SOURCES							
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
Total Stationary Sources	219.72	59.97	147.67	8.84	136.60	45.67	58.52
MOBILE SOURCES							
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
Total Mobile Sources	177.06	306.29	1594.86	5.29	30.17	16.42	16.43
TOTAL	396.78	366.26	1742.52	14.12	166.77	62.10	74.94

[1] Values may not sum due to rounding

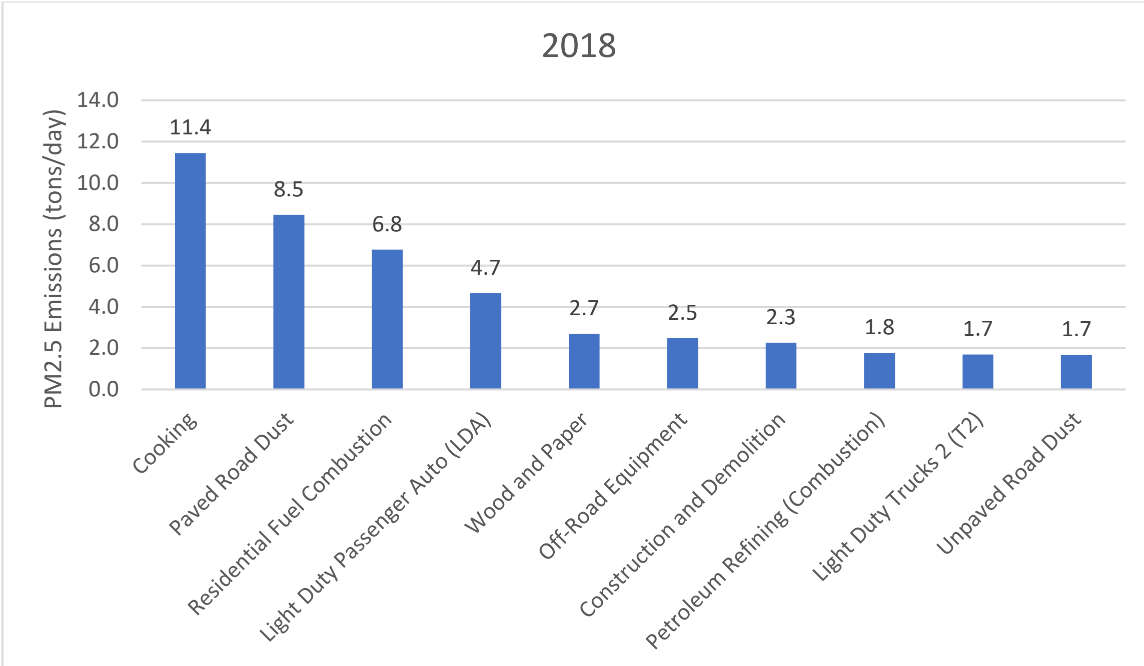

Figure 3-2. Top 10 PM2.5 sources in 2018

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. A list of South Coast AQMD's regulations and programs that result in reductions of criteria air pollutants is provided in Appendix I.

~~Future years' stationary source emissions~~The South Coast AQMD's RECLAIM is a market-based cap-and-trade program to reduce SOx and NOx emissions. The 2016 AQMP CMB-05 commits to a transition from RECLAIM cap-and-trade approach to a command and control regulatory structure requiring Best Available Retrofit Control Technology (BARCT) level controls as soon as practicable. 2025 and 2026 are expected to be the first year without NOx and SOx RELCAIM, respectively. As such, 2023 emissions included in this Plan are divided into RECLAIM and non-RECLAIM point source emissions and area sources. Future NOx and SOx emissions from RECLAIM point sources are estimated based on their allocations as specified by South Coast AQMD Rule 2002 – Allocations for NOx and SOx. 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~~Emissions from "former RECLAIM" emissions in 2031 and 2035 were estimated with the same methodology as for non-RECLAIM sources. Detailed information on the methodology to project emissions for future ~~years.~~year are provided in Appendix I of this Plan and is also available in Chapter 3 and Appendix III of the 2016 AQMP

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 PM2.5 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 including all stationary and mobiles sources can be found in Appendix III.

Table 3-2: 2020 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin (tpd[1])

SOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
STATIONARY SOURCES							
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
Total Stationary Sources	220.88	63.36	138.40	9.45	137.12	45.47	57.99
MOBILE SOURCES							
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
Total Mobile Sources	164.32	274.29	1538.73	5.40	29.33	15.56	17.77
TOTAL	385.20	337.65	1677.13	14.85	166.45	61.03	75.76

[1] Values may not sum due to rounding

Table 3-3: 2023 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin (tpd[1])

SOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
STATIONARY SOURCES							
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
Total Stationary Sources	225.01	55.71	137.71	9.48	139.11	45.92	57.54
MOBILE SOURCES							
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
Total Mobile Sources	148.04	220.69	1462.47	5.54	28.08	14.23	19.99
TOTAL	373.04	276.40	1600.18	15.02	167.19	60.15	77.53

[1] Values may not sum due to rounding

Table 3-4: 2031 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin (tpd[1])

SOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
STATIONARY SOURCES							
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
Total Stationary Sources	239.15	53.03	132.12	8.98	143.27	47.00	58.59
MOBILE SOURCES							
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
Total Mobile Sources	131.40	198.45	1427.27	6.03	27.55	13.65	22.29
TOTAL	370.55	251.48	1559.39	15.01	170.83	60.65	80.88

[1] Values may not sum due to rounding

Table 3-5: 2035 Average Annual Day Emissions by Major Source Category in the South Coast Air Basin (tpd[1])

SOURCE CATEGORY	Annual Average						
	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
STATIONARY SOURCES							
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
Total Stationary Sources	245.56	51.75	130.24	9.01	145.35	47.49	59.12
MOBILE SOURCES							
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
Total Mobile Sources	127.71	191.04	1446.05	6.36	27.65	13.61	23.14
TOTAL	373.27	242.79	1576.30	15.36	173.00	61.10	82.26

[1] Values may not sum due to rounding

While Basin total NOx emissions are expected to decrease dramatically over time, PM2.5 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 the Basin's total PM2.5 emissions.

Top 10 sources of PM2.5 emissions for 2020, 2023, 2031, and 2035 are presented in Figures 3-3 through 3-6. The top 10 sources of PM2.5 emissions remain the same in the attainment and future years, with cooking and paved road dust leading to the overall increases in total PM2.5 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 6th highest (2.5 tpd) in 2018 to 10th highest in 2031(1.6) and 2035 (1.5 tpd).

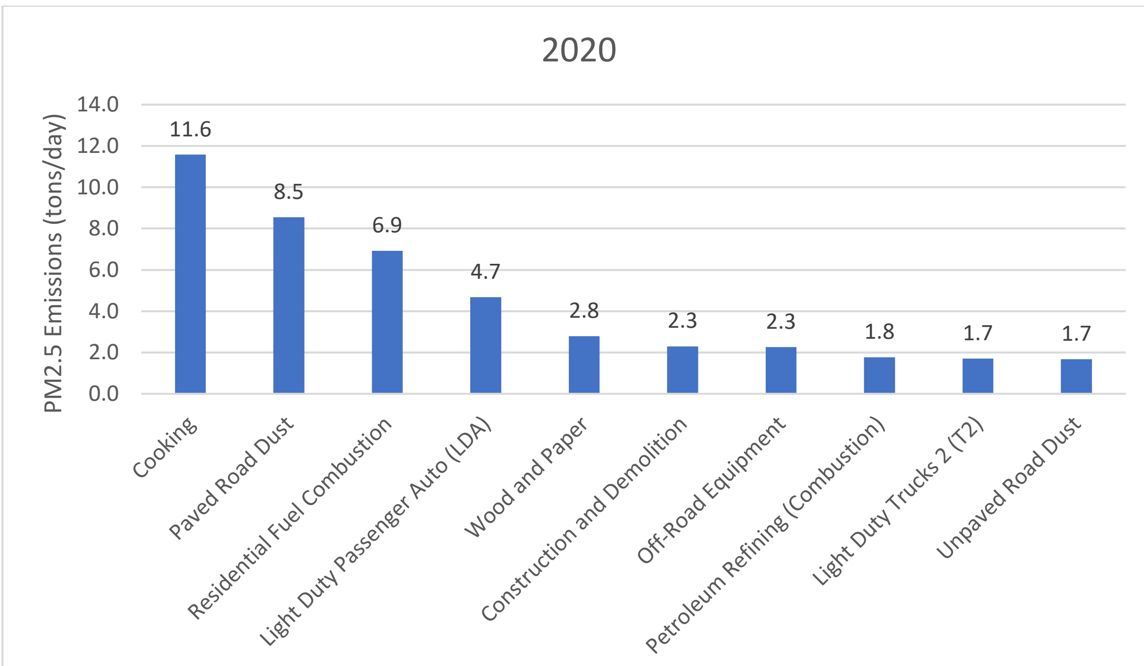

Figure 3-3: Top 10 ~~PM10~~PM2.5 sources in 2020

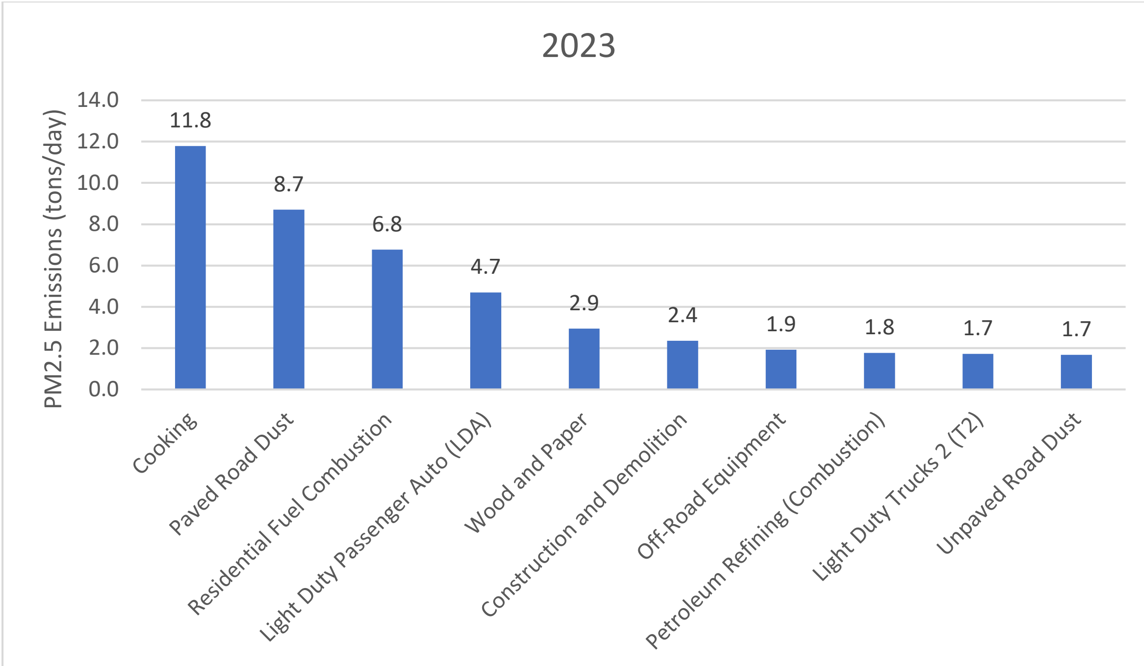

Figure 3-4: Top 10 PM2.5 sources in 2023

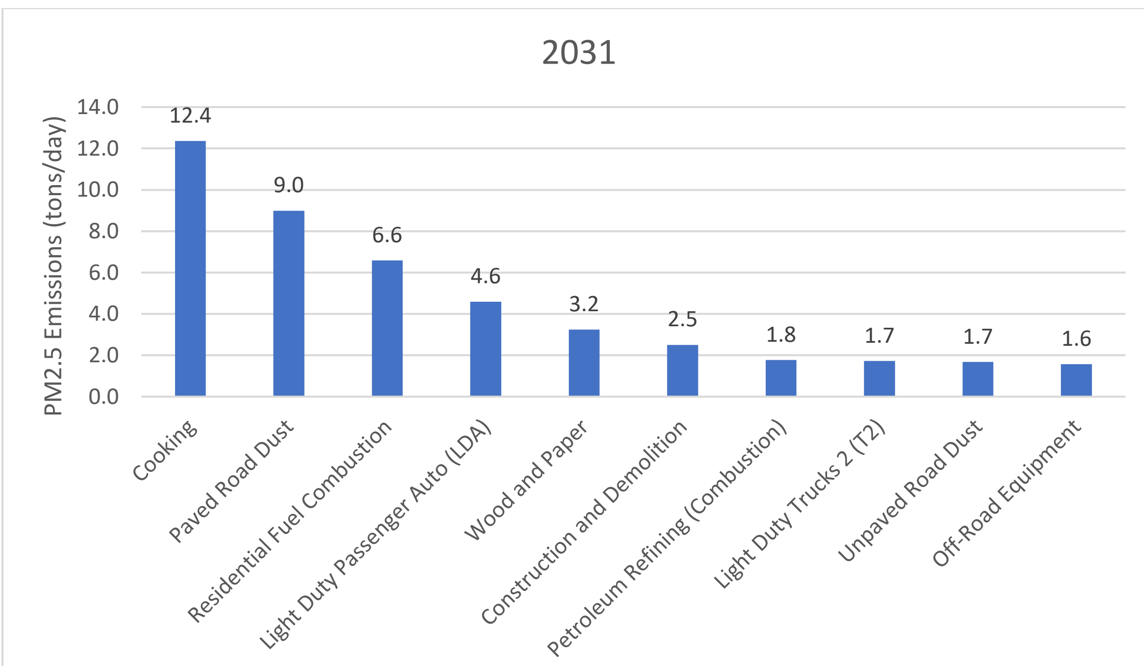

Figure 3-5: Top 10 PM2.5 sources in 2031

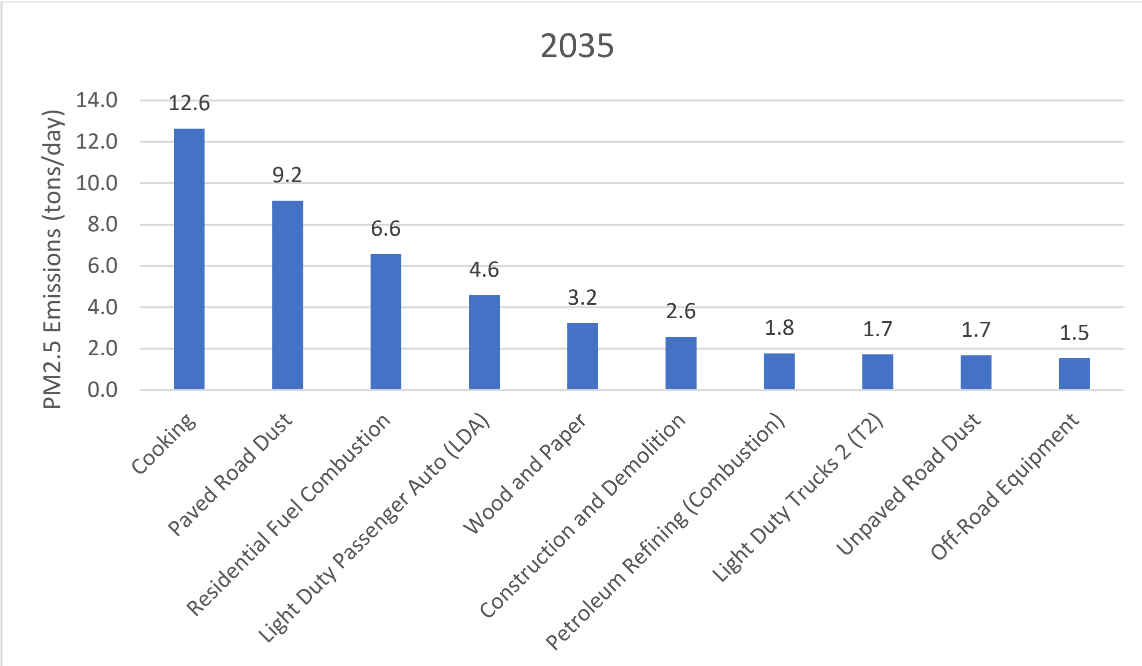

Figure 3-6: Top 10 PM2.5 sources in 2035

3.4. Condensable and Filterable Portions of PM2.5 Emissions

Per PM2.5 NAAQS final implementation rule[22], the SIP emissions inventory is required to identify the condensable and filterable portions of PM2.5 separately, in addition to primary PM2.5 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 PM2.5 size fraction. The U.S. EPA's Air Emissions Reporting Requirements (AERR) requires states to report annual emissions of filterable and condensable components of PM2.5 and PM10, "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 PM2.5 from stationary point and area sources are estimated using the methodology described in ~~the 189(d)~~Appendix I of this Plan. Filterable PM comprises "particles that are directly emitted by a source as a solid or liquid [aerosol] at stack or release conditions." Primary PM2.5 is the sum of condensable and filterable PM2.5 emissions. Mobile sources emit PM in both filterable and condensable form; however, the AERR does not require states to report filterable and condensable PM

[22] 40 CFR 51.1008(a)(1)(iv)

separately for mobile sources. Therefore, the condensable and filterable PM2.5 emissions submitted here include only those from stationary point and area sources. Condensable and Filterable Portions of PM2.5 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 PM2.5 emissions for 2020, 2023, 2031 and 2035.

As shown on Figure 3-7, total primary PM2.5 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 PM2.5 emissions in the Basin; for example, 0.2 tpd increase in both condensable and filtrable portions of PM2.5 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 PM2.5 in 2020, 2023, 2031, and 2035. ~~Majority~~The majority of condensable PM2.5 is emitted from the "Cooking" category, which accounts for 74.9% and 77.2% of the total condensable PM2.5 in 2020 and 2035, respectively. The sum of the top five condensable PM2.5 categories represents 95.6% and 96.0% of the total condensable PM2.5 both in 2020 and 2035, respectively. Table 3-7 shows the top five categories for filterable PM2.5. The "Paved Road Dust" source category is the top emitter of filtrable PM2.5. The top five filterable PM2.5 emissions categories account for approximately 71.1% (2020) and 72.0% (2035) of the total filterable PM2.5 emissions. This points to a marginally higher contribution of top five filterable categories to total filterable PM2.5 emissions in future years. Detailed emissions by major source category are included in Appendix ~~II~~III of this Plan.

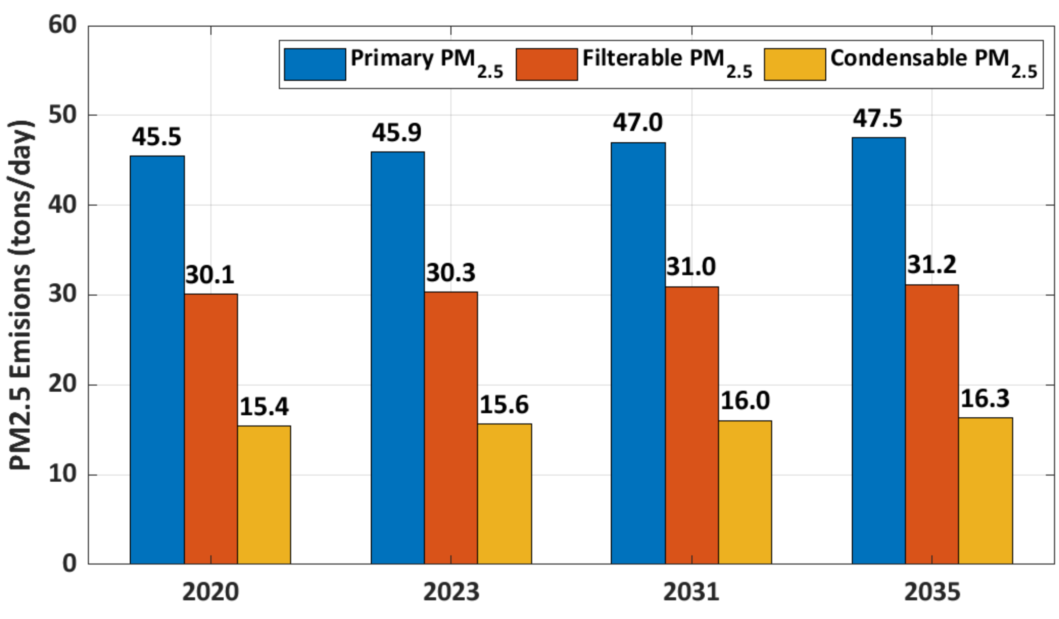

Figure 3-7: Annual Average Primary, Filterable and Condensable $PM_{2.5}$ emissions

Table 3-6: Top 5 categories emitting Condensable $PM_{2.5}$ (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 $PM_{2.5}$ (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 PM2.5 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 PM2.5 standards through 2035 for the South Coast Air Basin. This is because secondary PM2.5 has significant contribution to the ambient PM2.5 in the Basin; and therefore, chemical reactions and transport of precursor pollutants need to be considered in predicting future PM2.5 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 PM2.5 air quality which demonstrates continued attainment of the 1997 and 2006 24-hour PM2.5 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 Kerner Emissions (SMOKE) model, the Model of Emissions of Gases and Aerosols from Nature (MEGAN) and the Community Multiscale Air Quality (CMAQ) model to predict PM2.5 concentrations for the attainment and future milestone years. This chapter describes the Relative Response Factor (RRF) approach to predict future air quality, the PM2.5 chemical species fractions included in the RRF, future PM2.5 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.[23]

PM2.5 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. PM2.5 modeling employs the ~~same approach as described~~modeling platform employed in the 2016 AQMP and the South Coast Air Basin Attainment Plan for the 2006 24-Hour PM2.5 Standard (hereafter, 189(d) Plan) except for updates in the ~~modeling platform~~model versions, input databases, and emissions inventory.[24] Models used include

[23] U.S. EPA, (2018). Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.5, and Regional Haze. https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf

[24] South Coast AQMD, (2020). South Coast Air Basin Attainment Plan for the 2006 24-Hour PM2.5 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

CMAQ 5.2.1, MEGAN 3.0, SMOKE 4.8, and WRF 4.0.3. The Appendix V of the 2016 AQMP[25] provides detailed modeling configuration employed for the 2016 AQMP.

Future year design values are determined following U.S. EPA's guidance. Site-specific quarterly-averaged RRFs are calculated for the following PM2.5 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 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.~~EPA agreed in concept that, in this specific situation, using a 3-year DV and 5-years in the weight of evidence could be appropriate, if adequately justified. 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 µg/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 98th percentile of all 24-hour concentrations sampled at a monitoring site. Sites with everyday sampling frequency use the 8th highest value; sites with every 3rd day sampling frequency use the 3rd highest value; and sites with every 6th day sampling frequency use the 2nd highest value as the 98th percentile[26].

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.

[25] South Coast AQMD, (2017). 2016 Air Quality Management Plan, Appendix V. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/final-2016-aqmp/appendix-v.pdf?sfvrsn=10
Chapter 2 of the Appendix V provides modeling protocol for the 2016 AQMP modeling.

[26] 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.

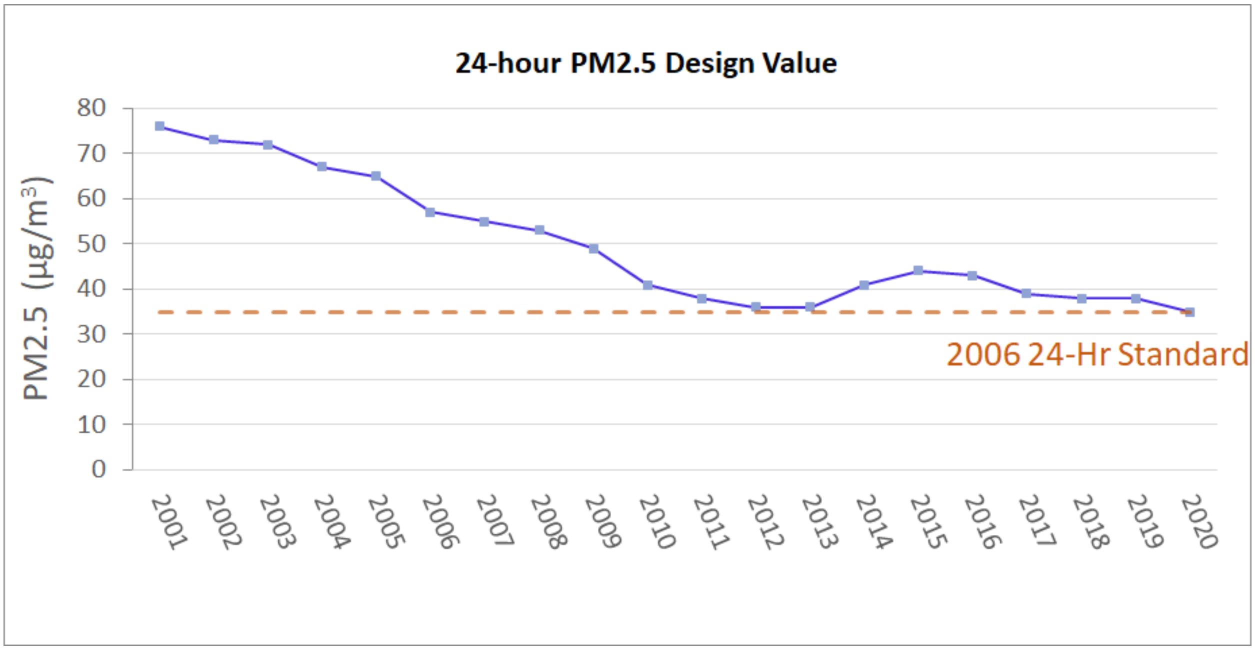

Figure 4-1: South Coast Air Basin 24-Hour PM2.5 Design Values. The 2020 design value excludes data influenced from the Bobcat and El Dorado wildfires from September 11 through 16.

Table 4-1 provides the 2020 24-hour PM2.5 design values and 98th 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 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 PM2.5 standard, with Mira Loma (Van Buren), Long Beach-Route 710 Near Road, Fontana, Compton, and Azusa at 35 $\mu g/m^3$ and the rest of stations below 35 $\mu g/m^3$.

Table 4-1: 24-hour Measured PM2.5 98th Percentile and Design Values (µg/m3)

Monitoring Site	2018 98th Percentile	2019 98th Percentile	2020 98th 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

PM2.5 Composition

PM2.5 is either directly emitted into the atmosphere (primary particles) or formed through atmospheric chemical reactions from precursor gases (secondary particles). Primary PM2.5 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.

PM2.5 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 a high volume of traffic and human activities in the Los Angeles countyCounty. The chemical speciation data used in this Plan is identical to those employedincluded in the 189(d) Plan. is used in this Plan as well. Details of chemical speciation data is provided in Appendix IV of this 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.[27,28] Inorganic nitrate is a semi-volatile component therefore shifts toward the gas phase during summer.[29] These trends are observed at all four CSN sites without major spatial gradients.. Details can be found in Ch. 4 of the 189(d) Plan and in Appendix IV of this Plan.

4.2. PM2.5 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 PM2.5 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 NOx, SOx, CO, PM2.5 and NH3 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 PM2.5 concentrations were calculated. The modeling system was applied to the emissions representing 2020, 2023, 2031, and 2035.

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[27] 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.
[28] 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.
[29] 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 PM2.5. RRFs were generated for seven species: ammonium (NH4), nitrate (NO3), sulfate (SO4), 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 PM2.5 measured data based on the eight highest PM2.5 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.[30] A blank mass of 0.2 $\mu g/m^3$ 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 98th percentile concentration each year. An average of the resulting future year 98th percentile concentrations for the three years was used to calculate future design values for the maintenance demonstration. The 98th percentile value was determined based on the data sampling frequency. For example, every day sampling makes the 8th highest day the 98th percentile and every 6th day sampling makes the 2nd highest day the 98th percentile. The proportion of nitrate, elemental carbon, and ammonium decreases from 2023 to 2035 consistent with the quarterly averaged RRFs in Figure 4-2.

[30] 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

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

4.3. PM2.5 Modeling Results

Model Performance Evaluation

Model performance was evaluated against corresponding measured PM2.5 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.

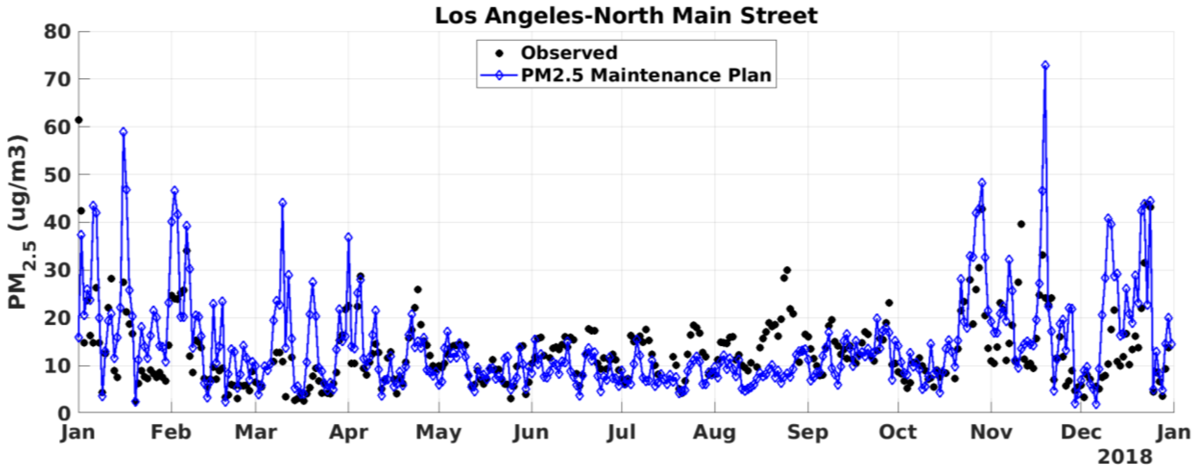


Figure 4-3: Time Series Comparison of PM2.5 Observations and Simulated Mass Concentrations at the Los Angeles-North Main Street Monitoring Site

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

Station	OBS_AVE[1] (μg/m³)	SIM_AVE[2] (μg/m³)	R[3]	RMSE[4] (μg/m³)	MB[5] (μg/m³)	MAGE[6] (μg/m³)	NMB[7] (%)	NME[8] (%)
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

[1] Observation average
[2] Simulation average
[3] Coefficient of correlation
[4] Root Mean Squared Error
[5] Mean Bias
[6] Mean Adjusted Gross Error
[7] Normalized Mean Bias
[8] 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 PM2.5 days for Los Angeles and Riverside-Rubidoux. High PM2.5 day is defined as annual 98th 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 NOx emissions reductions. Directly emitted PM2.5 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 PM2.5 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 NOx 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.

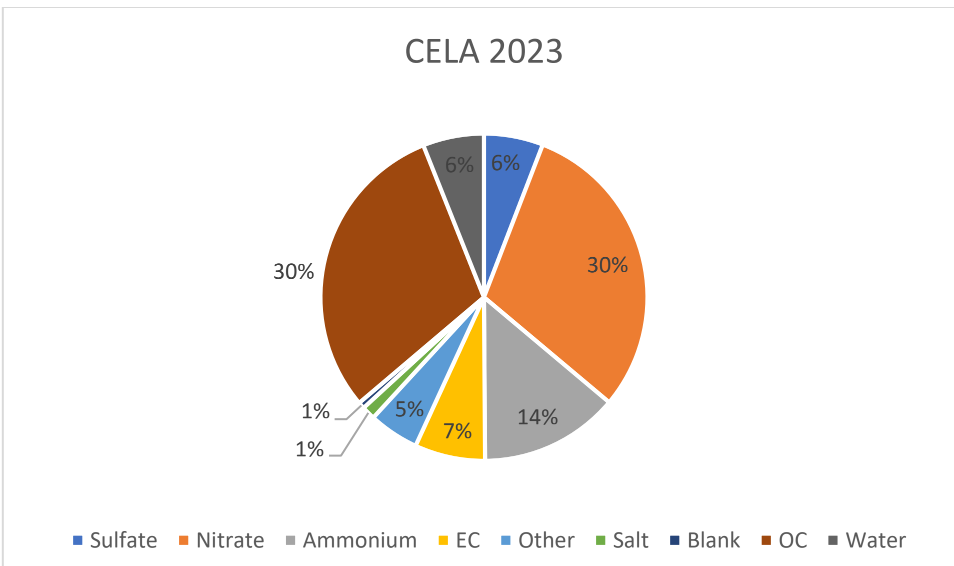


Figure 4-4: RRF-adjusted composition of 98th percentile PM2.5 in 2023 at Los Angeles-North Main Street (CELA)

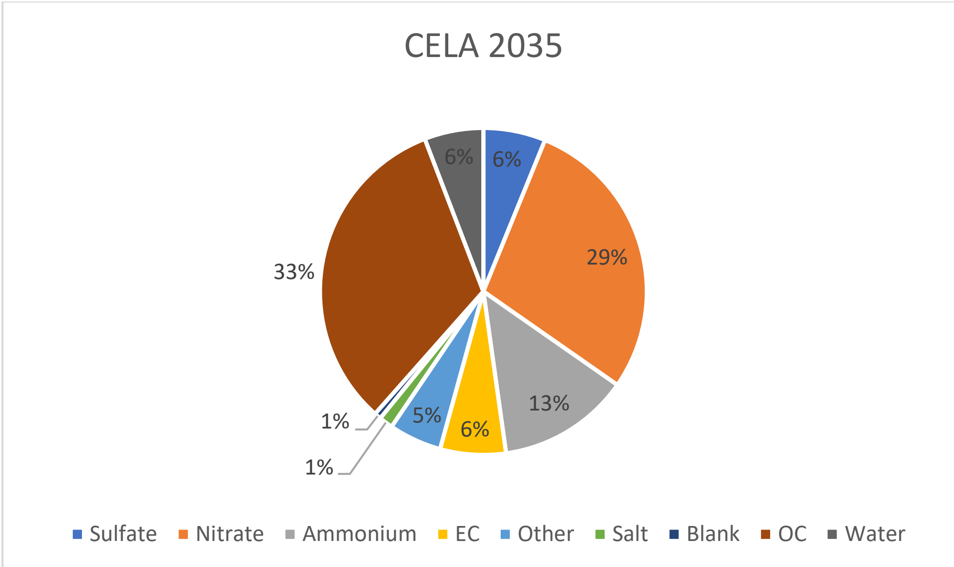


Figure 4-5: RRF-adjusted composition of 98th percentile PM2.5 in 2035 at Los Angeles-North Main Street (CELA)

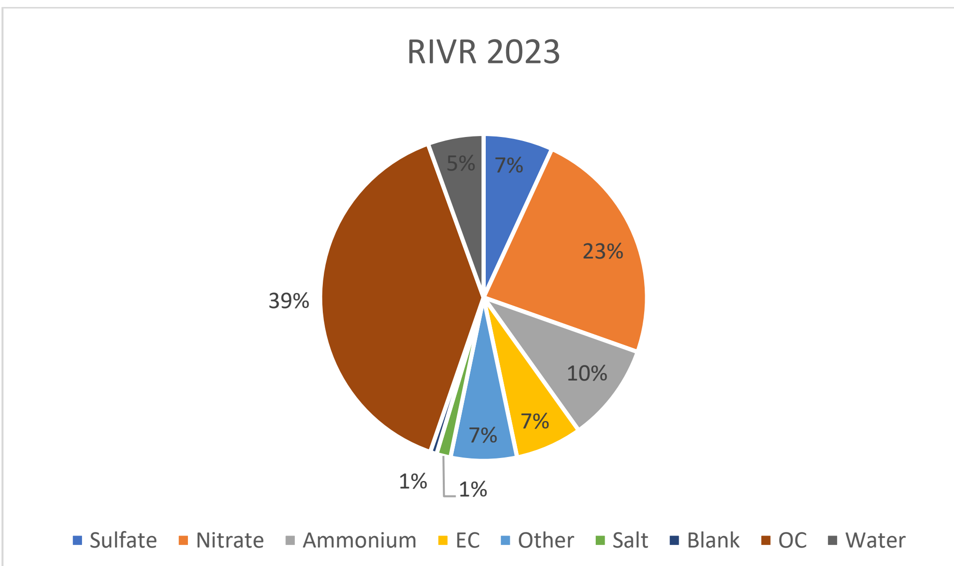


Figure 4-6: RRF-adjusted composition of 98th percentile PM2.5 in 2023 at Riverside-Rubidoux (RIVR)

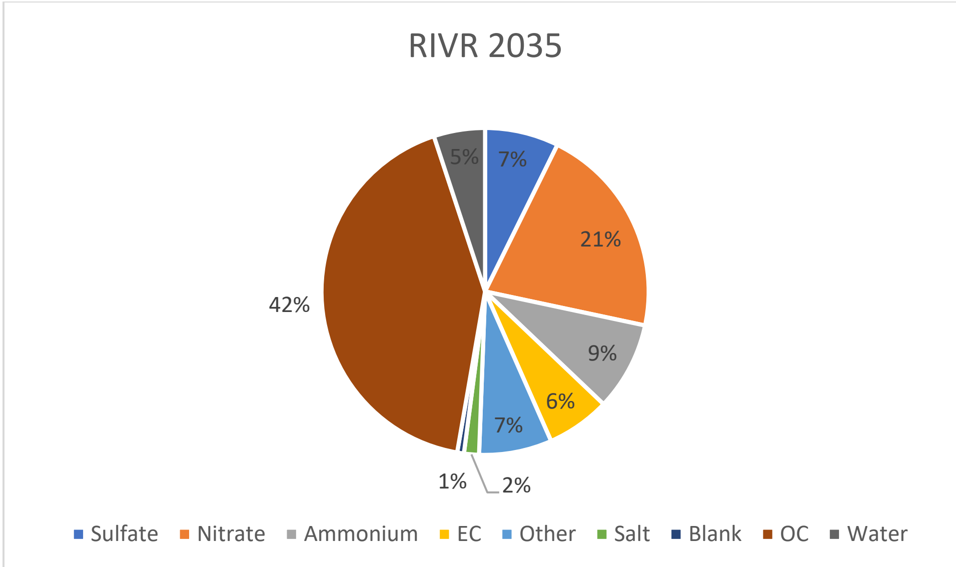


Figure 4-7: RRF-adjusted composition of 98th percentile PM2.5 in 2035 at Riverside-Rubidoux (RIVR)

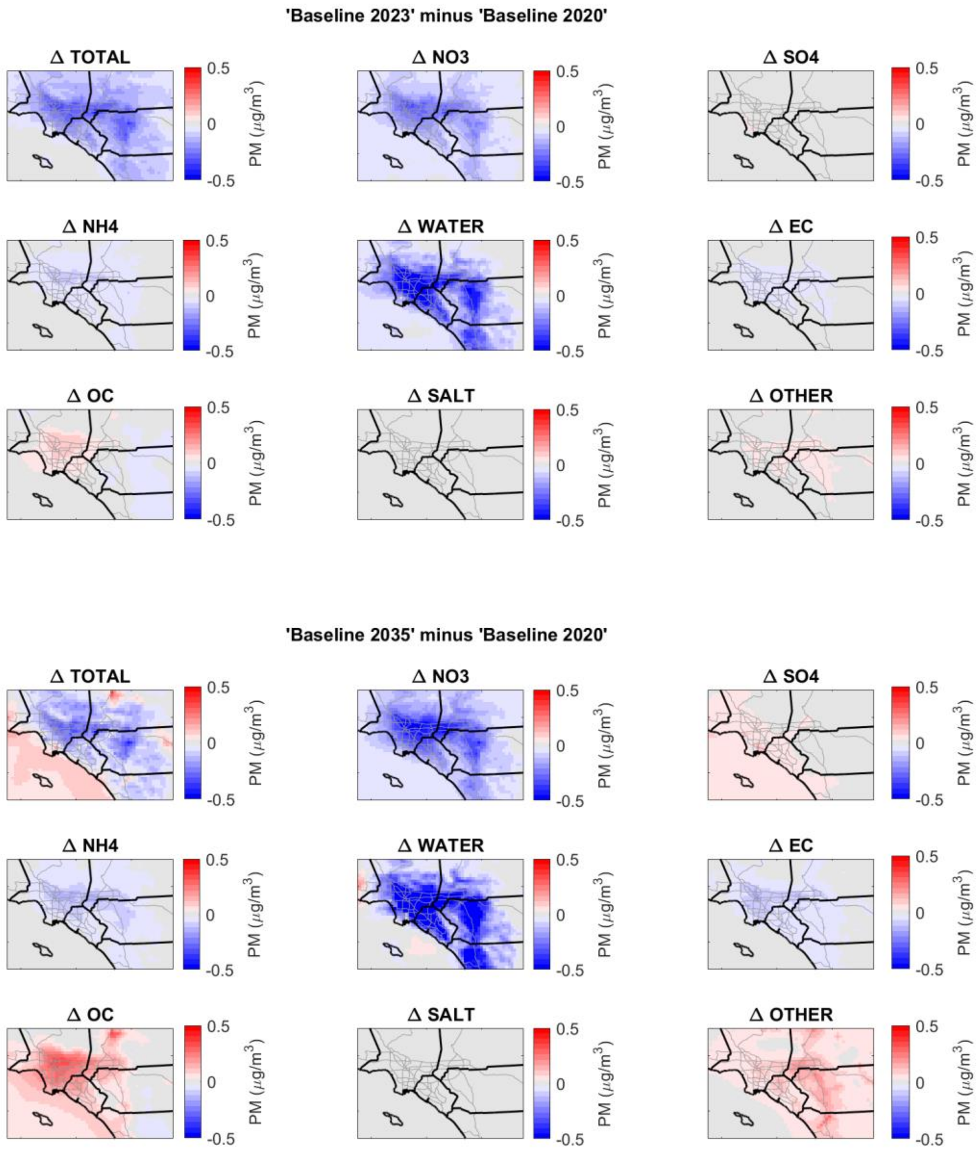


Figure 4-8: Annual averaged PM2.5 composition differences in 2023 (top) and 2035 (bottom) compared to baseline

Future PM2.5 design values

CMAQ simulations were conducted for the 2023, 2031, and 2035 using baseline emissions scenarios to assess the 24-hour PM2.5 attainment status in the Basin. Table 4-3 presents the future PM2.5 design concentrations based on the modeling analysis. The highest PM2.5 concentration in 2023 is projected to be 34.6 μg/m^3 at Long Beach-Route 710 Near Road. All other stations are forecast to be at least 1.0 μg/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 PM2.5 levels in 2031 and 2035. While peak daily PM2.5 can appear at any location along transportation ~~corridor~~corridors, 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 PM2.5 levels in future years in the areas close to the ports and along the transportation corridors. In summary, 24-hour average PM2.5 design values are predicted to be lower than or equal to 35 µg/m3 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 PM2.5 precursor emissions to meet ozone NAAQS in the Basin will further reduce the future PM2.5 concentrations.

Table 4-3: Future 24-hour PM2.5 Design Values (µg/m³)

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~~ The method employed in this unmonitored area analysis ~~conducted~~is consistent with those used in the 2016 AQMP and the 189(d) Plan. Chapter 7 of Appendix V of the 2016 AQMP describes the method for ~~this Plan,~~24-hour PM2.5 unmonitored area analysis. This unmonitored area analysis indicates that attainment of the 2006 24-hour PM2.5 standard ~~was confirmed~~is expected 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.

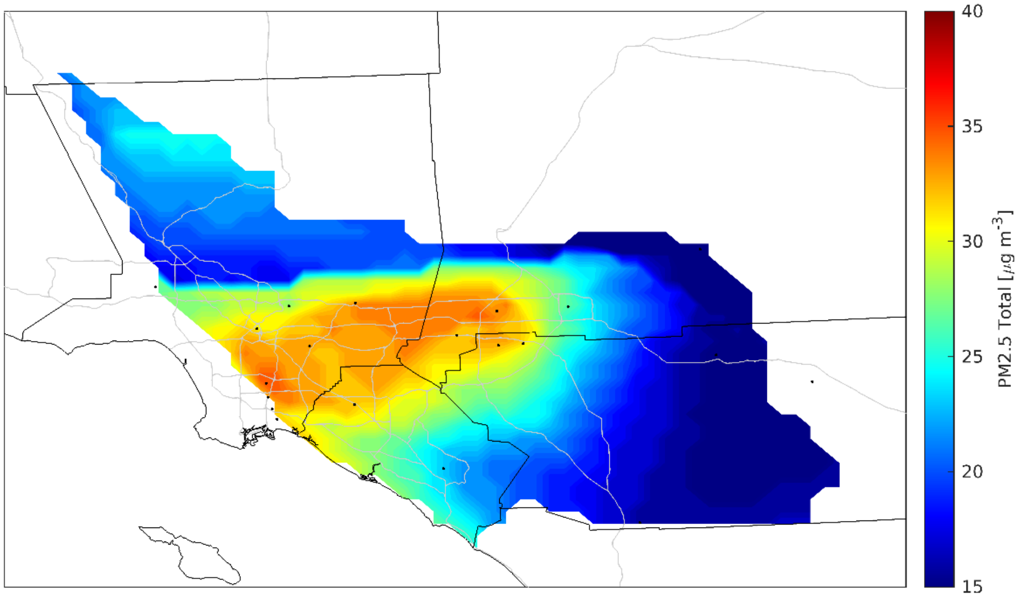


Figure 4-9: 2023 24-hour PM2.5 design concentrations

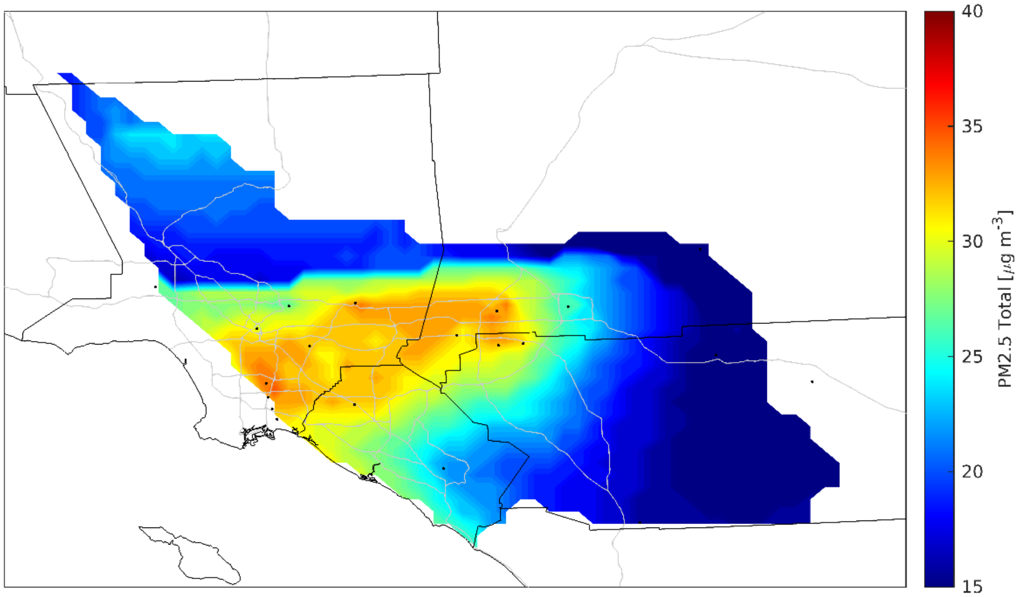


Figure 4-10: 2031 24-hour PM2.5 design concentrations

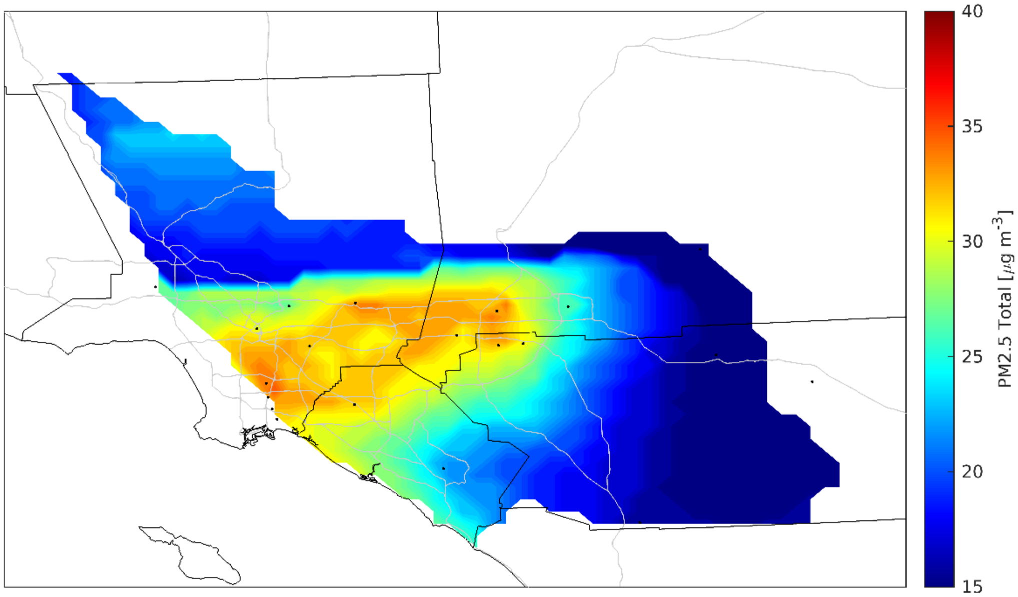


Figure 4-11: 2035 24-hour PM2.5 design concentrations

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^{th} percentile value in 2020 (53.1 µg/m^3) 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. Table 2-3 in Chapter 2 addresses wildfire impact for all stations in the Basin. When 'all suspected exceptional events' were excluded, the 2020 design value becomes lower by as much as 9 ug/m3 at Azusa, clearly indicating the presence of wildfire impact in 2020.

Another aspect to consider is increases in PM2.5 emissions and precursors from anchored ocean-going vessels. Notably, the Ports of LALos Angeles and Long Beach (hereafter, 'the Ports') 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)[31]. This increased anchorage activities resulted in NOx, SOx 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 PM2.5 concentrations in almost all areas in the Basin, with the highest impact estimated to be 0.47 $\mu g/m^3$ at Mira Loma (Van Buren). Figure 4-12 shows the changes in the 98th percentile 24-hour PM2.5 concentrations due to the increased anchorage activities. The congestion in the Ports is expected to be a temporary phenomenon reflecting consumer demand in the U.S. has shifted away from services to goods and home improvements due to the pandemic. Retailers' rushing to restock inventories that were depleted last year during the early months of the pandemic attributed to the congestion too.

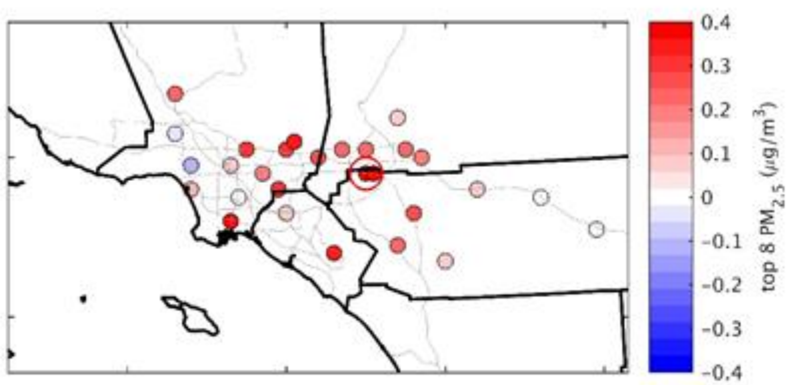
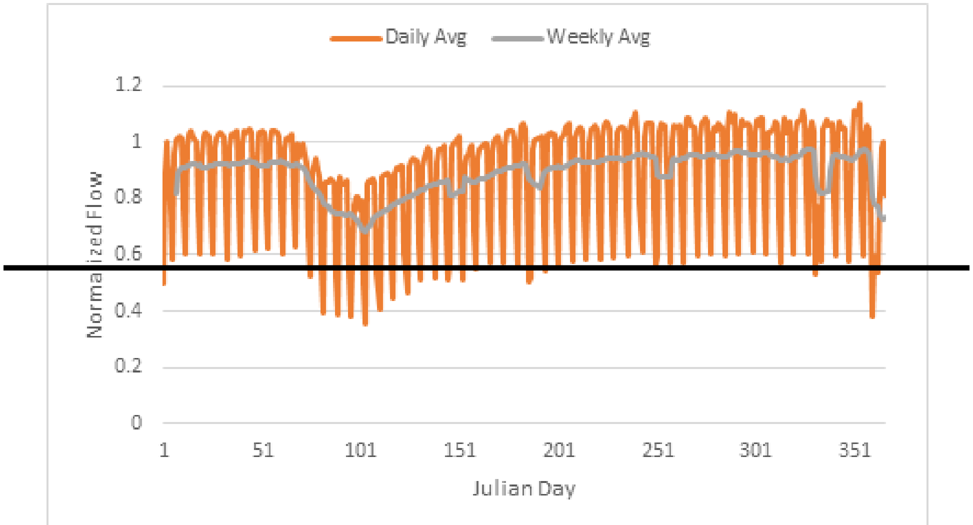


Figure 4-12: Modeled increase in PM2.5 top 8th day (98th percentile) due to 3.9 times increase in anchorage activity. Maximum increase is 0.47 $\mu g/m^3$, and occurs in Mira Loma (Van Buren) (circled station)

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

[31] Available at https://polb.com/environment/air#emissions-inventory

traffic was fully recovered to pre-pandemic levels by summer. Given that late fall and winter have high PM2.5 levels, the reduced traffic that occurred during late spring to early summer is unlikely to have affected the attainment status.



In all, the reduced emissions associated with reduced traffic volume and economic activities due to COVID-19 pandemic during spring and early summer in 2020 were not expected to contribute to the Basin's attainment of the 2006 and 1997 24-hour PM2.5 NAAQS. This is because high PM episodes typically occur during cold months in the Basin and emissions, especially from heavy duty vehicles recovered to the pre-pandemic level by summer. In addition, wildfires and congestion in the Ports of LA and Long Beach appear to impose adverse impact on PM2.5 levels compared to business-as-usual situation.

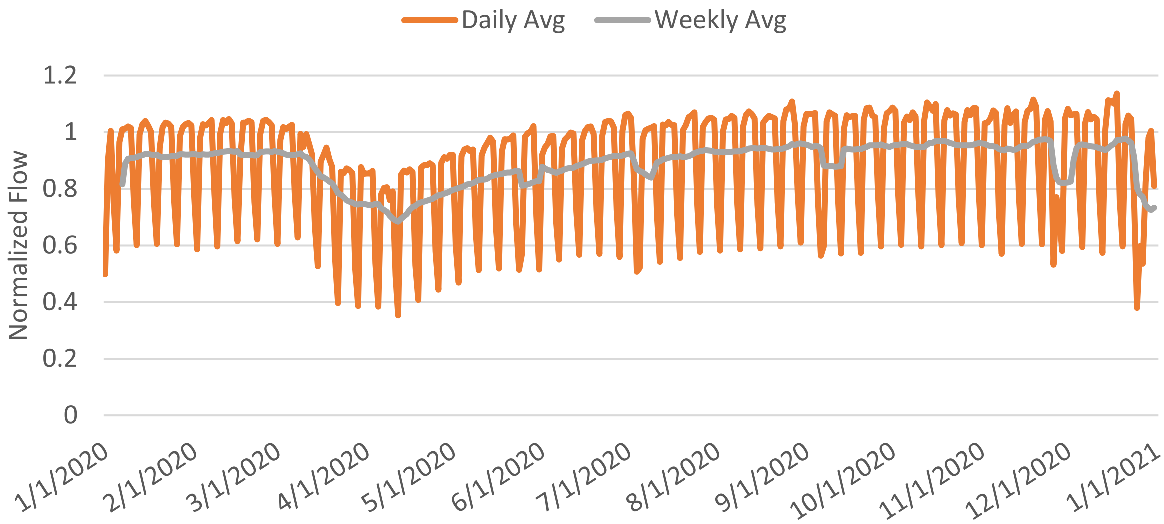


Figure 4-13: SCAB ~~averaged~~portion of Los Angeles county traffic flow from Caltrans' PeMS. The data is normalized to 2018 traffic flow.

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 1997 and 2006 24-hour PM2.5 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 PM2.5 standard is expected to be maintained through 2035, except in Compton~~ where~~ .

The Basin's highest PM2.5 value typically occurs in Riverside county. However, Compton exhibited the highest 5-year weighted DVs in the Basin, as shown in Table 4-5. This is due to high ~~design~~PM2.5 values measured in 2017. The latest 3-year DVs are 38, 38 and 35 ug/m3 in 2018, 2019 and 2020, respectively, which lead to 37.1 ug/m3 5-year weighted DVs. The nonattainment levels occurred in 2017 and 2018 were ~~likely~~ caused by ~~abnormal episodic human activity in close proximity to the monitoring station. Details~~2017 data, of which the 98th percentile value was 53.4 ug/m3. The abnormally high PM2.5 levels were influenced by a combination of woodsmoke, fireworks and adverse meteorology and did not recur after 2017.

Although the regional modeling results indicate the high PM2.5 levels lingered in the future milestone years, future DVs are in an almost steady decrease trend from the base year level. If the design value periods influenced by the abnormally high 2017 values are excluded, i.e. if the 2020 3-year design value is used, Compton is expected to be in attainment of the 1997 and 2006 24-hour PM2.4 NAAQS through 2035. More detailed analysis is provided in Appendix V to analyze the cause of the abnormally high PM2.5 levels. Excluding the 2017 data based on the Compton exceedances were presented in the 189(d) Plan.abnormality of the high values and non-recurrence since 2017, Compton is expected to maintain attainment of the 1997 and 2006 24-hour PM2.5 standard through 2035. In all, regardless of the choice of the attainment year's design value, maintenanceattainment status of the 1997 and 2006 24-hour PM2.5 standard isNAAQS are expected to continue through 2035.

Table 4-5: Future 5-year Weighted Average 24-hour PM2.5 Design Values (µg/m3)

Monitoring Site	5-year Measured Design Value	2023 Design Value	2031 Design Value	2035 Design Value
Anaheim	30.0	29.5	29.1	29.3
Azusa	29.0	27.8	27.2	27.1
Big Bear	20.7	18.5	17.9	17.9
Compton	37.1	36.4	36.1	36.2
Fontana	30.6	29.6	29.2	29.1
Long Beach – North	30.4	30.2	30.4	30.4
Long Beach – South	30.0	29.8	29.9	30.0
Long Beach-Route 710 Near Road	33.3	33.2	33.3	33.3
Los Angeles-North Main Street	31.4	30.3	29.3	29.4
Mira Loma (Van Buren)	36.2	34.3	33.4	33.2
Mission Viejo	18.7	18.1	18.0	18.1
Ontario-Route 60 Near Road	33.5	32.3	31.1	31.0
Pasadena	26.8	28.4	27.2	26.9
Pico Rivera #2	31.7	32.6	31.7	31.4
Reseda	25.1	27.9	27.7	27.8

Riverside Rubidoux	31.5	31.8	30.8	30.7
San Bernardino	27.1	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 PM2.5 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)[32] for the 24-hour average PM2.5 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~~(District) PM2.5 Maintenance Plan, the milestone years and

[32] 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.

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 PM2.5 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.

Direct PM2.5 Emissions

40 CFR Part 93.102(b)(1)[33] indicates that directly emitted PM2.5 motor vehicle emissions from the tailpipe, brake wear, and tire wear must be considered in conformity determinations.

Re-Entrained Paved and Unpaved Road Dust $PM_{2.5}$ Emissions

~~March 10, 2006, Transportation Conformity Final Rule amending~~According to 40 CFR Part 93.102(b)(3)[34] of the transportation conformity regulation ~~to establish criteria for PM2.5 and PM10 conformity determinations (71 FR 12498)[35]~~ indicates that $PM_{2.5}$ emissions as a result of re-entrained road dust ~~must~~should be included ~~in regional conformity determinations: "~~"if the EPA Regional Administrator or the director of the State air agency has ~~intended for~~made a finding that re-entrained road dust emissions within the area are a significant contributor to ~~be included in all conformity analyses of direct~~the PM2.5 ~~emissions."~~nonattainment problem". As shown in Table 3-7 above, re-entrained road dust and construction emissions are significant enough for inclusion in the MVEB.

Transportation-Related Construction Dust PM2.5 Emissions

Section 93.122(f) of the ~~Conformity Regulation~~transportation conformity regulation requires regional conformity determinations to include fugitive dust PM2.5 emissions from highway and transit construction activities if these sources are deemed significant contributors to the PM2.5 problem.

The PM2.5 Maintenance Plan establishes the MVEB for primary emissions of PM2.5 from motor vehicle exhaust, tire and brake wear, and the precursors of VOC and NOx. 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)[36] , 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

[33] https://www.govinfo.gov/content/pkg/CFR-2004-title40-vol19/pdf/CFR-2004-title40-vol19-sec93-102.pdf
[34] https://www.govinfo.gov/content/pkg/CFR-2004-title40-vol19/pdf/CFR-2004-title40-vol19-sec93-102.pdf
~~35 And emissions from road construction if found significant (§ 93.122(f)(2))~~
[36] 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

(also known as Connect SoCal, adopted by the SCAG Board on September 3, 2020)[37]. 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[38]. 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)[39] 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[40]. Further, the estimated emissions were adjusted for the Advanced Clean Trucks (ACT)[41] and Heavy-Duty Engine and Vehicle Omnibus Regulations[42]. The emissions for re-entrained paved road dust, unpaved road dust, and road construction dust are based on California Emissions Projection Analysis Model (CEPAM)[43].

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.

5.3. 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

[37] https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal-plan_0.pdf?1606001176
[38] U.S. EPA approval of EMFAC2017 can be found at 84 FR 41717 https://www.federalregister.gov/d/2019-17476
[39] 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
[40] 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
[41] Advanced Clean Trucks, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks
[42] Heavy-Duty Engine and Vehicle Omnibus Regulations, https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox
[43] 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

analysis years listed above. In addition, the MVEB developed for this plan includes more recent travel activity projections provided by the SCAG.

Table 5-1: Motor Vehicle Emissions Budgets (MVEB) for PM2.5 Maintenance Plan (Annual Season)

South Coast (Tons/Day)	2023			2031			2035		
	ROG	**NOx**	**PM2.5**	**ROG**	**NOx**	**PM2.5**	**ROG**	**NOx**	**PM2.5**
Vehicular ~~Exhaust~~[a]Exhaust, (Includes Tire~~,~~ and Brake Wear ~~for PM2.5~~)	55.~~74~~71	93.~~43~~44	9.~~6~~64	40.~~8~~76	~~71.9~~78.21	9.~~5~~56	36.~~5~~44	~~66.2~~76.56	9.~~5~~64
Emission reductions from ACT/HD Omnibus regulations[a]	0.00	-0.03	0.00	-0.08	-6.36	-0.07	-0.17	-10.45	-0.14
SAFE Vehicle rule[b]	0.03	0.02	0.00	0.16	0.09	0.01	0.24	0.12	0.01
Re-Entrained Paved Road Dust (Total)[b]	N/A	N/A	8.~~7~~71	N/A	N/A	~~9.0~~8.98	N/A	N/A	9.~~2~~16
Re-Entrained Unpaved Road Dust (City and County Roads)[b]	N/A	N/A	1.~~7~~67	N/A	N/A	1.~~7~~67	N/A	N/A	1.~~7~~67
Road Construction ~~Dust~~Dust[c]	N/A	N/A	0.~~3~~25	N/A	N/A	0.~~3~~27	N/A	N/A	0.~~3~~28
~~Total[b]~~Total[d]	55.74	93.43	20.27	40.84	71.94	20.43	36.52	66.23	20.61
Motor Vehicle Emission ~~Budget[c]~~Budget[e]	56	94	21	41	72	21	37	67	21

~~[a] 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~~[a] For detailed emission reduction estimation methodology for the ACT and HD Omnibus regulations, refer to the on-road mobile sources section of emission inventory.

[b] For detailed paved and unpaved road dust calculation methodology, refer to area sources section of emission inventory.

[c] CARB Emission Inventory Section 7.8, "Road Construction Dust." https://ww3.arb.ca.gov/ei/areasrc/onehtm/one7-8.htm

~~[b]~~[d] Values from CEPAM2022 v1.00 may not add up due to rounding.

~~[c]~~[e] 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., and the South Coast AQMD commits to do so. 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. throughout the South Coast Air Basin and Coachella Valley. 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 as described in the July 1, 2021 Annual Network Plan (http://www.aqmd.gov/home/air-quality/clean-air-plans/monitoring-network-plan). [44]. 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.

[44] http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-monitoring-network-plan/annual-air-quality-monitoring-network-plan-v2.pdf?sfvrsn=80

7. Verification of Continued Attainment

The U.S. EPA guidance[45] 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 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 PM2.5 ambient air quality data collected from its monitoring network. Specifically, the 24-hour average PM2.5 concentrations from monitoring stations that are comparable with the NAAQS will be compared with the 2006 24-hour average PM2.5 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. In this document, we refer to these contingency provisions as the contingency plan. 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.

[45] 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.

8.1. Definitions

Contingency plan trigger value: A calculated statistic that is used to determine if the contingency plan has been triggered. It is analogous to the design value except that contingency plan exceptional events (defined below) are removed from the calculation. This value is calculated no later than four months after the final day of each quarter with zero values substituted for samples in the current year that have not yet been made. The calculation method is described in section 8.3.

Trigger event: An event that results in a PM2.5 measurement that generates a contingency plan trigger value in excess of the NAAQS. A trigger event could have occurred at any time in the latest 3-year period, not necessarily in the last quarter or year that is the subject of the most recent contingency plan trigger value calculation.

Exceptional event: An event for which South Coast AQMD submits an exceptional event demonstration that is concurred upon by U.S. EPA and is then removed from calculation of design values.

Contingency plan exceptional event: An event for which South Coast AQMD develops a contingency plan exceptional event demonstration (CEED) and is then removed from calculation of the contingency plan trigger value. Contingency plan exceptional events could have occurred at any time in the latest 3-year period, not necessarily in the last quarter or year that is the subject of the most recent contingency plan trigger value calculation. CEEDs are submitted to CARB and U.S. EPA and can be disapproved by either agency. Further details of this process are detailed in section 8.6.

Contingency actions: The actions that South Coast AQMD will take if the contingency plan is triggered.

Data exploration timeline: the seven-month period after the end of the PM2.5 samples used to calculate the contingency plan trigger value.

~~8.1.~~8.2. 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 PM2.5 maintenance plan. The South Coast AQMD commits to the following:

> Establish a ~~trigger to implement a~~ contingency ~~action~~plan trigger; whereby; if the ~~24-hour average PM2.5 design~~ contingency plan trigger value ~~(98th percentile averaged over three consecutive years) at a station with a PM2.5 FRM monitor or FEM monitor that is included for comparison with the NAAQS~~in the South Coast Air Basin exceeds the level of the 2006 24-hour PM2.5 NAAQS ~~in the South Coast Air Basin, excluding exceptional events~~; then~~,~~ the contingency plan is triggered. If the contingency plan is triggered then South Coast AQMD will ~~trigger~~implement the contingency actions specified in section ~~8.2 of this maintenance plan.~~8.5.

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[46].

~~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 trigger ensures maintenance of both the 2006 and 1997 NAAQS.

8.3. ~~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.~~[47] Contingency Plan Trigger Value

In order to provide advance notice of a violation of the PM2.5 NAAQS, in each of the years from 2021 to 2035 or until a second maintenance plan is approved by the U.S. EPA[48], South Coast AQMD will calculate the contingency plan trigger values quarterly by the calculation date (D_{calc}) listed in Table 8-1. On or before each D_{calc}, PM2.5 samples with the AQS parameter code 88101 collected up until the end time of the PM2.5 samples (T_{end}) will be used to calculate the contingency plan trigger value for the year Y_{DV}. The corresponding T_{end} and Y_{DV} to each D_{calc} are also listed in Table 8-1. The T_{end} is always four months earlier than the D_{calc} since the AQS data must be reported by 90 days after the end of the calendar quarter in which they are collected and one month is added to allow for analysis. South Coast AQMD may conduct analysis of potential contingency plan exceptional events after calculating the contingency plan trigger value and if needed, the contingency plan will be triggered before the end of the data exploration timeline, also listed in Table 8-1. The data exploration timeline is the seven-month period after the end of the PM2.5 samples used to calculate the contingency plan trigger value.

Measurements meeting any of the following criteria will be excluded when calculating the contingency plan trigger value:

- A contingency plan exceptional event demonstration addressing the measurement has been submitted to CARB and U.S. EPA and it has not been disapproved.

[46] 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

~~[47] For the purposes of the 98th 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 98th percentile concentration after only the first two quarters of data are collected will be assigned as the 8th highest value.~~

[48] At this point, the procedures outlined in the second maintenance plan will be implemented.

- Measurements with exceptional event demonstrations that have been concurred upon by CARB and U.S. EPA.

As shown in Table 8-1, when D_{calc} is May 1, all PM2.5 samples collected before the end of the previous year will be used to calculate the contingency plan trigger value of the previous year. In this case, the procedure of calculating the 24-hour PM2.5 design value defined in 40 CFR Part 50 (Appendix N to part 50) will be followed to calculate the contingency plan trigger value.

When D_{calc} is not on May 1, the PM2.5 samples used to calculate the contingency plan trigger value for the year Y_{DV} do not cover the entire year. In this case, the procedure of calculating the 24-hour PM2.5 design value defined in 40 CFR Part 50 (Appendix N to part 50) will be followed to calculate the contingency plan trigger value with the following exceptions:

- The South Coast AQMD will assume that all scheduled samples for the remainder of Y_{DV} will be completed successfully. The sampling schedule of each station will follow the sampling schedule defined in the South Coast AQMD's monitoring network plan.[49] Any planned changes to the sampling schedule will be factored in to determine the sampling schedule for the remainder of Y_{DV}.
- All samples scheduled after T_{end} will be given a zero value.

After filling the scheduled samples for the remainder of Y_{DV} with zeros, the 98th percentile value and the contingency plan trigger value of Y_{DV} will be calculated following the procedures defined in 40 CFR Part 50 (Appendix N to part 50). This methodology will ensure that implementation of contingency actions will begin as soon as possible, but only after a violation of the standard is certain.

Table 8-1: The date of the calculation (D_{calc}), the end time of the PM2.5 samples (T_{end}), the end of the Data Exploration Timeline, and the year of the contingency plan design value (Y_{DV}) for the quarterly calculation of the PM2.5 24-hour design value

End of Data Exploration Timeline	**D_{calc}**	**T_{end}**	**Y_{DV}**
May 1 of the current year	February 1	September 30 of the previous year	The previous year
August 1 of the current year	May 1	December 31 of the previous year	The previous year
November 1 of the current year	August 1	March 31 of the current year	The current year
February 1 of the next year	November 1	June 30 of the current year	The current year

8.4. Contingency Plan Exceptional Events

~~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[50].~~

[49] Monitoring network plan available at http://www.aqmd.gov/home/air-quality/clean-air-plans/monitoring-network-plan

~~[50] United States Environmental Protection Agency. 1992. Procedures for Processing Requests to Redesignate Areas~~

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 designcontingency plan trigger 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 the contingency plan trigger value is recordedcalculated and would cause the contingency plan to be triggered, South Coast AQMD will firstevaluate events that have occurred in the latest 3-year period and determine if they meet the criteria for a contingency plan exceptional event. To 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 calculationpotential contingency plan exceptional event(s) exist, South Coast AQMD will assume that the sampling scheduleremove event(s) from the data and calculate the contingency plan trigger value again following the procedure described in section 8.3. If the contingency plan trigger value is below the 2006 NAAQS only after removing the event(s), the events are potential contingency plan exceptional event(s). The potential contingency plan exceptional event(s) can happen on any days between the beginning of the three-year period of the data used to calculate the contingency plan trigger value and T_{end}. If there are multiple potential contingency plan exceptional events, South Coast AQMD will generally find the combination with the minimum number of days and stations that could bring the contingency plan trigger value below the 2006 NAAQS.

If the contingency plan trigger value exceeds the 2006 NAAQS even after removing all contingency plan exceptional events(s), the contingency action 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 be initiated (see section 8.5).

If South Coast AQMD staff believesbelieve that the event meets the criteria for anthere has been a potential contingency plan exceptional event, staff in the last 3 years, the South Coast AQMD will provide CARB and U.S. EPA a weight-of-evidence analysis of the exceedancecontingency plan exceptional event demonstration (CEED) supporting this assertion. The CEED is a weight-of-evidence analysis that uses similar criteria that are used to demonstrate exceptional events but would be less resource intensive for all three agencies. If CARB or U.S. EPA do not agree that the event would likely be considered exceptional, based on the event would triggerCEED, the contingency measuresactions are no longer triggered. 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.6.

The next sections list the types of data that may be used to support a CEED. 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.event and the available data. The CEED is a weight-of-evidence analysis and it

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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 does not need to contain all the data listed below. The CEED need only provide an analysis that is sufficient to reasonably establish that the event meets the following criteria:

- There is a causal relationship between the event and the exceedance
- And, the event was not both reasonably controllable and not reasonably preventable,
- And, the event was caused by human activity that is unlikely to recur at a particular location or was a natural event.

More specifically, in the case of an exceedance due to the use of fireworks, the CEED need only provide an analysis that is sufficient to reasonably establish that the fireworks event meets the following criteria:

- There is a causal relationship between the event and the exceedance
- The use of fireworks is integral to traditional national, ethnic, or other cultural events

8.1.1.8.4.1. Wildfires

Wildfires are common causes of exceedances of the 2006 24-hour PM2.5 standard in the South Coast Air Basin. South Coast AQMD will use a weight of evidence approach to exclude exceedancescontingency plan exceptional events from the contingency plan trigger value that were caused by wildfires. In general, South Coast AQMD will use some or all of the following criteria to determine if wildfires could have caused the exceedanceevent:

Analysis/Product	**Criteria**
South Coast AQMD advisories	South Coast AQMD has issued a smoke or ash advisory due to wildfire
Hourly or 24-hour PM2.5 measurements	Simultaneous increase of hourly or 24-hour $PM_{2.5}$ measurements with the beginning of the fire
Low-Cost sensor measurements such as PurpleAir	Increase of PM2.5 measured at low-cost sensors consistent with the wildfire location and pollutant transport
Fire reports such as https://inciweb.nwcg.gov/	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.

Analysis/Product	Criteria
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 PM2.5 concentrations in the same season	PM2.5 concentrations are higher than concentrations during the same season over the past five years.
History of exceedances in the same month that the PM2.5 concentration exceedance was recorded	The concentration exceeds the NAAQS outside of the November through February period. 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.
Analysis of co-pollutants	Data such as levoglucosan and CO are elevated, indicating presence of smoke
Fire perimeter	Fire perimeter includes wildland (indicating that the fire may not be reasonably controllable or preventable)

8.1.2. 8.4.2. Fireworks

Exceedances of the 24-hour PM2.5 NAAQS can occur on July 4th or 5th because of smoke emissions from fireworks. Exceedances are also possible in select areas on January 1st due to fireworks on New Year's Eve. According to Title 40 in the Code of Federal Regulations[51], fireworks that are significantly integral to traditional national, ethnic, or other cultural events are considered exceptional events. If the measured PM2.5 exceedance occurs on January 1st, July 4th or July 5th then South Coast AQMD will conduct investigation to determine if fireworks emissions could have caused the exceedance. South Coast AQMD will analyze the hourly PM2.5 measurements to determine if there is a simultaneous increase of measured PM2.5 with the occurrence of observed or reported fireworks. If hourly PM2.5 measurements are not available, then nearby PM2.5 monitors or low-cost sensor measurements of PM2.5 may be used for this evaluation. South Coast AQMD may also analyze nearby webcams and the composition of filter-based or real-time PM2.5 speciation measurements and evaluate whether the composition is characteristic of fireworks emissions. July 4th and 5th exceedances are common each year due to commercial and "backyard" fireworks displays. PM2.5 measurements on adjacent days typically record concentrations well below the standard, as it is expected for the summer months. January 1st 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 1st fireworks. A more extensive weight of evidence discussion will be required to exclude exceedances on January 1st that are influenced by fireworks.

8.2. 8.5. Contingency Action

South Coast AQMD will review available data to determine the causes of the 24-hour PM2.5 exceedance. PM2.5 measurements that resulted in the trigger event. This review may involve an analysis of speciation data, source attribution studies, meteorological data, etc. Causes of the exceedancetrigger event may include local and regional primary PM2.5 emission sources and secondary particulate matter formation. If the causes of the exceedancetrigger event 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 exceedancetrigger event.

[51] 40 CFR § 50.14 Treatment of air quality monitoring data influenced by exceptional events

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 exceedancePM2.5 measurement that caused the trigger event when evaluating whether these actions will effectively mitigate the cause of the exceedancetrigger event:

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 8-2).
4. Propose new rules to reduce particulate emissions, if needed.

Table 8-2: Potential rules to be evaluated as part of Contingency Plan

Rule Name	South Coast AQMD Rule
Wood-Burning Devices	445
Open Burning	444

If South Coast AQMD has submitted an exceptional event demonstration that is awaiting concurrence or rejection by U.S. EPA and concurrence would avoid triggering the contingency plan[52], then the contingency action includes all the actions listed above except that the South Coast AQMD will not amend an existing rule or promulgate a new rule that is called for by the contingency action until U.S. EPA concurs or rejects the exceptional event demonstration. If U.S. EPA concurs on or rejects the exceptional event demonstration then the contingency plan trigger value will be recalculated and the contingency trigger will be evaluated to determine if the contingency plan is still triggered. If the contingency plan is not triggered then any work on the current contingency action will be abandoned. If contingency plan is triggered, then the South Coast AQMD will proceed with implementing contingency actions and the contingency actions may include amending an existing rule or promulgating a new rule if needed.

8.3.8.6. 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 BasinFour months after the end of every quarter, the South Coast AQMD will calculate the three-year design value, which is the 98th percentile of the 24-hour average PM2.5 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 contingency plan trigger value but will not yet trigger the contingency plan based on this calculated value. If the contingency plan trigger value would cause the contingency plan to

[52] Concurrence would avoid triggering the contingency plan if removal of data associated with this exceptional event and any CEED(s) not yet disapproved would result in a contingency plan trigger value that does not exceed the 2006 NAAQS.

be triggered then the South Coast AQMD will evaluate the criteria to exclude ~~measurements that would result in a violation of the 2006 NAAQS~~contingency plan exceptional events from the contingency ~~trigger.~~plan trigger value calculation. South Coast AQMD will evaluate potential contingency plan exceptional events that have occurred in the latest three-year period and determine if they meet the criteria for a contingency plan exceptional event. If evidence indicates that ~~the exceedance is not likely an~~there are no contingency plan exceptional ~~event~~events in the latest three-year period, the contingency ~~action~~plan 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[53].~~ 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 there has been a contingency plan exceptional event or events in the ~~exceedance is likely an exceptional event~~last three years that upon their removal would result in a contingency plan trigger value that does not violate the 2006 NAAQS, the South Coast AQMD will initiate the ~~following~~contingency plan exceptional event demonstration (CEED) procedure:

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

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

5) ~~U.S. EPA does not agree~~and this procedure ends assuming that the ~~exceedance is likely an exceptional~~recalculated contingency plan trigger value does not exceed the 2006 NAAQS after removing data influenced by the approved events. If CARB or U.S. EPA disagree that the event ~~and South Coast AQMD does not submit an~~or events are a contingency plan exceptional event then the contingency plan is triggered.
~~•~~ If CARB or U.S. EPA disagree that the event is a contingency plan exceptional event, South Coast AQMD may prepare a formal exceptional event demonstration. ~~In this case the contingency measures are triggered.~~
6) ~~In step five of the above procedure,~~ or demonstrations. If South Coast AQMD prepares a formal exceptional event demonstration. ~~If~~ or multiple demonstrations, then the contingency action specifies that currently active contingency actions will continue to be implemented but the actions do not include the steps of amending a rule or promulgating a new rule until CARB or

~~[53] For example, if an exceedance was recorded on November 15th, the South Coast AQMD will complete the evaluate of the exceedance by May 1st. This allows for approximately one month of analysis time after the data is finalized.~~

U.S. EPA ~~does not concur with~~rejects the ~~formal~~ demonstration~~, then contingency actions are triggered~~.

7) If CARB or U.S. EPA disapprove the formal exceptional event demonstration, contingency actions may also include rule amendments or the promulgation of new rules if needed to avoid future violation.

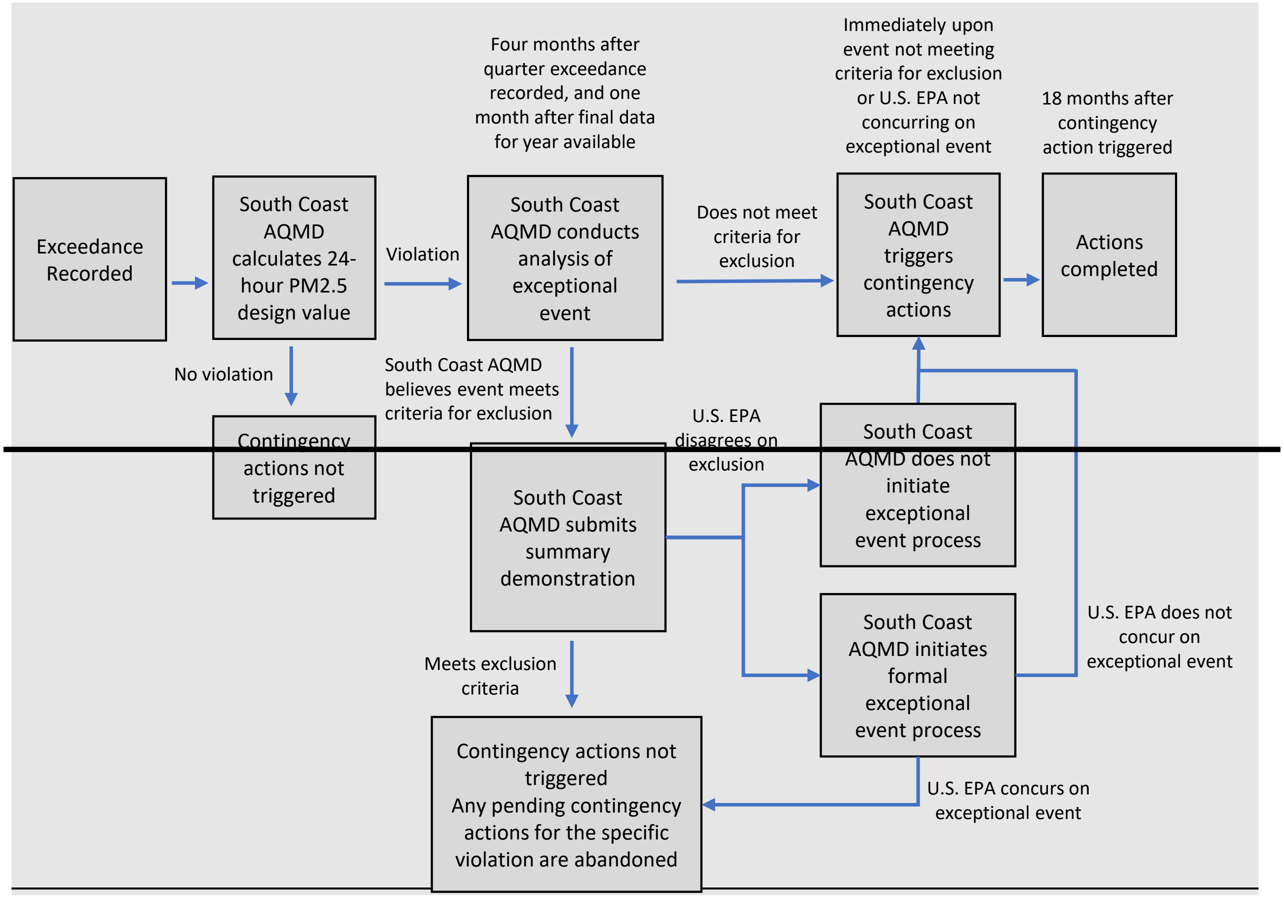
Steps 1 through 4 will be completed within the data exploration timeline.

Step 6 allows the contingency actions to be implemented simultaneously with the U.S. EPA review of the exceptional event demonstration(s) but only up to the point of amending a rule or promulgating a new rule. This ensures that contingency actions are implemented expediently once they are triggered because most of the contingency action can be completed while U.S. EPA reviews the event demonstration. We expect that in most cases, the process will end at step 5, with South Coast AQMD, CARB, and U.S. EPA in agreement on the contingency plan exceptional event. South Coast AQMD will submit the exceptional event demonstration(s) within six months of triggering the contingency plan.

If South Coast AQMD has not submitted an exceptional event demonstration that is awaiting concurrence or rejection by U.S. EPA, then South Coast AQMD will further evaluate the cause of the trigger event and implement the contingency action to address the nature of the trigger event within 24 months after the contingency action is triggered. If South Coast AQMD has submitted an exceptional event demonstration that is awaiting concurrence or rejection, then South Coast AQMD will implement the contingency action except for amending an existing rule or promulgating a new rule within 24 months after the contingency action is triggered. Once U.S. EPA rejects the exceptional event demonstration or demonstrations such that the contingency plan trigger value would exceed the 2006 NAAQS, the South Coast AQMD will implement the remaining contingency actions as needed within 12 months from the date of rejection.

South Coast AQMD will also recalculate the ~~design~~contingency plan trigger 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~~trigger event do not result in a change in the ~~design~~contingency plan trigger value. If it is determined that the ~~design~~contingency plan trigger 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.~~

~~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.~~


Four months after quarter exceedance recorded, and one month after final data for year available
Immediately upon event not meeting criteria for exclusion or U.S. EPA not concurring on exceptional event
18 months after contingency action triggered
Exceedance Recorded
South Coast AQMD calculates 24-hour PM2.5 design value
Violation
South Coast AQMD conducts analysis of exceptional event
Does not meet criteria for exclusion
South Coast AQMD triggers contingency actions
Actions completed
No violation
Contingency actions not triggered
South Coast AQMD believes event meets criteria for exclusion
U.S. EPA disagrees on exclusion
South Coast AQMD does not initiate exceptional event process
South Coast AQMD submits summary demonstration
South Coast AQMD initiates formal exceptional event process
U.S. EPA does not concur on exceptional event
Meets exclusion criteria
Contingency actions not triggered
Any pending contingency actions for the specific violation are abandoned
U.S. EPA concurs on exceptional event

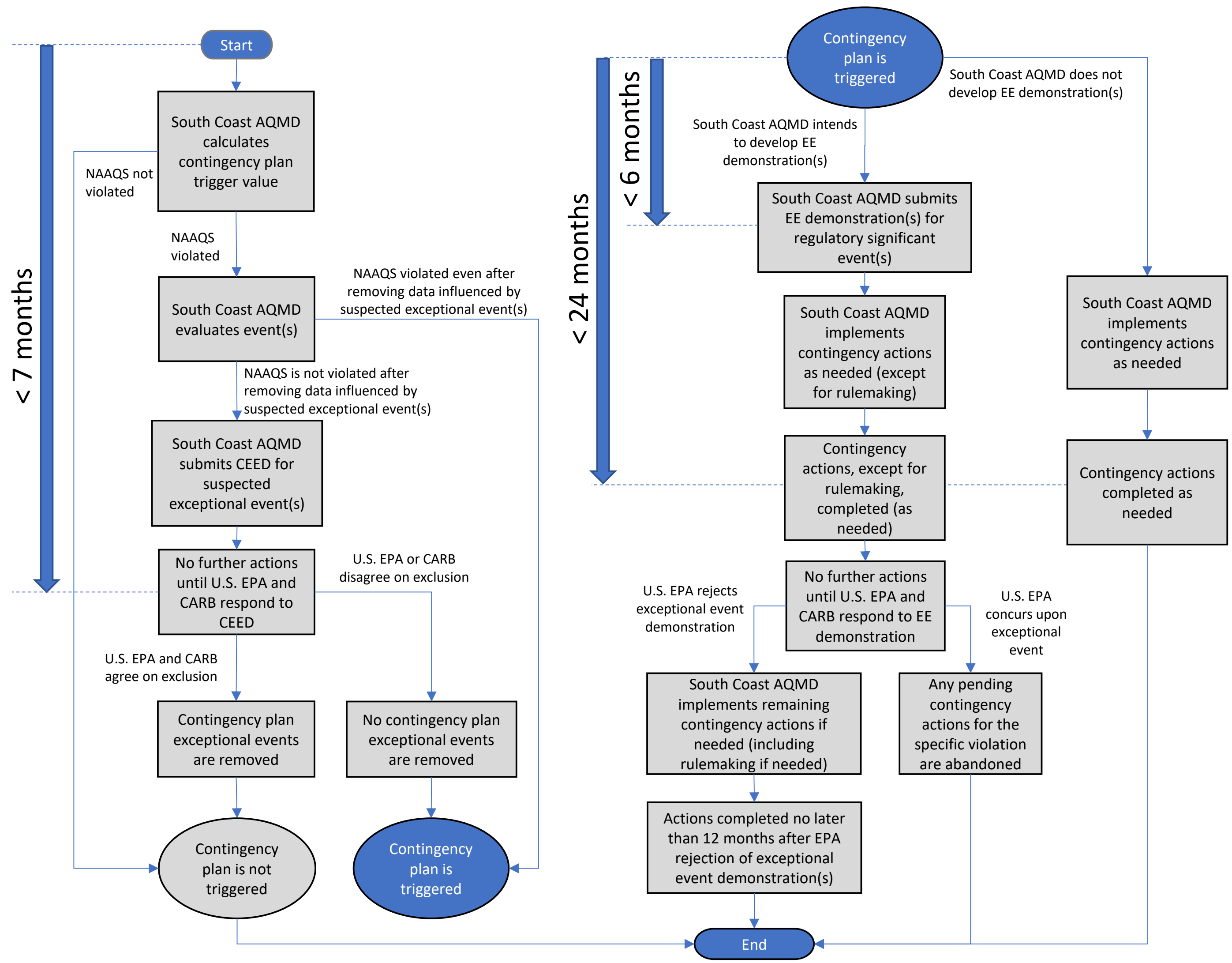


Figure 8-1: Contingency plan trigger and schedule for implementation. The process starts quarterly after each T_{end} in Table 8-1.

8.4. 8.7. 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. California Environmental Quality Act

Pursuant to the California Environmental Quality Act (CEQA) Guidelines Sections 15002(k) and 15061, the proposed project is exempt from CEQA pursuant to CEQA Guidelines Sections 15061(b)(3) and 15308. Further, there is no substantial evidence indicating that any of the exceptions in CEQA Guidelines Section 15300.2 to the categorical exemption apply to the proposed project. A Notice of Exemption will be prepared pursuant to CEQA Guidelines Section 15062, and if the proposed project is approved, the Notice of Exemption will be filed for posting with the State Clearinghouse of the Governor's Office of Planning and Research, and with the county clerks of Los Angeles, Orange, Riverside, and San Bernardino counties. In addition, the Notice of Exemption will be electronically posted on the South Coast AQMD's webpage which can be accessed via the following weblink: http://www.aqmd.gov/nav/about/publicnotices/ceqa-notices/notices-of-exemption/noe---year-2021.

9. 10. 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 10-1 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 10-1: Summary Checklist of Document References

CAA/U.S. EPA Requirements	Status	Document Reference
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

11. Public Comments and Responses to Comments

Two comment letters were received from the U.S. EPA Region 9 staff during the comment period for the Draft 2021 PM2.5 Redesignation Request and Maintenance Plan. The comment letters and responses to comments are listed in this section.

Comment Letter #1

Ginger Vagenas, U.S. EPA

September 7, 2021

Thanks for the opportunity to take a quick look at your draft plan. Given the short turnaround and the limited availability of staff within the time allotted for our "soft review," we were not able to review the draft in depth and our feedback has not been subject to the usual management review process that more formal comments undergo. At present, we can only offer some preliminary feedback on the main plan (minus the Contingency Plan section), which was provided without appendices. It's possible that we could identify additional questions or concerns upon a more thorough review. We intend to provide preliminary feedback on Section 8 (Contingency Plan) later, with the goal of doing so by the end of the week. Please let us know if you have any questions regarding our feedback. 1-1

EPA preliminary feedback on SC draft RRMP for the 1997 and 2006 24-hour PM2.5 NAAQS

The RRMP relies on numerous references to previous plans, including the 189(d) plan. For example: 1-2

- The emissions inventory used in this Plan follows the methodology used in previous air quality management plans and recent attainment and maintenance plans. (page 20)
- The condensable PM2.5 from stationary point and area sources are estimated using the methodology described in the 189(d) Plan. (page 31)
- The chemical speciation data used in this Plan is identical to those employed in the 189(d) Plan. (page 38)

- These trends are observed at all CSN sites without major spatial gradients. Details can be found in Ch. 4 of the 189(d) Plan. (page 38) 1-3
- 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. (page 49) 1-4
- Details on the Compton exceedances were presented in the 189(d) Plan. (page 53) 1-5

Please incorporate any methodologies and analyses the District is relying on for the RRMP into the plan itself, rather than referencing other plans. This will ensure both the public and EPA have a clear and consistent understanding of the technical bases for the RRMP and that the RRMP can stand on its own, and will facilitate EPA review and action on the RRMP. Additionally, the District has indicated it intends to withdraw the 189(d) plan if the RRMP is approved. 1-6

Section 2 – Redesignation Request

- Page 5: The Exceptional Events methodology bullet #2 conflates two separate requirements of the EER. It is separately required that the event is not reasonably controllable or preventable, AND that the event is a natural event or an event caused by human activity that is unlikely to recur at a particular location. The first is not shown by the second; they are separate criteria. They should be broken into separate bullets. 1-7
- Page 12 – DV's for no EE removed and reg significant EE removed (first two columns) match AQS with/without EE removed. We cannot comment on the third column (all suspected EE's removed). 1-8
- Page 13, footnote #4: In 2017, Compton's sampling schedule was 1-in-3, not 1-in-6. 1-9
- Section 2.2: The meteorological indices chosen to demonstrate that conditions during 2018 – 2020 were not unusually favorable to low $PM_{2.5}$ seem reasonable to account for transport and dispersion of primary $PM_{2.5}$. However, the air pollution processes in South Coast Air Basin are complex, including secondary formation, pollution formation in residual layers, large scale stagnation, etc. It therefore cannot be assumed that the specific metrics presented in the Plan are correlated with high $PM_{2.5}$ concentrations. We suggest including a justification for the metrics used – for example, a demonstration that the metrics chosen are correlated with high $PM_{2.5}$ using ambient data first, followed by the analyses showing that the metrics were not anomalously low in the recent years. This would provide a stronger argument for relying on these metrics. 1-10
- Section 2.2, pp. 18-19: Why is the baseline of 2008-2012 chosen to normalize the data? It seems like 2008-2020 would be a more inclusive metric. 1-11

Section 3 – Emissions Inventory

- The District did not provide appendices for EPA review. Without these documents, we cannot determine whether the emissions inventories conform to EPA regulations and guidance, including that regarding identification of condensible/filterable components. 1-12
- While emissions information regarding the top 10 or top 5 source categories may be useful to illustrate a point, the Plan must address the total inventory. 1-13
- On page 24, the Plan states

  > 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.

  Please list any new control measures that are being relied on for the emissions inventory, along with rule adoption dates. 1-14
- Please include all information the District relies on for the emissions inventory in the Plan itself, rather than referencing the 189(d) plan or other plans. 1-15

Section 4 – Maintenance of Attainment of the 2006 24-hour PM2.5 standard through 2035

- Pages 51-52 include several pieces of information to support that the pandemic did not lead to anomalously low concentrations in 2020. The Plan describes how wildfires increased concentrations as did an increase in ship emissions, while traffic remained ~10% lower than 2018 in Q4. Please include a summary to tie this information together regarding overall impact. Also, please include a discussion of whether the congestion/increased ship emissions are expected to continue into the future. 1-16
- The plan uses the 2020 DV (3-years) as the base period for the RRF calculation in the main body of the maintenance demonstration and includes the same calculation using 2018-2020 DVs (5-years) in the weight of evidence, but notes anomalously high values at the Compton monitor as discussed in the 189(d) Plan. 1-17
    - Please incorporate the analyses from the 189(d) Plan that discuss the Compton monitor exceedances into the RRMP itself.
    - p. 35 states "[t]his approach was concurred upon by U.S.EPA staff" in reference to using the 2020 DV as the appropriate base period. This is not an accurate representation. Prior to seeing the plan, EPA agreed in concept that, in this specific situation, using a 3-year DV and 5-years in the weight of evidence could be appropriate, if adequately justified. We did not concur that using a 3-year DV instead of a 5-year weighted average is appropriate because it corresponds to the year in which attainment was achieved. The Calcagni memo states that modeling for maintenance demonstration purposes should generally be at the same level as that used for the attainment demonstration. Showing maintenance of attainment using the 5-year DV would account for meteorological and other fluctuations that could happen in future years. We reviewed the approach used in this plan: 1) using the three-year 2020 DV and 2) including the five-year 2018-2020 DVs in the WOE to account for interannual variability, while acknowledging and providing information for the issues in Compton. We agree this approach is appropriate in this circumstance, given the justifications provided.

Section 5 – Transportation Conformity (pages 55 – 58).

- Please update the discussion of re-entrained road dust on page 56 to correctly reflect the Transportation Conformity rule. The text on page 56 currently reads: 1-18

    Re-Entrained Paved and Unpaved Road Dust $PM_{2.5}$ Emissions March 10, 2006, Transportation Conformity Final Rule amending the transportation conformity regulation to establish criteria for $PM_{2.5}$ and PM_{10} conformity determinations (71 FR 12498)[1] 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 $PM_{2.5}$ emissions."

  The sentence in the Federal Register notice actually reads: "EPA has intended for road dust emissions to be included in all conformity analyses of direct PM_{10} emissions." As explained in

[1] And emissions from road construction if found significant (§ 93.122(f)(2)).

the referenced notice, section 93.102(b)(3) of the transportation conformity rule contains provisions related to the applicability of $PM_{2.5}$ re-entrained road dust. The emissions should be included if EPA or the SIP makes a finding that re-entrained road dust emissions are a significant contributor. This section of the maintenance plan should reference Table 3-7 which shows that re-entrained road dust and construction emissions are significant as justification for including re-entrained road dust in the motor vehicle emission budgets. 1-18

- Table 5-1: Motor Vehicle Emission Budgets.
  - Some emission estimates in the budget table are listed to nearest hundredth and some to nearest tenth. All should be consistent. 1-19
  - How were the EMFAC2017 emission estimates adjusted for ACT and HD Omnibus regulations? Please include those reductions and SAFE as line item reductions. Will the emissions be listed as line item adjustments in the emission inventory tables? Will the adjustment factors, the methodology and the total reductions for each year be included in an appendix? 1-20
  - Will the emission inventory documentation show the assumptions for the fugitive dust emission calculations? The document references CEPAM – is the latest version of AP-42 methodology incorporated into CEPAM? What assumptions were included for the road construction? 1-21
  - Note that we may have further questions once we have a chance to review the appendices to the plan with documentation on the emission inventory. 1-22
  - Be sure to use the total motor vehicle emission budgets in the maintenance demonstration (assuming they are higher than the on road emissions used for modeling due to the rounding) or be prepared to provide a supplemental analysis showing how the budgets are consistent with maintenance for the area notwithstanding they are higher than the modeled values. 1-23

Section 6 – Future Monitoring Network

- This section should include a commitment to continue to operate the monitoring network consistent with part 58. One way to do this would be to add language to this effect to the first sentence of this section: 1-24

  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, and the District commits to do so.

Section 7 – Verification of Continued Attainment

- No comments based on our preliminary review.

Section 8 – Contingency Plan

- Preliminary comments on this section to follow.

Response to comment 1-1

Thank you for providing comments on the draft plan promptly with such a limited time for review.

Response to comment 1-2

Technical appendices are provided. Appendix I describes emissions inventory methodology for criteria air pollutants and condensable and filterable portions of PM2.5. Appendix IV provides chemical speciation data.

Response to comment 1-3

Appendix IV is added and the sentence is revised to point to the Appendix as well as 189(d) Plan.

Response to comment 1-4

The reference to the 189(d) Plan is removed and the sentence is revised to refer to the method used in the 2016 AQMP and 189(d) Plan.

Response to comment 1-5

Appendix V is added and the sentence is revised.

Response to comment 1-6

We have added appendices that incorporate the external references into the plan itself.

Response to comment 1-7

We have separated the requirements of the exceptional events methodology.

Response to comment 1-8

Thank you for verifying these design values.

Response to comment 1-9

We have changed the text to reflect the 1-in-3 day sampling schedule.

Response to comment 1-10

We have added an analysis that demonstrates the metrics are correlated with measured PM2.5 at Mira Loma (Van Buren).

Response to comment 1-11

We agree that the baseline of 2008-2020 is preferable since it includes more data. We have made the change in the analysis and text.

Response to comment 1-12

Thank you for reviewing the information that was provided in the draft plan.

Response to comment 1-13

The Plan addresses all sources including mobile sources, as shown in the figures, tables and Appendix II & III (Appendix I & II in the draft version).

Response to comment 1-14

This is included in Tables I-1 and I-2 in Appendix I.

Response to comment 1-15

This has been revised.

Response to comment 1-16

A summery section is added. The congestion in the Ports is expected to be a temporary phenomenon. The paragraph is revised accordingly.

Response to comment 1-17

Thank you for the comment. The sentence is revised accordingly.

Response to comment 1-18

The paragraph has been updated to reflect the proper justification for including re-entrained road dust and we have referenced Table 3-7.

Response to comment 1-19

The table has been modified to show all figures to nearest hundredths.

Response to comment 1-20

The rules were reflected in the inventory via adjustment factors applied to EMFAC2017 output. Details on the rules, their impacts and references are included in Appendix I

Response to comment 1-21

A reference for the updated methodology is included in Appendix I. The most updated data and information including AP-42 methodology were used to estimate emissions at the time of development.

Response to comment 1-22

Thank you for reviewing the information that was provided in the draft plan.

Response to comment 1-23

The budget matches with emissions inventory used in the rest of the Plan. Detailed major source category level emissions are included in Appendix II.

Response to comment 1-24

We have modified the sentence to include the commitment to operate an air quality monitoring network to verify attainment.

Comment Letter #2

Ginger Vagenas, U.S. EPA

September 10, 2021

Thanks again for the opportunity to provide a quick review of the draft SC 24-hr PM2.5 RRMP. We previously provided preliminary feedback on most sections of the main plan and are now following up with our preliminary feedback on the contingency plan section. As you know, given the short turnaround we are not able to review the draft in depth and our feedback has not been subject to the usual management review process that more formal comments undergo. It's possible that we could identify additional questions or concerns upon a more thorough review. Please let us know if you have any questions regarding our feedback. 2-1

Also, as a follow up to our discussion regarding materials referenced in the plan, please keep in mind that previously developed materials need to be appropriate for the current plan. In some cases that could require updates or revisions to materials that pre-date the current planning effort. Incorporation of such materials into the current plan can help ensure any appropriate updates are made and that inconsistencies resolved.

EPA's preliminary comments on the Contingency Plan section of the draft SC 24-hr PM2.5 RRMP

September 10, 2021

1. Clearly define terms and use them consistently. 2-2
    - The following terms are used interchangeably or require better definition: "contingency provisions," "contingency plan," "contingency plan trigger," "contingency action," "contingency action trigger," "control measures," "contingency measure indicators/triggers."
    - Use "exceedance" while talking about data being reviewed as a likely exceptional event, not "event" to avoid conflating concurred exceptional events with exceedances that are reviewed as likely exceptional events.

2. Clearly distinguish between the design value and contingency action trigger. Please ensure the maintenance plan consistently distinguishes between the contingency action trigger, which is calculated after excluding exceedances that the District, CARB, and EPA agree were likely caused by exceptional events, and the design value, which must include such exceedances unless EPA concurs on a formal exceptional events demonstration submitted by CARB. 2-3

3. More clearly describe the calculation for determining if an exceedance will cause a violation of the NAAQS. The maintenance plan includes a process for calculating what we are thinking of as a "provisional design value" that allows the District to determine if an exceedance could cause a violation of the NAAQS as those exceedances occur, rather than waiting for the end of the calendar year. If an exceedance could cause a violation, the District then determines if the exceedance was 2-4

likely caused by an exceptional event. If so, the District can proceed with the process of working with CARB and EPA to determine if the exceedance can be excluded from the contingency action trigger calculation. 2-4

- Please include a clear, step-by-step description of how the contingency trigger value will be calculated. Consider including the example provided in footnote 40 in the text, rather than as a footnote.
- Please consider including a formula for the provisional DV calculation.

4. Clarify discussion of FEM waiver for monitors. While not technically incorrect, the discussion of FEM waivers for monitors could be revised to avoid ambiguity. 2-5
   - FEMs that do not compare well with the FRM are not automatically removed from the DV period, but an agency can request a waiver annually. This waiver for each monitor is evaluated on a 3-year (DV) period and if approved, that FEM data can be excluded from the regulatory record. Note that the District can choose to use the FEM data even if it passes the test and not to submit a waiver. If a waiver is approved, the next step would be re-coding data in AQS under the non-regulatory parameter code. If the data remain in AQS under the regulatory parameter code, regardless of whether a waiver was approved, that data will be considered part of the regulatory data record.
   - If in a future DV period for a monitor with an approved FEM waiver, the FEM data do not meet the criteria for removal, or a waiver is not requested, that new 3-year DV period will be required to be recoded as regulatory data. This may mean that if a waiver is no longer granted for FEM data after being approved the previous year, the inclusion of the prior year's data may necessitate review of exceedances in prior years.
   - Also, please note that the intention behind the FEM waiver was to give agencies time to resolve potential issues with their FEM/FRM comparability. The FEM waiver was not envisioned to be used indefinitely or bounce back and forth between a waiver being approved, unapproved/not submitted, and approved again.

5. Table of wildfire criteria. 2-6
   - It would be useful to include an analysis of co-pollutants associated with wildfire emissions (e.g., speciation data, CO, PM_{10}, others). These kinds of analyses are particularly important to show smoke specific impacts for less clear events.
   - Include information that shows that the fire was a wildfire on wildland – this is important for the Not Reasonably Controllable or Preventable and Natural Event criteria.
   - Include a demonstration that exceedance concentrations being analyzed are clearly higher than other exceedances or concentrations measured over the past 5 years during the same season.

6. CARB role in exceedance evaluation for contingency action trigger calculation. 2-7
   - CARB should be more explicitly involved in the process. The procedure outlined in the maintenance plan only includes CARB in the notification of the intention to exclude the exceedance from the contingency measure trigger calculation (step 1). SCAQMD should incorporate CARB in discussions and review of materials (remaining steps).

7. Timeline for implementation of contingency measures. The maintenance plan should include a schedule and procedure for adoption and implementation of contingency measures and a specific time limit for action by the state. When triggered, contingency measures should be implemented expediently, generally within 18 to 24 months.
   - Please add a timeline to the steps for the contingency plan process outlined in your draft maintenance plan, keeping in mind the need to implement contingency measures within 24 months of being triggered. 2-8
   - If the District disagrees with a determination by EPA that an exceedance should be included in the contingency trigger calculation and decides to submit an EE demonstration, it might be necessary to implement the contingency action process in parallel with the EE process to preserve the ability to implement contingency measures in a timely manner.

Response to comment 2-1

Thank you for providing comments with such a short time for review.

Response to comment 2-2

We have added definitions of the commonly used terms to the contingency plan. We prefer to use the phrase "trigger" event rather than exceedance to discuss data that could be an exceptional event. This is because data that doesn't exceed the NAAQS could still be a potential exceptional event and may cause the 98th percentile, averaged over three years, to exceed the NAAQS. We have made changes throughout the contingency plan to reflect this new language.

Response to comment 2-3

We have defined the contingency plan trigger value in the text to clarify the difference from the design value.

Response to comment 2-4

We have added the step by step process by referencing 40 CFR Part 50 (Appendix N to part 50) in the text. This reference to the external document is because we intend the contingency plan trigger value to be calculated almost exactly like the design value except that it is calculated more frequently and excludes the contingency plan exceptional events. The formulas are contained in the CFR and because we intend to reference the entire process from the CFR and therefore, we did not include a formula in the plan.

Response to comment 2-5

We have removed the discussion of the FEM waiver because it is not necessary. In the procedure for calculating the contingency plan trigger value, we have added that we will use data in AQS coded with the 88101 parameter code. This data should reflect any FEMs that should be included in the calculation and so we do not need to consider the waivers explicitly.

Response to comment 2-6

We have added these analyses to the table.

Response to comment 2-7

We have included CARB explicitly in the process for contingency plan trigger calculation.

Response to comment 2-8

We have added a time limit for implementation of contingency measures. We have also added a provision to the contingency plan that an exceptional event submitted by South Coast AQMD will be reviewed by CARB and U.S. EPA in parallel with the implementation of contingency measures. However, the contingency measures will only be implemented up to the point that they require amending a rule or promulgating a new rule. At this point the exceptional event demonstration must be concurred upon or disapproved by U.S. EPA before the contingency actions can proceed to rulemaking.

Appendix I.

Emissions Inventory Methodology

1. Base and Future Years' Criteria Air Pollutants Emissions

2. Condensable and Filterable Portions of PM2.5 Emissions

1. Base and Future Years' Criteria Air Pollutants Emissions

This technical appendix provides detailed methodology how emissions inventory used in this Plan was developed. Emissions in the inventory can be grouped into four categories: point, area, on-road and off-road mobile sources. Emissions from each category are estimated using specific methodologies described briefly in the next sections. While the methodology to estimate emissions inventory development for the base and future years is consistent with the 2016 AQMP, the methodology and major updates introduced since the 2016 AQMP are provided in this section

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 Annual Emissions Reporting (AER) Program. Facilities subject to the AER Program calculate and report their emissions primarily based on their throughput data (e.g., fuel usage, material usage), appropriate emission factors or source tests, and control efficiency (if applicable) on an annual basis and are subject to emission audits. The smaller industrial facilities with emissions below reporting thresholds are not subject to the AER program. The emissions from those facilities are included as part of the area source inventory. This Plan uses the 2018 annual reported emissions for 2018.

In order to prepare the point source inventory, emissions data for each facility were categorized based on U.S. EPA's Source Classification Codes (SCCs) for each emission source category. Since the AER program collects emissions data on an aggregate basis (i.e., similar equipment and processes with same emission factor are grouped and reported together), facility's equipment permit data were used in conjunction with the reported data to assign the appropriate SCC codes and develop the inventory at the SCC level. For modeling purposes, facility location (in latitude and longitude) is specified. Business operation activity profiles are also recorded. The facility business type is assigned to the facilities based on North American Industry Classification System (NAICS) Code according to their primary activity. The growth projections are assigned by NAICS.

Due to the adoption of the Regional Clean Air Incentive Market (RECLAIM) program in October 1993, emissions from stationary point sources are divided into two categories, RECLAIM and non-RECLAIM. Future NOx and SOx emissions from RECLAIM sources are estimated based on their allocations specified by South Coast AQMD Rule 2002. Amendments to Regulation XX in December 2015 established a 12 tons per day shave from the total RECLAIM Trading Credits (RTCs) for NOx by 2022. The 2016 AQMP included measure CMB-05, which further reduces emissions from the RECLAIM program by five tons per day by 2025, along with a sunset of the program. 2025 and 2026 are the first year without RECLAIM program for NOx and SOx, respectively.

Point source emission projections for future milestone years use growth and control factors derived from regulatory and socio-economic data. The impact of South Coast AQMD rules adopted or amended by December 2020 with compliance dates after 2018 are included in the baseline emission forecasts with control factors. Table 1 provides a list of South Coast AQMD regulations adopted since the 2016 AQMP. Control factors were developed in reference to 2018 and applied to source categories and/or specific industries affected by the adopted rules/amendments. For industrial sources, the standard industrial codes (SIC) system is used. The U.S. EPA's SCC system is used for equipment. A full list of the surrogates used in the future projections of emissions is provided in Appendix III of the 2016 AQMP (Table III-2-5). Southern California Association of governments (SCAG) 2020 Regional Transportation Plan/Sustainable Community Strategy (RTP/SCS) provided growth forecast for future emissions.

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 thresholds described in the Point Sources) 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 the South Coast AQMD.

For each area source category, a specific methodology is used to estimate emissions. For example, natural gas combustion categories associated with residential and commercial space heating, water heating, and other uses were estimated and based on annual consumption data from Southern California Gas Company and California Energy Commission's annual report. County total consumption was broken down to the end user appliance level and, for each appliance, corresponding emission factors from U.S. EPA's AP-42 were applied to calculate emissions. Area source emissions are the remaining portion after the AER reported point source emissions are subtracted from the total stationary emissions.

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 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. The methodology to estimate entrained paved road dust[1] and construction dust emissions[2] is available at CARB's California Emissions Projection Analysis Model (CEPAM) website. The methodology reflects the most updated data and information available during the development of the inventory.

Similar to point sources, area source emission projections for future milestone years use growth and control factors derived from regulatory and socio-economic data. The road dust categories updated based

[1] https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

[2] https://ww3.arb.ca.gov/ei/areasrc/onehtm/one7-8.htm

on the vehicle activity data used to develop on-road mobile source emissions described in the next section.

The impact of South Coast AQMD rules were identified in category of emission sources (CES) level for area sources. Each emission source in the inventory is projected to grow based on its growth surrogate. Growth surrogates include industry output growth, employment growth, demographic growth and others. The selection of the surrogate by which emission growth is projected depends on the type of activity. For instance, manufacturing sectors use output growth as a surrogate. Output growth is the product of employment and productivity. Employment growth is chosen for labor intensive sectors, such as construction and laundering. Certain emission sources use demographic data as a surrogate, such as architectural coatings (housing units as surrogate) and composting (population as surrogate). A full list of the surrogates used in the future projections of emissions is provided in Appendix III of the 2016 AQMP (Table III-2-6).

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. This Plan uses the travel activity data from SCAG's 2020 RTP/SCS. The California Department of Transportation (Caltrans), the Department of Motor Vehicles (DMV), and SCAG supply CARB with data necessary to develop the on-road mobile source emissions inventory. The California DMV maintains a count of registered vehicles and Caltrans provides highway network, traffic counts and road capacity data. SCAG maintains the regional transportation model containing the temporal and spatial distribution of motor vehicle activity (travel time, travel speed, and volume of traffic for AM-peak, mid-day, PM-peak, evening and night hours). In addition, SCAG periodically conducts origin and destination surveys to validate the regional transportation model. SCAG also updates a demographic database for population, housing, employment and patterns of land use within its jurisdiction.

Vehicle emission factors are estimated based on CARB's EMFAC 2017 model, which is an update to the EMFAC 2014 model that was used in the 2016 AQMP.

EMFAC2017 includes data on California's car and truck fleets and travel activity. Light-duty motor vehicle fleet age, vehicle type, and vehicle population were updated based on 2016 DMV data. The model also reflects the emissions benefits of CARB's regulations adopted before December 2017, such as the Advanced Clean Cars Program, Federal Phase 2 GHG Standards, Truck and Bus Rule and previously adopted rules for other on-road diesel fleets.

EMFAC2017 utilizes a socio-econometric regression modeling approach to forecast new vehicle sales and to estimate future fleet mix. Light-duty passenger vehicle population includes 2016 DMV registration data along with updates to mileage accrual using smog check data. Updates to heavy-duty trucks include model year specific emission factors based on new test data, and population estimates using DMV data for in-state trucks and International Registration Plan (IRP) data for out-of-state trucks.

Additional information and documentation on the EMFAC2017 model is available at CARB's Mobile Source Emissions Inventory (MSEI) Modeling Tools - EMFAC Software and Technical Support Documentation website.[3]

Projections of on-road sources are determined using projected travel demand data and projected future vehicle emission factors. Future travel demand data is obtained from SCAG's 2020 RTP/SCS, which forecasts changes in vehicle volumes and accounts for projected transportation projects, including development of new roadways. Emission factors for future years are extracted from EMFAC2017, which accounts for fleet turnover and vehicle regulations. Using the projected travel demand and future emission factors, future on-road emissions are calculated with the same approach as baseline on-road emissions. External adjustments were made with regulations adopted after the release of EMFAC2017. Regulations include amendments to the smoke opacity regulation, amendments to HD engine warranty requirements, innovative clean transit, and zero emission airport shuttle buses. Associated on-road emission reduction factors were provided by CARB.

Adjustment to EMFAC2017 Emission Factors to Reflect Recently Adopted Regulations

Since the development of the EMFAC2017, new regulations have been adopted by U.S. EPA and National Highway Traffic Safety Administration (NHTSA) and CARB. The following sections provide details on "Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule" by U.S. EPA and NHTSA, and Advanced Clean Truck (ACT) and Heavy-Duty (HD) Omnibus regulations by CARB.

A. EMFAC2017 SAFE Vehicles Rules Off-Model Adjustment

On September 27, 2019, U.S. EPA and National Highway Traffic Safety Administration (NHTSA) published the "Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program."[4] The Part One Rule revokes California's authority to set its own greenhouse gas emissions standards and set zero-emission vehicle mandates in California. The SAFE Vehicle Rule Part One impacts some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, CARB developed off-model adjustment factors to reflect SAFE Vehicle Rule Part One in future transportation emissions estimates using EMFAC2017. CARB released these adjustment factors on November 20, 2019. These adjustments factors, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model to account for the impact of this rule. The off-model adjustment factors were only applied to emissions from gasoline light duty vehicles (LDA, LDT1, LDT2 and MDV). Additional information on the SAFE Rule Part One adjustment factors is available at: https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_draft.pdf

The adjustment factors mentioned in the preceding section represents the impacts of SAFE Rule Part One only for criteria emissions. Furthermore, in April 2020, the federal agencies issued the SAFE Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (Final SAFE Rule) that relaxed federal greenhouse gas emissions and fuel economy standards. In response to the federal action, on June 26,

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[3] https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools-emfac-software-and

[4] 84 FR 51310. https://www.govinfo.gov/content/pkg/FR-2019-09-27/html/2019-20672.htm

2020, CARB released EMFAC off-model adjustment factors for carbon dioxide (CO2) emissions to account for the SAFE Vehicles Rule Part One and the Final SAFE Rule. CARB has evaluated the Final SAFE Rule and determined that the criteria adjustment factors to EMFAC2017 that were issued on November 20, 2019, and subsequently approved by U.S. EPA continue to be valid and should be used for purposes of transportation conformity.

Additional information on the Final SAFE Rule adjustment factors is available at:

https://ww3.arb.ca.gov/msei/emfac_off_model_co2_adjustment_factors_06262020-final.pdf

B. EMFAC2017 Advanced Clean Truck (ACT) and Heavy-Duty (HD) Omnibus Off-Model Adjustment

The ACT adopted in 2020 requires manufacturers of Class 2b-8 chassis or complete vehicles with combustion engines to sell an increasing percentage of zero-emission trucks in their annual California sales starting in 2024. By 2035, zero-emission truck or chassis sales would need to be 55 percent of Class 2b – 3 truck sales, 75 percent of Class 4 – 8 vocational truck sales, and 40 percent of Class 7-8 tractor truck sales. This regulation reduces all types of emissions from trucks with engines which are model year 2024 and newer.

The HD Omnibus regulation adopted in 2020 represents a comprehensive update to the heavy-duty engine NOx emissions standards and ensures that these engines will remain clean throughout their lifetime. This regulation reduces NOx emissions from trucks with engines that are model year 2024 and newer.

The ACT and HD Omnibus regulations impact some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, CARB developed off-model adjustment factors to reflect the combined impacts of these two regulations. The combined adjustment factors were based on (1) the percentage of California-certified ZEV sales for each EMFAC category and model year to reflect ACT requirements, and (2) adjustments to emission rates that reflect the impact of all components of the HD Omnibus regulation on tightened NOx standards, in-use (i.e. real-world) NOx emissions, and deterioration-related impacts. More information on inventory modelling methods can be found in the ACT Initial Statement of Reasons (ISOR) Appendix F[5] and HD Omnibus Initial Statement of Reasons (ISOR) Appendix D.[6] These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model to account for the impact of the ACT regulation.

The combined ACT and HD off-model adjustment factors were only applied to the medium-and heavy-duty truck sectors. Off-model calculations were done in the Mobile Emissions Toolkit for Analysis (META[7]).

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[5] https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/act2019/appf.pdf

[6] https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hdomnibuslownox/appd.pdf

[7] https://arb.ca.gov/emfac/meta

Additional information on ACT and HD Omnibus is available at:

(1) https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks and

(2) https://ww2.arb.ca.gov/our-work/programs/heavy-duty-low-nox

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. Temporal usage profiles are used to develop seasonal emission estimates that are then spatially allocated to or within the county or air basin using surrogates such as population.

OGV emissions in this Plan is consistent with those included in the CARB 2018 Updates to the California State Implementation Plan[8]. The updates in OGV inventory includes growth rates for containerships, the delayed introduction of Tier 3 engines in California waters and other activity data in ports. The OGV emissions in the 2016 AQMP had anticipated a faster turnover to cleaner vessels (i.e., vessels meeting International Maritime Organizations' Tier 3 engine standards). However, the updated OGV inventory shows NOx emissions increasing faster with time reflecting delayed turnover to cleaner vessels in the near future, while PM2.5 emissions decrease due to the impact of existing regulations.

Table I-1 and Table I-2 illustrate the control factors and reductions expected from the implementation of regulations adopted by South Coast AQMD and Memorandum of Understandings (MOUs) executed between South Coast AQMD and commercial airports in the Basin since the 2016 AQMP development.

[8] Available at https://ww3.arb.ca.gov/planning/sip/2018sipupdate/2018update.pdf

TABLE I-1. Control Factors by District Rules with Post-2018 Compliance Dates (normalized with the 2018 baseline emission level)*

RULES*	DESCRIPTION	Adoption /Amend Date	2023			2031			2035		
			VOC	NOX	PM	VOC	NOX	PM	VOC	NOX	PM
445	Wood Burning Devices	27-Oct-2020	0.99	-	0.97	0.99	-	0.97	0.99	-	0.97
1110.2**	Emissions from Gaseous and Liquid-Fueled Engines	1-Nov-2019	-	0.85	-	-	0.25	-	-	0.25	-
1111	Residential NG Heating Furnaces (<175k btu/hr)	2-Mar-2018	-	0.88	-	-	0.64	-	-	0.56	-
1113	Architectural Coatings	5-Feb-2016	0.92	-	-	0.92	-	-	0.92	-	-
1117**	Glass Melting Furnaces	5-Jun-2020	-	0.51	-	-	0.51	-	-	0.51	-
1118.1**	Non-Refinery Flares	4-Jan-2019	-	0.91	-	-	0.81	-	-	0.81	-
1134**	Stationary Gas Turbine	5-Apr-2019	-	1	-	-	0.36	-	-	0.36	-
1135**	Electricity Generating Facilities	2-Nov-2018		1			0.41			0.41	
1146**	Large Ind/Comm Boilers, Steam Generator, & Process Heaters	7-Dec-2018	-	0.36	-	-	0.33	-	-	0.33	-
1146.1**	Small Ind/Comm Boilers, Steam Generators & Process Heaters	7-Dec-2018	-	0.36	-	-	0.33	-	-	0.33	-
1146.2**	Large Water Heaters & Small Boilers	7-Dec-2018	-	0.99	-	-	0.99	-	-	0.99	-
1168	Adhesive and Sealant Applications	6-Oct-2017	0.86	-	-	0.86	-	-	0.86	-	-
Airport	Airports MOUs	6-Dec-2019	0.53	0.53	-	0.76	0.76	-	0.76	0.76	-

* Adopted or amended as of December 2020, Only rules with emissions impact after 2018 are listed.

** Reductions are reflected in the 2015 RECLAIM shave

TABLE I-2. **Lists the resulting future annual average emission reductions (tons/day) in 2023, 2031, 2035**

RULES*	DESCRIPTION	Adoption /Amend Date	2023			2031			2035		
			VOC	NOX	PM	VOC	NOX	PM	VOC	NOX	PM
445	Wood Burning Devices	27-Oct-2020	0.06	-	0.13	0.06	-	0.13	0.06	-	0.13
1110.2**	Emissions from Gaseous and Liquid-Fueled Engines	1-Nov-2019	-	0.06	-	-	0.29	-	-	0.29	-
1111	Residential NG Heating Furnaces (<175k btu/hr)	2-Mar-2018	-	0.87	-	-	2.51	-	-	3.12	-
1113	Architectural Coatings	5-Feb-2016	0.1	-	-	0.1	-	-	0.1	-	-
1117**	Glass Melting Furnaces	5-Jun-2020	-	0.14	-	-	0.14	-	-	0.14	-
1118.1**	Non-Refinery Flares	4-Jan-2019	-	0.08	-	-	0.17	-	-	0.17	-
1134**	Stationary Gas Turbine	5-Apr-2019	-	0	-	-	1.96	-	-	1.96	-
1135**	Electricity Generating Facilities	2-Nov-2018		0.25			0.4			0.4	
1146**	Large Ind/Comm Boilers, Steam Generator, & Process Heaters	7-Dec-2018	-	0.38	-	-	0.39	-	-	0.4	-
1146.1**	Small Ind/Comm Boilers, Steam Generators & Process Heaters	7-Dec-2018	-	0	-	-	0	-	-	0.06	-
1146.2**	Large Water Heaters & Small Boilers	7-Dec-2018	-	0	-	-	<0.01	-	-	<0.01	-
1168	Adhesive and Sealant Applications	6-Oct-2017	0.6	-	-	0. 6	-	-	0. 6	-	-
Airport	Airports MOUs	6-Dec-2019	0.08	0.52	-	0.04	0.38	-	0	0	-

* Adopted or amended as of December 2020. Only rules with emissions impact after 2018 are listed.

** Reductions are reflected in the 2015 RECLAIM shave

2. Condensable and Filterable Portions of PM2.5 Emissions

Per PM2.5 NAAQS final implementation rule[9], the SIP emissions inventory is required to identify the condensable and filterable portions of PM2.5 separately, in addition to primary PM2.5 emissions. Primary PM emissions consist of 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 $PM_{2.5}$ size fraction. The U.S. EPA's Air Emissions Reporting Requirements (AERR) requires states to report annual emissions of filterable and condensable components of $PM_{2.5}$ and PM_{10}, "as applicable," for large sources for every inventory year and for all sources every third inventory year, beginning with 2011.[10] Subsequent emissions inventory guidance[11] 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 $PM_{2.5}$ from stationary and area sources are estimated using the methodology described below.

Filterable PM comprises "particles that are directly emitted by a source as a solid or liquid [aerosol] at stack or release conditions."[12] Primary $PM_{2.5}$ is the sum of condensable and filterable $PM_{2.5}$ 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. Therefore, the condensable and filterable $PM_{2.5}$ emissions submitted here include only those from stationary point and area sources.

Methodology

Category specific conversion factors developed by CARB and used in the Imperial County 2018 SIP[13] were applied in the current analysis to estimate condensable PM and then filterable PM was calculated by subtracting the condensable from the total $PM_{2.5}$ primary emissions. The baseline 2018, attainment year (2020) and future milestone years (2023, 2031 and 2035) are included in the analysis. Selected list of conversion factors are presented in Table I-3. The factors are developed for point and area source categories, which were classified by Source Classification Code (SCC). Primary emissions are from all source categories including on-road and off-road mobile sources, while condensable and filterable emissions are only for point and area sources, as described above.

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[9] 40 CFR 51.1008(a)(1)(iv)

[10] 40 CFR §51.15(a)(1) and §51.30(b)(1)

[11] USEPA. 2017. Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations.. Available at: https://www.epa.gov/sites/production/files/2017-7/documents/ei_guidance_may_2017_final_rev.pdf..

[12] ibidem

[13] Imperial County 2018 Annual Particulate Matter less than 2.5 microns in Diameter State Implementation Plan, April 2018. Available at https://ww3.arb.ca.gov/planning/sip/planarea/imperial/final_2018_ic_pm25_sip.pdfT

Table I-3. List of Category Specific Conversion Factors (Developed by CARB and Used in the Imperial County 2018 SIP) to Estimate Condensable PM2.5 from Primary PM2.5

SCC	SCC_LEVEL_ONE	SCC_LEVEL_TWO	SCC_LEVEL_THREE	SCC_LEVEL_FOUR	Conversion Factor
20100101	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Turbine	0.0703
20100102	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Reciprocating	0.0703
20100105	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Reciprocating: Crankcase Blowby	0.0706
20100106	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)	0.0000
20100107	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Reciprocating: Exhaust	0.0706
20100109	Internal Combustion Engines	Electric Generation	Distillate Oil (Diesel)	Turbine: Exhaust	0.0706
20100201	Internal Combustion Engines	Electric Generation	Natural Gas	Turbine	0.4505
20100202	Internal Combustion Engines	Electric Generation	Natural Gas	Reciprocating	0.4505
20100205	Internal Combustion Engines	Electric Generation	Natural Gas	Reciprocating: Crankcase Blowby	0.4505
20100206	Internal Combustion Engines	Electric Generation	Natural Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)	0.4505
20100207	Internal Combustion Engines	Electric Generation	Natural Gas	Reciprocating: Exhaust	0.4505
20100209	Internal Combustion Engines	Electric Generation	Natural Gas	Turbine: Exhaust	0.4505
20100301	Internal Combustion Engines	Electric Generation	Gasified Coal	Turbine	0.4505
20100702	Internal Combustion Engines	Electric Generation	Process Gas	Reciprocating	0.4505
20100707	Internal Combustion Engines	Electric Generation	Process Gas	Reciprocating: Exhaust	0.4505
20100801	Internal Combustion Engines	Electric Generation	Landfill Gas	Turbine	0.4505
20100802	Internal Combustion Engines	Electric Generation	Landfill Gas	Reciprocating	0.4505
20100805	Internal Combustion Engines	Electric Generation	Landfill Gas	Reciprocating: Crankcase Blowby	0.4505
20100807	Internal Combustion Engines	Electric Generation	Landfill Gas	Reciprocating: Exhaust	0.4505
20100809	Internal Combustion Engines	Electric Generation	Landfill Gas	Turbine: Exhaust	0.4505
20100901	Internal Combustion Engines	Electric Generation	Kerosene/Naphtha (Jet Fuel)	Turbine	0.0566
20100902	Internal Combustion Engines	Electric Generation	Kerosene/Naphtha (Jet Fuel)	Reciprocating	0.0588
20100907	Internal Combustion Engines	Electric Generation	Kerosene/Naphtha (Jet Fuel)	Reciprocating: Exhaust	0.0566
20100909	Internal Combustion Engines	Electric Generation	Kerosene/Naphtha (Jet Fuel)	Turbine: Exhaust	0.0566
20101001	Internal Combustion Engines	Electric Generation	Geysers/Geothermal	Steam Turbine	0.4505
20101020	Internal Combustion Engines	Electric Generation	Geysers/Geothermal	Well Pad Fugitives: Blowdown	0.0000
20101302	Internal Combustion Engines	Electric Generation	Liquid Waste	Waste Oil - Turbine	0.0706
20182599	Internal Combustion Engines	Electric Generation	Wastewater, Points of Generation	Specify Point of Generation	0.0000
20200101	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Turbine	0.0227
20200102	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating	0.0227

(continued)

Table I-3. List of Category Specific Conversion Factors (Developed by CARB and Used in the Imperial County 2018 SIP) to Estimate Condensable PM2.5 from Primary PM2.5

SCC	SCC_LEVEL_ONE	SCC_LEVEL_TWO	SCC_LEVEL_THREE	SCC_LEVEL_FOUR	Conversion Factor
20200103	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Turbine: Cogeneration	0.0227
20200104	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating: Cogeneration	0.0227
20200105	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating: Crankcase Blowby	0.0227
20200106	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)	0.0000
20200107	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Reciprocating: Exhaust	0.0227
20200109	Internal Combustion Engines	Industrial	Distillate Oil (Diesel)	Turbine: Exhaust	0.0227
20200201	Internal Combustion Engines	Industrial	Natural Gas	Turbine	0.4505
20200202	Internal Combustion Engines	Industrial	Natural Gas	Reciprocating	0.4505
20200203	Internal Combustion Engines	Industrial	Natural Gas	Turbine: Cogeneration	0.4505
20200204	Internal Combustion Engines	Industrial	Natural Gas	Reciprocating: Cogeneration	0.4505
20200205	Internal Combustion Engines	Industrial	Natural Gas	Reciprocating: Crankcase Blowby	0.4505
20200207	Internal Combustion Engines	Industrial	Natural Gas	Reciprocating: Exhaust	0.4505
20200209	Internal Combustion Engines	Industrial	Natural Gas	Turbine: Exhaust	0.4505
20200252	Internal Combustion Engines	Industrial	Natural Gas	2-cycle Lean Burn	0.4505
20200253	Internal Combustion Engines	Industrial	Natural Gas	4-cycle Rich Burn	0.4505
20200254	Internal Combustion Engines	Industrial	Natural Gas	4-cycle Lean Burn	0.4505
20200255	Internal Combustion Engines	Industrial	Natural Gas	2-cycle Clean Burn	0.4505
20200256	Internal Combustion Engines	Industrial	Natural Gas	4-cycle Clean Burn	0.4505
20200401	Internal Combustion Engines	Industrial	Large Bore Engine	Diesel	0.1344
20200402	Internal Combustion Engines	Industrial	Large Bore Engine	Dual Fuel (Oil/Gas)	0.1344
20200403	Internal Combustion Engines	Industrial	Large Bore Engine	Cogeneration: Dual Fuel	0.1344
20200406	Internal Combustion Engines	Industrial	Large Bore Engine	Evaporative Losses (Fuel Storage and Delivery System)	0.0000
20200407	Internal Combustion Engines	Industrial	Large Bore Engine	Exhaust	0.1342
20200501	Internal Combustion Engines	Industrial	Residual/Crude Oil	Reciprocating	0.0830
20200701	Internal Combustion Engines	Industrial	Process Gas	Turbine	0.4505
20200702	Internal Combustion Engines	Industrial	Process Gas	Reciprocating Engine	0.4505
20200705	Internal Combustion Engines	Industrial	Process Gas	Refinery Gas: Turbine	0.4505
20200706	Internal Combustion Engines	Industrial	Process Gas	Refinery Gas: Reciprocating Engine	0.4505
20200711	Internal Combustion Engines	Industrial	Process Gas	Reciprocating: Evaporative Losses (Fuel Delivery System)	0.4505

(continued)

Table I-3. List of Category Specific Conversion Factors (Developed by CARB and Used in the Imperial County 2018 SIP) to Estimate Condensable PM2.5 from Primary PM2.5

SCC	SCC_LEVEL_ONE	SCC_LEVEL_TWO	SCC_LEVEL_THREE	SCC_LEVEL_FOUR	Conversion Factor
20200712	Internal Combustion Engines	Industrial	Process Gas	Reciprocating: Exhaust	0.4505
20200714	Internal Combustion Engines	Industrial	Process Gas	Turbine: Exhaust	0.4505
20200901	Internal Combustion Engines	Industrial	Kerosene/Naphtha (Jet Fuel)	Turbine	0.0227
20200902	Internal Combustion Engines	Industrial	Kerosene/Naphtha (Jet Fuel)	Reciprocating	0.0227
20200909	Internal Combustion Engines	Industrial	Kerosene/Naphtha (Jet Fuel)	Turbine: Exhaust	0.0227
20201001	Internal Combustion Engines	Industrial	Liquified Petroleum Gas (LPG)	Propane: Reciprocating	0.4505
20201002	Internal Combustion Engines	Industrial	Liquified Petroleum Gas (LPG)	Butane: Reciprocating	0.4505
20201005	Internal Combustion Engines	Industrial	Liquified Petroleum Gas (LPG)	Reciprocating: Crankcase Blowby	0.4505
20201012	Internal Combustion Engines	Industrial	Liquified Petroleum Gas (LPG)	Reciprocating Engine	0.4505
20201013	Internal Combustion Engines	Industrial	Liquified Petroleum Gas (LPG)	Turbine: Cogeneration	0.4505
20201602	Internal Combustion Engines	Industrial	Methanol	Reciprocating Engine	0.4505
20201607	Internal Combustion Engines	Industrial	Methanol	Reciprocating: Exhaust	0.4505
20201609	Internal Combustion Engines	Industrial	Methanol	Turbine: Exhaust	0.4505
20201701	Internal Combustion Engines	Industrial	Gasoline	Turbine	0.4505
20201702	Internal Combustion Engines	Industrial	Gasoline	Reciprocating Engine	0.4505
20201707	Internal Combustion Engines	Industrial	Gasoline	Reciprocating: Exhaust	0.4505
20280001	Internal Combustion Engines	Industrial	Equipment Leaks	Equipment Leaks	0.4505
20282599	Internal Combustion Engines	Industrial	Wastewater, Points of Generation	Specify Point of Generation	0.0000
20300101	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Reciprocating	0.0227
20300102	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Turbine	0.0227
20300105	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Reciprocating: Crankcase Blowby	0.0227
20300106	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)	0.0000
20300107	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Reciprocating: Exhaust	0.0227
20300108	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Turbine: Evaporative Losses (Fuel Storage and Delivery System)	0.0000
20300109	Internal Combustion Engines	Commercial/Institutional	Distillate Oil (Diesel)	Turbine: Exhaust	0.0227
20300201	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Reciprocating	0.4505
20300202	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Turbine	0.4505
20300203	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Turbine: Cogeneration	0.4505
20300204	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Reciprocating: Cogeneration	0.4505

(continued)

Table I-3. List of Category Specific Conversion Factors (Developed by CARB and Used in the Imperial County 2018 SIP) to Estimate Condensable PM2.5 from Primary PM2.5

SCC	SCC_LEVEL_ONE	SCC_LEVEL_TWO	SCC_LEVEL_THREE	SCC_LEVEL_FOUR	Conversion Factor
20300207	Internal Combustion Engines	Commercial/Institutional	Natural Gas	Reciprocating: Exhaust	0.4505
20300301	Internal Combustion Engines	Commercial/Institutional	Gasoline	Reciprocating	0.0672
20300307	Internal Combustion Engines	Commercial/Institutional	Gasoline	Reciprocating: Exhaust	0.0672
20300701	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Turbine	0.3750
20300702	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Reciprocating: POTW Digester Gas	0.4505
20300706	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Reciprocating: Evaporative Losses (Fuel Storage and Delivery System)	0.0000
20300707	Internal Combustion Engines	Commercial/Institutional	Digester Gas	Reciprocating: Exhaust	0.4505
20300801	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Turbine	0.4505
20300802	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Reciprocating	0.4505
20300805	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Reciprocating: Crankcase Blowby	0.4505
20300809	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Turbine: Exhaust	0.4505
20300901	Internal Combustion Engines	Commercial/Institutional	Kerosene/Naphtha (Jet Fuel)	Turbine: JP-4	0.4505
20301001	Internal Combustion Engines	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Propane: Reciprocating	0.4505
20301002	Internal Combustion Engines	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Butane: Reciprocating	0.4505
20301007	Internal Combustion Engines	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Reciprocating: Exhaust	0.4505
20400101	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	Turbojet	0.0712
20400102	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	Turboshaft	0.4505
20400111	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	JP-5 Fuel	0.4505
20400112	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	JP-4 Fuel	0.0712
20400199	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	Other Not Classified	0.0000
20400201	Internal Combustion Engines	Engine Testing	Rocket Engine Testing	Rocket Motor: Solid Propellant	0.4505
20400202	Internal Combustion Engines	Engine Testing	Rocket Engine Testing	Liquid Propellant	0.4505
20400299	Internal Combustion Engines	Engine Testing	Rocket Engine Testing	Other Not Classified	0.0000
20400301	Internal Combustion Engines	Engine Testing	Turbine	Natural Gas	0.4505
20400302	Internal Combustion Engines	Engine Testing	Turbine	Diesel/Kerosene	0.0712
20400303	Internal Combustion Engines	Engine Testing	Turbine	Distillate Oil	0.0712
20400305	Internal Combustion Engines	Engine Testing	Turbine	Kerosene/Naphtha	0.0712
20400399	Internal Combustion Engines	Engine Testing	Turbine	Other Not Classified	0.0000
20400401	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Gasoline	0.0712

(continued)

Table I-3. List of Category Specific Conversion Factors (Developed by CARB and Used in the Imperial County 2018 SIP) to Estimate Condensable PM2.5 from Primary PM2.5

SCC	SCC_LEVEL_ONE	SCC_LEVEL_TWO	SCC_LEVEL_THREE	SCC_LEVEL_FOUR	Conversion Factor
20400402	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Diesel/Kerosene	0.0712
20400403	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Distillate Oil	0.0712
20400404	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Process Gas	0.4505
20400406	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Kerosene/Naphtha (Jet Fuel)	0.0712
20400407	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Dual Fuel (Gas/Oil)	0.0712
20400408	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Residual Oil/Crude Oil	0.0712
20400409	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Liquified Petroleum Gas (LPG)	0.4505
20400499	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Other Not Classified	0.0000
26000320	Internal Combustion Engines	Off-highway 2-stroke Gasoline Engines	Industrial Equipment	Industrial Forklift: Gasoline Engine (2-stroke)	0.0712
26500320	Internal Combustion Engines	Off-highway 4-stroke Gasoline Engines	Industrial Equipment	Industrial Forklift: Gasoline Engine (4-stroke)	0.0712
27000320	Internal Combustion Engines	Off-highway Diesel Engines	Industrial Equipment	Industrial Forklift: Diesel	0.0712
27300320	Internal Combustion Engines	Off-highway LPG-fueled Engines	Industrial Equipment	Industrial Forklift: Liquified Petroleum Gas (LPG)	0.4505
28500201	Internal Combustion Engines	Railroad Equipment	Diesel	Yard Locomotives	0.0712
28888801	Internal Combustion Engines	Fugitive Emissions	Other Not Classified	Specify in Comments	0.0000
20300802	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Reciprocating	0.4505
20300805	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Reciprocating: Crankcase Blowby	0.4505
20300809	Internal Combustion Engines	Commercial/Institutional	Landfill Gas	Turbine: Exhaust	0.4505
20300901	Internal Combustion Engines	Commercial/Institutional	Kerosene/Naphtha (Jet Fuel)	Turbine: JP-4	0.4505
20301001	Internal Combustion Engines	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Propane: Reciprocating	0.4505
20301002	Internal Combustion Engines	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Butane: Reciprocating	0.4505
20301007	Internal Combustion Engines	Commercial/Institutional	Liquified Petroleum Gas (LPG)	Reciprocating: Exhaust	0.4505
20400101	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	Turbojet	0.0712
20400102	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	Turboshaft	0.4505
20400111	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	JP-5 Fuel	0.4505
20400112	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	JP-4 Fuel	0.0712
20400199	Internal Combustion Engines	Engine Testing	Aircraft Engine Testing	Other Not Classified	0.0000
20400201	Internal Combustion Engines	Engine Testing	Rocket Engine Testing	Rocket Motor: Solid Propellant	0.4505
20400202	Internal Combustion Engines	Engine Testing	Rocket Engine Testing	Liquid Propellant	0.4505
20400299	Internal Combustion Engines	Engine Testing	Rocket Engine Testing	Other Not Classified	0.0000

(continued)

Table I-3. List of Category Specific Conversion Factors (Developed by CARB and Used in the Imperial County 2018 SIP) to Estimate Condensable PM2.5 from Primary PM2.5

SCC	SCC_LEVEL_ONE	SCC_LEVEL_TWO	SCC_LEVEL_THREE	SCC_LEVEL_FOUR	Conversion Factor
20400301	Internal Combustion Engines	Engine Testing	Turbine	Natural Gas	0.4505
20400302	Internal Combustion Engines	Engine Testing	Turbine	Diesel/Kerosene	0.0712
20400303	Internal Combustion Engines	Engine Testing	Turbine	Distillate Oil	0.0712
20400305	Internal Combustion Engines	Engine Testing	Turbine	Kerosene/Naphtha	0.0712
20400399	Internal Combustion Engines	Engine Testing	Turbine	Other Not Classified	0.0000
20400401	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Gasoline	0.0712
20400402	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Diesel/Kerosene	0.0712
20400403	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Distillate Oil	0.0712
20400404	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Process Gas	0.4505
20400406	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Kerosene/Naphtha (Jet Fuel)	0.0712
20400407	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Dual Fuel (Gas/Oil)	0.0712
20400408	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Residual Oil/Crude Oil	0.0712
20400409	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Liquified Petroleum Gas (LPG)	0.4505
20400499	Internal Combustion Engines	Engine Testing	Reciprocating Engine	Other Not Classified	0.0000
26000320	Internal Combustion Engines	Off-highway 2-stroke Gasoline Engines	Industrial Equipment	Industrial Forklift: Gasoline Engine (2-stroke)	0.0712
26500320	Internal Combustion Engines	Off-highway 4-stroke Gasoline Engines	Industrial Equipment	Industrial Forklift: Gasoline Engine (4-stroke)	0.0712
27000320	Internal Combustion Engines	Off-highway Diesel Engines	Industrial Equipment	Industrial Forklift: Diesel	0.0712
27300320	Internal Combustion Engines	Off-highway LPG-fueled Engines	Industrial Equipment	Industrial Forklift: Liquified Petroleum Gas (LPG)	0.4505
28500201	Internal Combustion Engines	Railroad Equipment	Diesel	Yard Locomotives	0.0712
28888801	Internal Combustion Engines	Fugitive Emissions	Other Not Classified	Specify in Comments	0.0000

Appendix II

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
Fuel Combustion										
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
Total Fuel Combustion		**20.43**	**5.33**	**21.12**	**80.93**	**2.09**	**5.54**	**5.42**	**5.35**	**7.79**
Waste Disposal										
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
Total Waste Disposal		**693.64**	**14.67**	**1.44**	**0.65**	**0.44**	**0.34**	**0.26**	**0.25**	**5.74**
Cleaning and Surface Coatings										
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
Total Cleaning and Surface Coatings		**95.44**	**36.98**	**0.01**	**0.12**	**0.00**	**1.57**	**1.51**	**1.45**	**0.14**
Petroleum Production and Marketing										
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
Total Petroleum Production and Marketing		**65.29**	**19.61**	**0.25**	**2.65**	**0.30**	**1.92**	**1.28**	**0.91**	**0.07**
Industrial Processes										
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
Total Industrial Processes		**11.97**	**10.23**	**0.11**	**0.67**	**0.13**	**16.97**	**9.58**	**4.71**	**9.14**
Solvent Evaporation										
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
Total Solvent Evaporation		**148.78**	**120.31**	**0.00**	**0.00**	**0.00**	**0.03**	**0.02**	**0.02**	**1.25**

(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				
Total Miscellaneous Processes		**41.47**	**12.59**	**37.04**	**62.65**	**5.88**	**223.10**	**118.54**	**32.97**	**34.39**
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
Total On-Road Motor Vehicles		**93.34**	**79.03**	**170.85**	**724.31**	**1.68**	**24.37**	**23.91**	**11.06**	**16.25**
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
Total Other Mobile Sources		**107.10**	**98.03**	**135.44**	**870.55**	**3.61**	**6.51**	**6.25**	**5.36**	**0.17**
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
Total		**1277.48**	**396.78**	**366.26**	**1742.52**	**14.12**	**280.35**	**166.77**	**62.10**	**74.94**

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
Fuel Combustion										
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
Total Fuel Combustion		**20.30**	**5.34**	**20.43**	**79.67**	**2.11**	**5.57**	**5.45**	**5.37**	**7.74**
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	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
Total Waste Disposal		**704.15**	**14.86**	**1.45**	**0.65**	**0.44**	**0.34**	**0.26**	**0.25**	**5.85**
Cleaning and Surface Coatings										
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
Total Cleaning and Surface Coatings		**96.15**	**37.25**	**0.01**	**0.12**	**0.00**	**1.60**	**1.54**	**1.48**	**0.14**
Petroleum Production and Marketing										
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
Total Petroleum Production and Marketing		**66.88**	**19.33**	**0.25**	**2.65**	**0.30**	**1.92**	**1.28**	**0.91**	**0.07**
Industrial Processes										
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
Total Industrial Processes		**12.06**	**10.31**	**0.11**	**0.68**	**0.13**	**17.28**	**9.79**	**4.84**	**9.14**
Solvent Evaporation										
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
Total Solvent Evaporation		**150.64**	**121.84**	**0.00**	**0.00**	**0.00**	**0.03**	**0.02**	**0.02**	**1.24**

(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				
Total Miscellaneous Processes		**39.14**	**11.94**	**41.10**	**54.64**	**6.46**	**224.30**	**118.79**	**32.60**	**33.81**
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
Total On-Road Motor Vehicles		**81.38**	**69.27**	**141.91**	**628.36**	**1.60**	**23.90**	**23.45**	**10.52**	**17.59**
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
Total Other Mobile Sources		**103.97**	**95.05**	**132.38**	**910.37**	**3.79**	**6.13**	**5.89**	**5.04**	**0.18**
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
Total		**1274.66**	**385.20**	**337.65**	**1677.13**	**14.85**	**281.06**	**166.45**	**61.03**	**75.76**

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
Total Fuel Combustion		**20.45**	**5.41**	**20.51**	**79.37**	**2.12**	**5.60**	**5.47**	**5.39**	**7.73**
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
Total Waste Disposal		**718.80**	**15.12**	**1.41**	**0.66**	**0.45**	**0.34**	**0.27**	**0.25**	**6.02**
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
Total Cleaning and Surface Coatings		**97.41**	**37.69**	**0.01**	**0.12**	**0.00**	**1.65**	**1.58**	**1.52**	**0.15**
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
Total Petroleum Production and Marketing		**65.79**	**19.02**	**0.25**	**2.64**	**0.31**	**1.92**	**1.28**	**0.91**	**0.07**
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
Total Industrial Processes		**12.23**	**10.48**	**0.11**	**0.71**	**0.13**	**17.76**	**10.11**	**5.03**	**9.14**
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
Total Solvent Evaporation		**155.13**	**125.58**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.02**	**1.22**

(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				
Total Miscellaneous Processes		**36.66**	**11.72**	**33.41**	**54.21**	**6.45**	**227.73**	**120.38**	**32.78**	**33.21**
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
Total On-Road Motor Vehicles		**65.00**	**55.74**	**93.43**	**501.69**	**1.49**	**23.15**	**22.71**	**9.64**	**19.80**
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
Total Other Mobile Sources		**101.12**	**92.30**	**127.26**	**960.78**	**4.05**	**5.61**	**5.37**	**4.59**	**0.19**
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
Total		**1272.59**	**373.04**	**276.40**	**1600.18**	**15.02**	**283.79**	**167.19**	**60.15**	**77.53**

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
Total Fuel Combustion		**20.11**	**5.42**	**19.86**	**74.73**	**2.13**	**5.46**	**5.33**	**5.25**	**7.20**
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
Total Waste Disposal		**755.05**	**15.78**	**1.41**	**0.69**	**0.46**	**0.36**	**0.27**	**0.26**	**6.42**
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
Total Cleaning and Surface Coatings		**100.33**	**39.33**	**0.01**	**0.12**	**0.00**	**1.73**	**1.66**	**1.60**	**0.16**
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
Total Petroleum Production and Marketing		**62.54**	**18.68**	**0.24**	**2.62**	**0.34**	**1.92**	**1.28**	**0.91**	**0.07**
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
Total Industrial Processes		**12.52**	**10.75**	**0.11**	**0.76**	**0.14**	**18.64**	**10.71**	**5.39**	**9.15**
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
Total Solvent Evaporation		**169.56**	**137.59**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**1.18**

(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
	Former RECLAIM			16.42		5.54				
Total Miscellaneous Processes		**35.96**	**11.60**	**31.39**	**53.20**	**5.90**	**234.99**	**124.00**	**33.56**	**34.40**
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
Total On-Road Motor Vehicles		**47.67**	**40.84**	**71.94**	**377.44**	**1.24**	**23.11**	**22.69**	**9.50**	**22.07**
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
Total Other Mobile Sources		**99.59**	**90.56**	**126.51**	**1049.83**	**4.79**	**5.09**	**4.87**	**4.15**	**0.22**
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
Total		**1303.33**	**370.55**	**251.48**	**1559.39**	**15.01**	**291.31**	**170.83**	**60.65**	**80.88**

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
Total Fuel Combustion		**20.14**	**5.43**	**19.59**	**72.90**	**2.15**	**5.44**	**5.30**	**5.23**	**7.06**
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
Total Waste Disposal		**770.50**	**16.03**	**1.43**	**0.70**	**0.47**	**0.36**	**0.28**	**0.26**	**6.55**
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
Total Cleaning and Surface Coatings		**99.68**	**39.35**	**0.01**	**0.12**	**0.00**	**1.73**	**1.66**	**1.60**	**0.16**
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
Total Petroleum Production and Marketing		**62.14**	**18.81**	**0.24**	**2.61**	**0.35**	**1.92**	**1.28**	**0.91**	**0.07**
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
Total Industrial Processes		**12.53**	**10.76**	**0.11**	**0.77**	**0.14**	**18.67**	**10.73**	**5.41**	**9.15**
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
Total Solvent Evaporation		**176.76**	**143.59**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**1.17**

(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
	Former RECLAIM			16.39		5.54				
Total Miscellaneous Processes		**35.80**	**11.60**	**30.37**	**53.15**	**5.90**	**239.14**	**126.08**	**34.06**	**34.97**
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
Total On-Road Motor Vehicles		**42.89**	**36.52**	**66.23**	**359.12**	**1.19**	**23.24**	**22.83**	**9.50**	**22.91**
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
Total Other Mobile Sources		**100.36**	**91.19**	**124.82**	**1086.93**	**5.17**	**5.03**	**4.82**	**4.11**	**0.23**
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
Total		**1320.82**	**373.27**	**242.79**	**1576.30**	**15.36**	**295.56**	**173.00**	**61.10**	**82.26**

Appendix III

Primary, Condensable and Filterable PM2.5 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 Emission

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
Fuel Combustion					
	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
Total Fuel Combustion			**5.34**	**2.66**	**2.68**
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	1.39	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
Total Cleaning and Surface Coatings			**1.45**	**0**	**1.45**
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	0	0	0
Total Petroleum Production and Marketing			0.91	0.91	0.14
Industrial Processes					
	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
Total Industrial Processes			**4.71**	**0.16**	**4.55**
Solvent Evaporation					
	510	Consumer Products	0	0	0
	520	Architectural Coatings and Related	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)
2018 Primary, Condensable and Filterable PM2.5 Emissions by Major Source Category (Tons

CODE	Source Category	PM2.5	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
Total Miscellaneous Processes		**32.98**	**12.19**	**20.79**
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	--	--
Total On-Road Motor Vehicles		**11.06**	**--**	**--**
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	--	--
Total Other Mobile Sources		**5.36**	**--**	**--**
Total Stationary and Area Sources		**45.66**	**15.19**	**30.48**
Total On-Road Vehicles		11.06	--	--
Total Other Mobile		5.36	--	--
Total		**62.10**	--	--

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	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	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

CODE	Source Category	PM2.5	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
Total Miscellaneous Processes		**32.6**	**12.38**	**20.22**
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	--	--
Total On-Road Motor Vehicles		**10.51**	**--**	**--**
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	--	--
Total Other Mobile Sources		**5.04**	**--**	**--**
Total Stationary and Area Sources		**45.46**	**15.4**	**30.06**
Total On-Road Vehicles		10.51	--	--
Total Other Mobile		5.04	--	--
Total		**61.03**	**--**	**--**

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	0	0	0
Total Petroleum Production and Marketing			0.91	0.91	0.14
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	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

CODE	Source Category	PM2.5	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
Total Miscellaneous Processes		**32.78**	**12.57**	**20.21**
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	--	--
Total On-Road Motor Vehicles		**9.64**	**--**	**--**
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	--	--
Total Other Mobile Sources		**4.59**	**--**	**--**
Total Stationary and Area Sources		**45.91**	**15.6**	**30.31**
Total On-Road Vehicles		9.64	--	--
Total Other Mobile		4.59	--	--
Total		**60.15**	**--**	**--**

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
Total Fuel Combustion			**5.24**	**2.58**	**2.66**
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
Total Waste Disposal			**0.26**	**0.04**	**0.22**
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
Total Cleaning and Surface Coatings			**1.6**	**0**	**1.6**
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	0	0	0
Total Petroleum Production and Marketing			**0.91**	**0.91**	**0.14**
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
Total Industrial Processes			**5.39**	**0.19**	**5.2**
Solvent Evaporation					
	510	Consumer Products	0	0	0
	520	Architectural Coatings and Related	0	0	0
	530	Pesticides/Fertilizers	0	0	0
	540	Asphalt Paving/Roofing	0.03	0	0.03
Total Solvent Evaporation			**0.03**	**0**	**0.03**

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

CODE	Source Category	PM2.5	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
Total Miscellaneous Processes		**33.56**	**13.08**	**20.48**
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	--	--
Total On-Road Motor Vehicles		**9.5**	**--**	**--**
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	--	--
Total Other Mobile Sources		**4.15**	**--**	**--**
Total Stationary and Area Sources		**47**	**16.05**	**30.95**
Total On-Road Vehicles		9.5	--	--
Total Other Mobile		4.15	--	--
Total		**60.65**	**--**	**--**

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
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
Total Fuel Combustion			**5.22**	**2.56**	**2.66**
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
Total Waste Disposal			**0.26**	**0.04**	**0.22**
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
Total Cleaning and Surface Coatings			**1.6**	**0**	**1.6**
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	0	0	0
Total Petroleum Production and Marketing			**0.91**	**0.91**	**0.14**
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
Total Industrial Processes			**5.4**	**0.2**	**5.21**
Solvent Evaporation					
	510	Consumer Products	0	0	0
	520	Architectural Coatings and Related	0	0	0
	530	Pesticides/Fertilizers	0	0	0
	540	Asphalt Paving/Roofing	0.03	0	0.03
Total Solvent Evaporation			**0.03**	**0**	**0.03**

(Continued)

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

CODE	Source Category	PM2.5	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
Total Miscellaneous Processes		**34.06**	**13.35**	**20.71**
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	--	--
Total On-Road Motor Vehicles		**9.5**	**--**	**--**
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	--	--
Total Other Mobile Sources		4.11	--	--
Total Stationary and Area Sources		**47.49**	**16.3**	**31.19**
Total On-Road Vehicles		9.5	--	--
Total Other Mobile		4.11	--	--
Total		**61.10**	**--**	**--**

Appendix IV.

PM2.5 Chemical Speciation Data

PM2.5 Chemical Speciation Data

This appendix provides details how PM2.5 chemical composition data were developed for this Plan. PM2.5 speciation data measured at four Chemical Speciation Network (CSN) sites provided the chemical characterization for evaluation and validation of the CMAQ model predictions. 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 site was intended to capture the characteristics of an emission source area.

For the 24-hour attainment demonstration, the U.S. EPA's guidance (U.S. EPA, 2018) recommends that the determination of species fractions be based on the top 10% of days in each quarter. This results in two days per quarter for the 1-in-6 day CSN data. Figures IV-1 through IV-4 depict the measured PM2.5 chemical composition from the top two PM2.5 concentration days for each quarter for the four CSN sites in the Basin. In general, concentrations in the first or fourth quarter are higher than those in the other quarters and secondary ammonium (NH4), nitrate (NO3) and sulfate (SO4) often comprise close to half of the total PM2.5 concentrations. Organic carbon (OC) is another significant component.

OC as measured by a Speciation Air Sampling System (SASS) is believed to be highly uncertain with a mostly positive sampling artifact. The 6.7 Liter Per Minute (LPM) flow rate of the SASS used to collect OC is approximately 2.5 times lower than that of the Federal Reference Method (FRM) sampling system (16.7 LPM). The slower flow rate in the SASS reduces the pressure drop across the filter and increases the adsorption of organic vapor on the quartz filter. The FRM sampler uses a Teflon filter for mass measurements which is much less subject to organic vapor adsorption. Therefore, for the same air mass, more OC can be collected by the SASS than the FRM sampler, often leading to an overbalance in the sum of the PM2.5 species relative to FRM mass. There are uncertainties in the measurements and the speciation analyses for all species; however, the greatest uncertainty in species concentration is generally associated with the measurement and analysis of OC.

The U.S. EPA recommends estimating uncertain OC concentrations through the Sulfate, Adjusted Nitrate, Derived Water, Inferred Carbon Hybrid (SANDWICH) material balance method (Frank, 2006).[1] According to the SANDWICH method, OC is estimated by mass balance, defined as the difference between the measured mass and the sum of all inorganic species, water and a filter blank of 0.2 $\mu g/m^3$.

The OC derived by mass balance is further constrained by a floor and a ceiling. The floor value is equal to the measured OC mass, except when the speciation mass exceeds FRM mass. In this case, the measured OC is scaled by the ratio of the FRM to speciation mass; this value then defines the OC floor. While the U.S. EPA's guidance recommends setting the ceiling to 0.8 times the FRM mass, this resulted in large OC

[1] Frank, N.H., 2006. Retained Nitrate, Hydrated Sulfates, and Carbonaceous Mass in Federal Reference Method Fine Particulate Matter for Six Eastern U.S. Cities. *Journal of Air & Waste Management Association*, 56:4, 500-511.

fractions that were not supported by the field measurements taken in the Basin (Hayes et al., 2013).[2] Thus, the OC ceiling was lowered to 0.5 times the FRM mass, which is consistent with a previous study (Hayes et al., 2013).[2] Figures IV-5 through IV-8 depict the species fractional splits for the 6 primary components and water vapor for the four CSN sites in 2018 after SANDWICH was applied.

Similar PM2.5 species fractions as well as seasonal variation patterns were shown in the four CSN sites in 2018. OC and NO3 were the dominate PM2.5 components throughout the year with the OC fraction highest around 50% in the third quarter (Q3) and lowest around 25-35% in second quarter (Q2). Rubidoux site has the highest OC fraction compared with other three CSN, which may due to the impact of transport of secondary organic carbon formation from downtown and the biogenic emission over foothills. When the ambient PM2.5 concentration were high in first (Q1) and fourth quarter (Q4), the fraction of EC increased, which suggest the higher contribution to PM2.5 total mass from direct emission such as on-road mobile and wood burning. The fraction of SO4 was higher in Q2 and Q3 when the ambient PM2.5 concentrations were relatively low compared with Q1 and Q4.

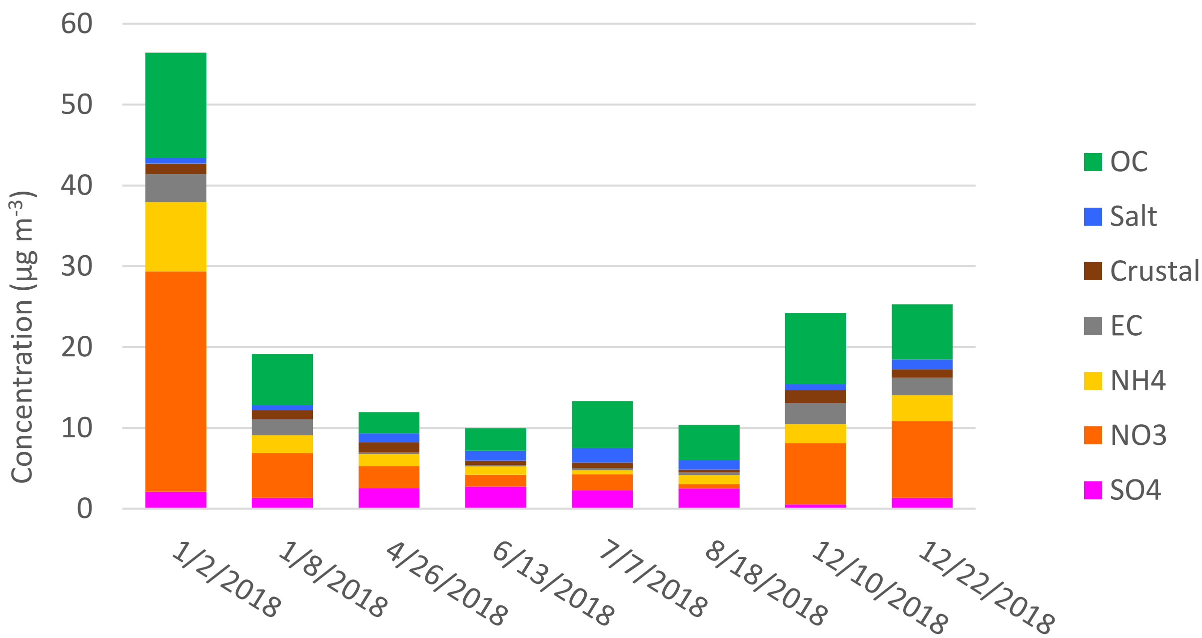

Figure IV-1. Anaheim Quarterly Top-two Day 24-Hour PM2.5 Mass and Chemical Components Concentrations in 2018

[2] Hayes, P.L., et al., (2013). Organic aerosol composition and sources in Pasadena, California, during the 2010 CalNex campaign. *Journal of Geophysical Research: Atmospheres*, 118:16, 9233-9257.

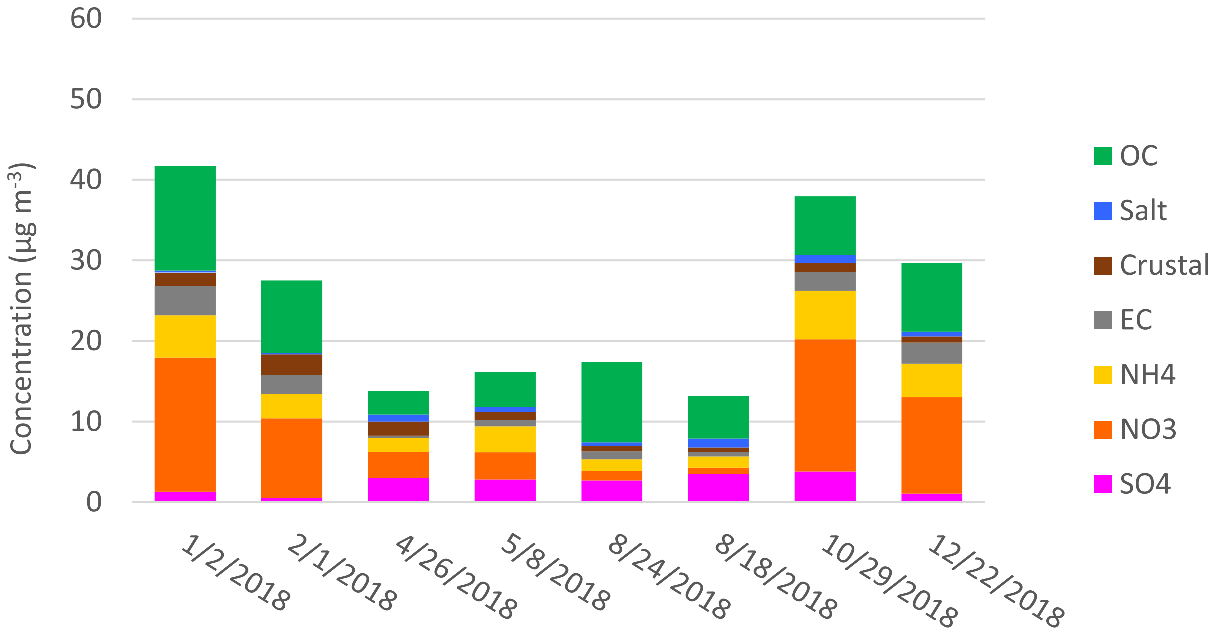

Figure IV-2 Los Angeles Quarterly Top-two Day 24-Hour PM2.5 Mass and Chemical Components Concentrations in 2018

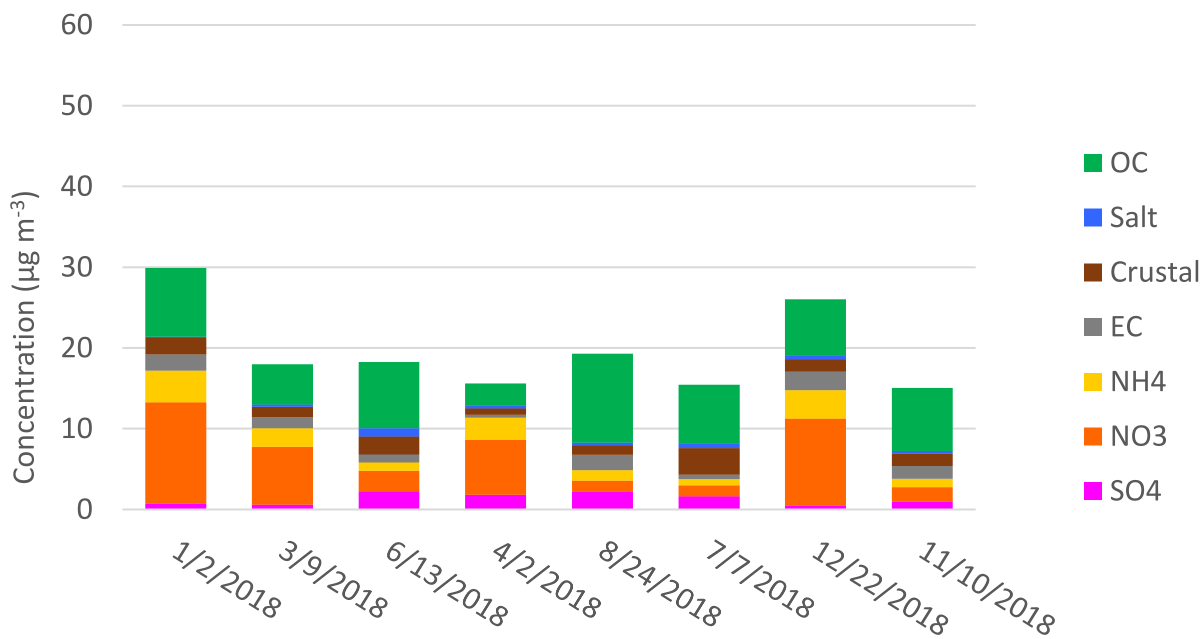

Figure IV-3. Fontana Quarterly Top-two Day 24-Hour PM2.5 Mass and Chemical Components Concentrations in 2018

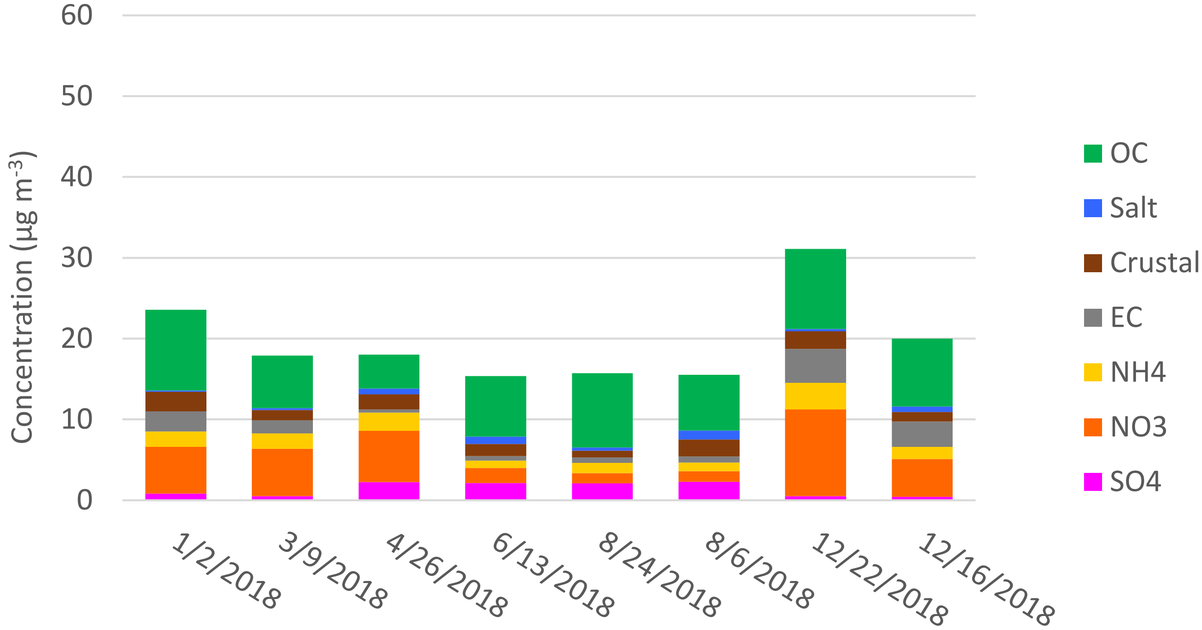

Figure IV-4. Rubidoux Quarterly Top-two Day 24-Hour PM2.5 Mass and Chemical Components Concentrations in 2018

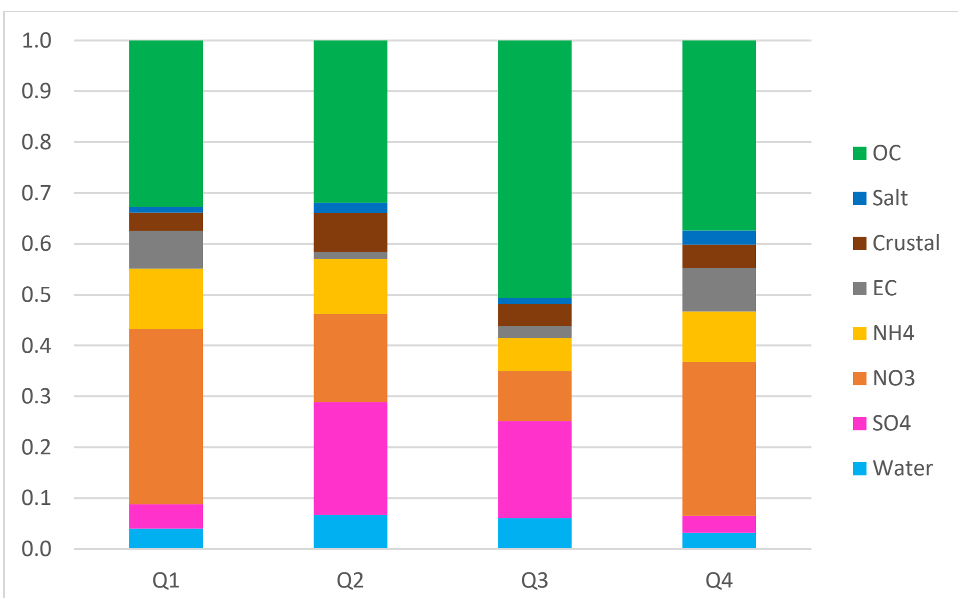

Figure IV-5. Anaheim Quarterly Top-two Day Averaged PM2.5 Species Fraction after SANDWICH method in 2018

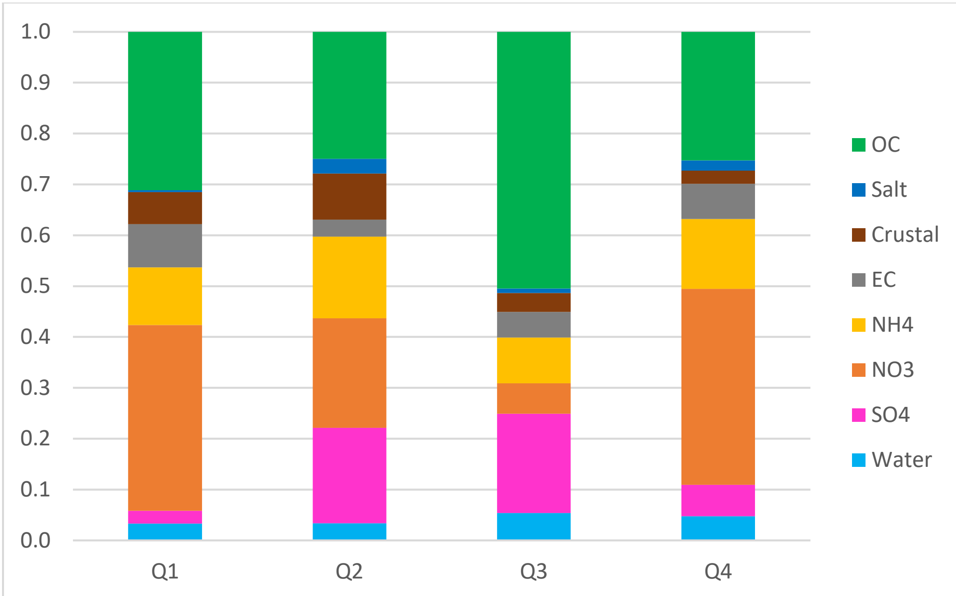

Figure IV-6. Los Angeles Quarterly Top-two Day Averaged PM2.5 Species Fraction after SANDWICH method in 2018

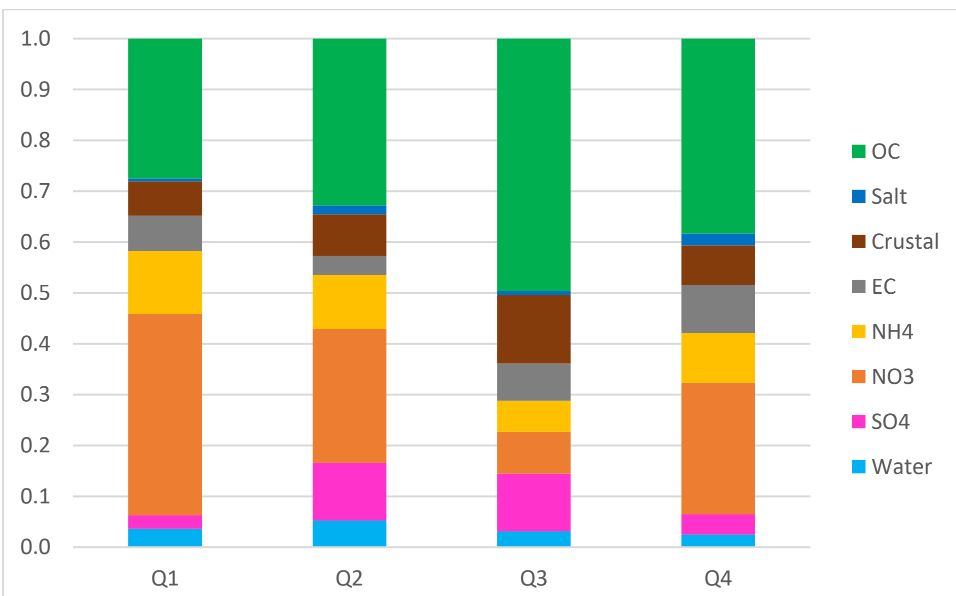

Figure IV-7. Fontana Quarterly Top-two Day Averaged PM2.5 Species Fraction after SANDWICH method in 2018

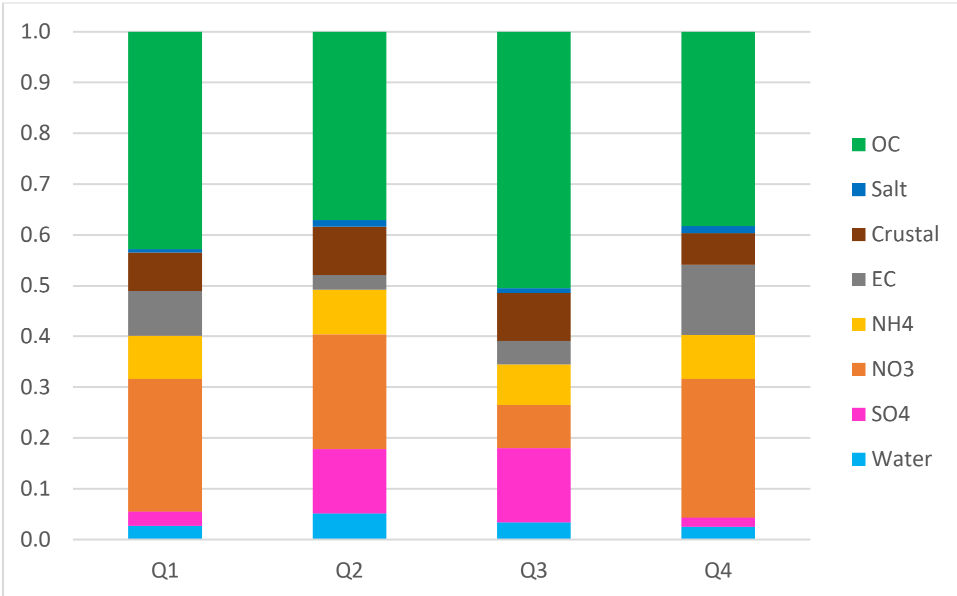

Figure IV-8. Rubidoux Quarterly Top-two Day Averaged PM2.5 Species Fraction after SANDWICH method in 2018

Appendix V.

Maintenance of 1997 and 2006 24-hour PM2.5 NAAQS Attainment using 5-year Weighted Design Value for Compton

Maintenance of 1997 and 2006 24-hour PM2.5 NAAQS Attainment Status using 5-year Weighted Design Value for Compton

The U.S. EPA's guidance recommends the use of 5-year weighted design values (DVs) instead of 3-year design values in the modeled attainment demonstration. When 5-year weighted design values were used, attainment of the 24-hour PM2.5 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. The 189(d) Plan[1] provided weight of evidence discussions that the abnormally high PM levels attributed to exceedance of 35 ug/m3 were likely caused by various factors such as woodsmoke, unfavorable meteorological condition and fireworks. Therefore, attainment in Compton cannot be demonstrated with regional modeling, but various analysis using ambient air quality trend, emissions, biomass burning marker, etc. This appendix reiterates key findings from the weight of evidence discussions included in the 189(d) Plan to demonstrate that the high PM episodes occurred 2017 were likely unusual and episodic events and did not recur. Evidently, Compton reached attainment of the 2006 24-hour PM2.5 NAAQS in 2020. As the CMAQ based regional modeling system predicted, Compton is expected to maintain attainment status of the 1997 and 2006 24-hour PM2.5 standards through 2035 if design values periods influenced by the abnormally high values in 2017 was excluded.

PM2.5 Trend Measured at Compton

Since FRM measurement for PM2.5 began on Dec. 23, 2008, all the DVs prior to 2017 were below the 2006 24-hour PM2.5 standard of 35 μg/m^3 in Compton. The 2017 DV was 39 μg/m^3, which was caused by unusually high PM2.5 readings recorded on January 1, December 24th and 27th, 2017. The 98th percentile value used in the DV calculation was 53.4 μg/m^3 measured on Jan 1st 2017. Since a DV comprises a three-year period, the high reading in 2017 carried over and caused exceedances in 2017, 2018 and 2019. However, as is evident from Figure V-1, the abnormally high PM episode did not recur after 2017. The three highest values recorded in 2017 are among the top four highest PM2.5 values recorded in Compton since the beginning of the PM2.5 measurements. Further analysis indicates that meteorological conditions were not particularly conducive towards high PM2.5 concentrations on January 1st, whereas meteorological conditions were highly conducive to PM accumulation on December 27th. This suggests that the high PM levels on January 1st and December 24th were likely caused by episodic local emissions. Evidently, Compton reached attainment (35 μg/m3) in 2020.

[1] 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

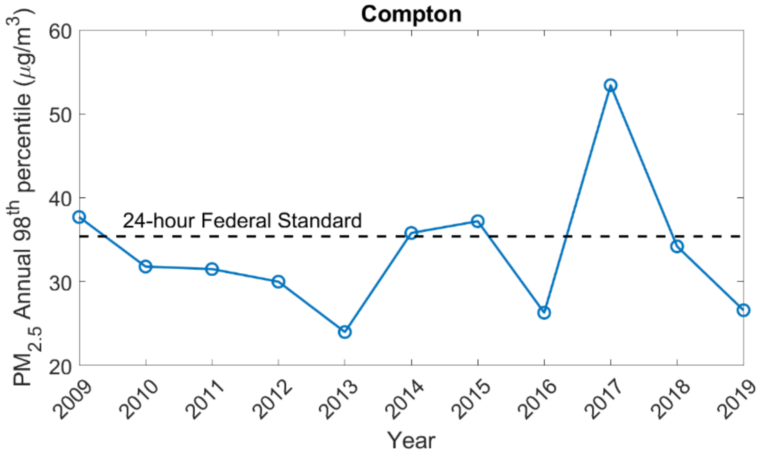

Figure V-1. Annual 98th Percentile 24-Hour PM2.5 Concentrations Measured in Compton

PM2.5 Precursor Trend Measured at Compton

Concentrations of NOx and VOCs, PM2.5 precursors, have decreased significantly over the past decade. Annual average NOx concentrations measured at the Compton station from Feb. 2009 to Aug. 2020 are presented in Figure V-2. The annual NOx concentration in Compton decreased at an average rate of 1.39 ppb/year from 2009 to 2019. The total speciated VOC concentrations measured in Compton during three Multiple Air Toxics Exposure Studies (MATES) are shown in Figure V-3. MATES are a series of year-long monitoring, modeling, and evaluation studies conducted in the South Coast Air Basin to evaluate Basin-wide cancer risk exposure caused by toxic air pollutants. The three most recent MATES iterations, MATES III, IV, and V, included monitoring conducted from April 2004 – March 2006, July 2012 – June 2013, and May 2018 – April 2019, respectively. Only speciated VOCs measured in all three MATES campaigns were considered here. As shown in Figure V-3, VOC concentrations measured in Compton have decreased by more than a factor of two between 2004 and 2019. The emission trend indicates that the Basin-wide emission reductions are evident in the Compton area, even though ambient PM2.5 does not show the same level of reductions due to the complexity of PM chemistry and year-to-year variation in meteorology. Even then, 98th percentile values in Compton have been below or close to the 35 μg/m³ standard in all years except 2017, as shown in Figure V-2.

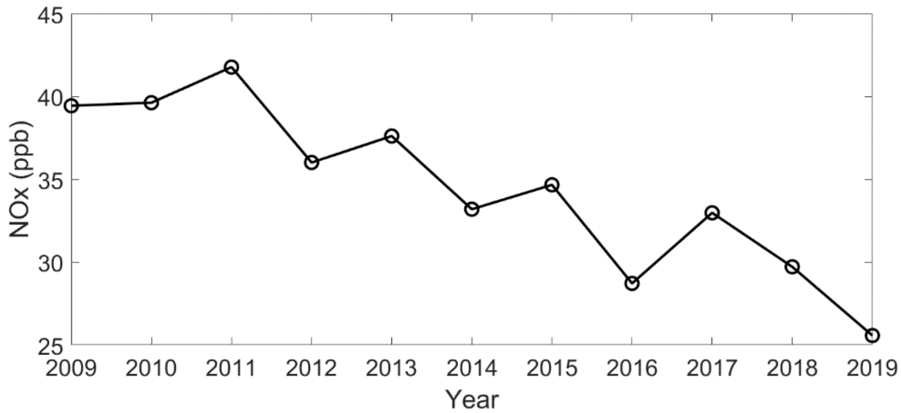

Figure V-2. Annual Average NOx Concentrations Measured in Compton

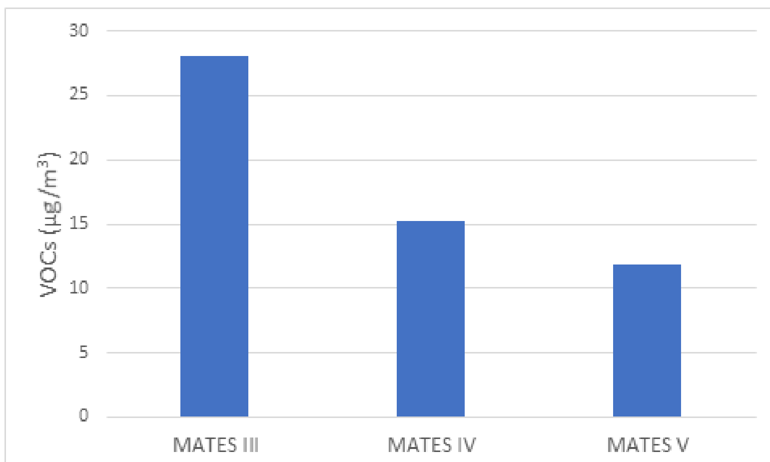

Figure V-3. Total Speciated Volatile Organic Compound (VOC) Concentrations Measured in Compton During the Multiple Air Toxics Exposure Studies (Mates)

Based on the emissions inventory, NOx and VOC concentrations are expected to further decrease by 2023 and thereafter. Figure V-4 demonstrates trends in the Basin-wide VOC and NOx inventories from 2012 to 2024. While the pace of VOC reductions has slowed, NOx reductions are continuing at a steady pace. The emissions trend generally mirrors that of ambient concentrations as shown in Figures V-2 and V-3. NOx and VOCs are major PM and ozone precursors and reductions in their emissions are critical for the Basin to attain PM2.5 and ozone standards. In addition to the progress shown in Figure V-4, emission reductions resulting from recently adopted regulations that are not reflected in the baseline emissions will further ensure attainment status of the 2006 24-hour PM2.5 NAAQS to be continued to the future maintenance horizon year in Compton.

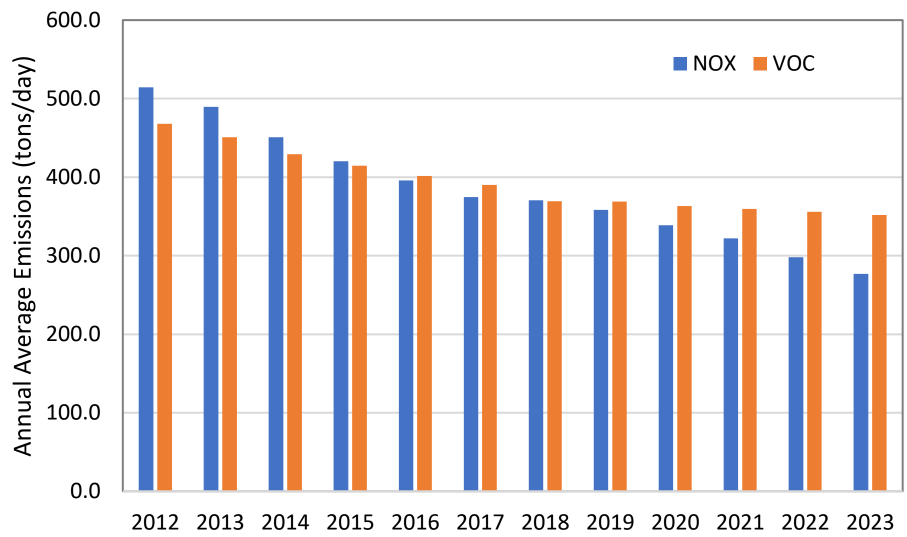

Figure V-4. Basin-Wide Annual Average Emissions of NOx and VOCs

The weight of evidence, based on emissions and air quality trends, strongly suggests that the 24-hour PM2.5 98th percentile in 2017 was anomalous.

Meteorology on December 24th and December 27th, 2017 was Unusual and Highly Conducive for High PM2.5 Levels

The potential to accumulate PM2.5 was evaluated to determine the influence of meteorology on the three highest PM days in 2017. This analysis illustrated that meteorological conditions on December 27, 2017, and to a lesser extent, December 24, 2017, were unusually favorable for high PM2.5 concentrations. This indicates that the high PM2.5 recorded on December 27, 2017 was somewhat expected based on unfavorable meteorology whereas the concentration recorded on December 24th was likely partially driven by meteorology with some contribution from local emissions. The meteorology on January 1st was not particularly conducive to high concentrations, indicating that local emissions played a large role in the exceedance.

A Mathematical Model Suggests That Remarkably High PM2.5 Concentrations in Compton on January 1st, December 24th, and December 27th, 2017 Were Caused by Unusual or Atypical Emission Sources

A model was developed to simulate historical PM2.5 concentrations in Compton based on actual PM2.5 measurements taken during 2009-2020, with meteorological, traffic flow, seasonal, and day-of-week data as predictor variables. The model was used to predict PM2.5 on the dates of interest as well as on dates that were randomly removed from the training dataset (held out dates). Evaluation of model performance by comparing measured concentrations with predicted concentrations on the held-out dates indicated that the model accurately simulates PM2.5 concentrations at Compton. However, the model failed to reproduce the three high PM days in question. This indicates that typical meteorology and seasonality, represented by day of a year, did not completely drive the exceptionally high concentrations recorded in Compton. Therefore, it is likely that local and infrequent episodic emissions significantly contributed to the high PM2.5 levels in Compton on the three highest days in 2017.

Fireworks Contributed to the High PM2.5 Concentration on January 1st, 2017

To quantify the impact of fireworks on high PM2.5 in Compton on January 1st, 2017, FRM filters collected during July 4th and 5th, 2017 and 2018, and the FRM filter collected at Compton on January 1st, 2017 were analyzed using the X-Ray Fluorescence (XRF) for 50 inorganic and metal species. A full list of analyzed species can be found in Appendix V. Metals are a major chemical component of firework smoke. In the South Coast Air Basin, the highest PM2.5 concentrations in the summer months have always been recorded on July 4th and 5th because of Independence Day fireworks celebrations. There are also some fireworks events on New Year's Eve and widespread use of consumer-grade fireworks. However, fireworks activities on New Year's Eve are usually less intensive than Independence Day. By comparing measurements on Independence Day and New Year' Eve, it is possible to estimate the contribution of firework on PM2.5 in Compton on January 1st, 2017. It is estimated that fireworks were responsible for 7.84 - 12.47 μg/m^3 of the mass, corresponding to 14.7 – 23.4% of the total PM2.5 mass measured in Compton on January 1st, 2017. While this increased mass from fireworks on January 1st, 2017 was not large enough to make an exceptional event demonstration, it did play an important role in driving the atypically high concentrations on that day.

High PM2.5 Concentrations Measured During Wintertime in Compton are Heavily Influenced by Residential Wood Burning

Levoglucosan, a common tracer for wood combustion, was measured during MATES V[2]. The measurements demonstrate that wood combustion is prevalent in the area surrounding Compton, particularly during winter. The average wintertime concentration measured at all MATES stations is presented in Figure V-5. The levoglucosan concentration at Compton is 61% higher than the second highest station (West Long Beach) and 111% higher than the average of all other stations. This suggests that, during winter, PM2.5 in Compton is more influenced by wood burning compared to other locations in the South Coast Air Basin.

Residential wood burning is regulated by South Coast AQMD under Rule 445. When PM2.5 is forecast to exceed a threshold, which is currently 30 μg/m^3, a "no burn" day is declared. Since the U.S. EPA has recently finalized its determination on the South Coast Air Basin's failure to attain the 2006 24-hour PM2.5 standard by December 31, 2019, the threshold will be lowered to 29 ug/m^3. However, low income households or households that use wood burning as a sole

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[2] Multiple Air Toxics Exposure Study
in the South Coast AQMD, Final Report, August 2021. available at http://www.aqmd.gov/docs/default-source/planning/mates-v/mates-v-final-report.pdf?sfvrsn=4

source of heat are exempt under Rule 445. A large fraction of the neighborhoods surrounding Compton contain low income households. Thus, a significant amount of wood burning in Compton may occur even on "no burn" days.

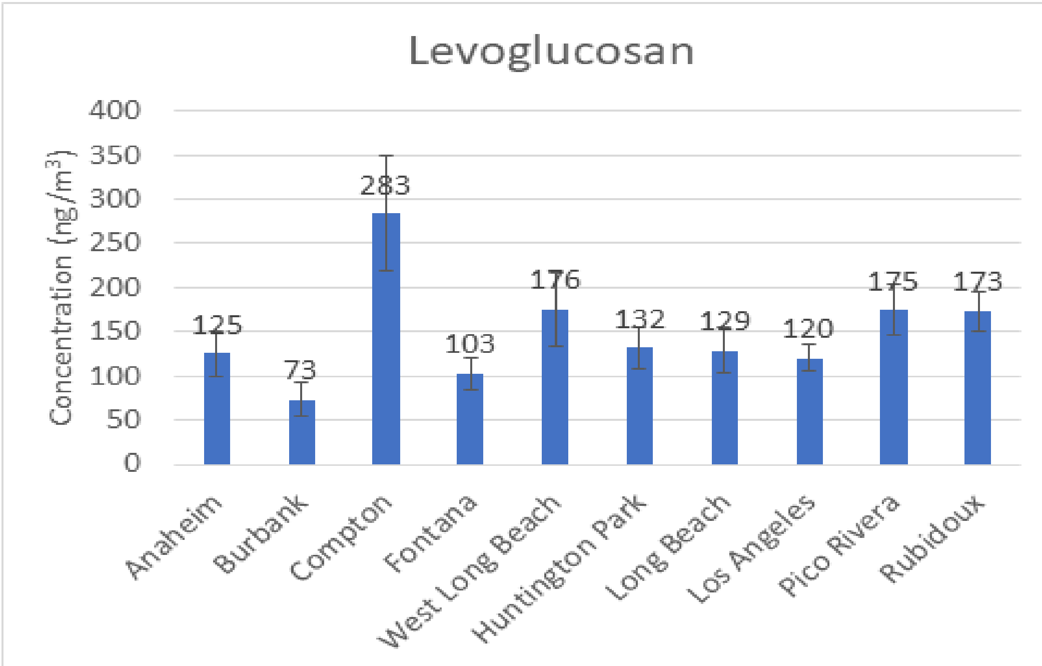

Figure V-5. Average Levoglucosan Concentration Measured at Stations Across the South Coast Air Basin from Nov. 2018 – Feb. 2019 (Error bars represent the standard error of the measurements)

To better quantify the impact of residential wood burning on PM2.5 in Compton, a forecasting tool was created to predict PM2.5 from residential wood smoke based on levoglucosan observations during MATES V. The model relies on meteorological variables and seasonal parameters, which capture the influence of human behavior on wood smoke emissions, to estimate the PM2.5 concentrations due to wood smoke. This forecast tool can be used to estimate wood smoke concentrations on days without levoglucosan measurements.

The fraction of PM2.5 from wood smoke was calculated using the wood smoke PM2.5 concentrations estimated by the levoglucosan model and the total PM2.5 concentration measured on corresponding days. The fraction of PM2.5 from wood smoke has a clear seasonal cycle, which peaks in winter months and is lowest in summer months. This analysis suggests that wood smoke substantially contributes to PM2.5 mass in Compton; however, the model-predicted business-as-usual wood smoke contribution does not completely account for the high PM levels in 2017. Therefore, this indicates the presence of an abnormally high and unusual amount of local emissions on the 2017 exceedance days.

Summary

This appendix provides analysis about PM2.5 trend in Compton, PM2.5 precursor emissions trends, meteorological impact, and fireworks and biomass burning affecting high PM2.5 levels in Compton. These analyses indicate the unusually high PM2.5 days in 2017 were influenced by a combination of woodsmoke, fireworks and adverse meteorology. Since PM2.5 FRM measurements began in 2008, all design values were below the 1997 and 2006 24-hour PM2.5 standard of 35 $\mu g/m^3$ until 2017. The 2017 high PM2.5 levels that caused the exceedances in 2017 and 2018 did not recur and evidently, Compton reached attainment of the 1997 and 2006 24-hour PM2.5 NAAQS in 2020. If the design value periods influenced by abnormally high 2017 data were excluded, Compton is expected to maintain attainment status of the 1997 and 2006 24-hour PM2.5 through 2035, as shown in the maintenance demonstration using the 2020 3-year DV.