



# 2022

## DRAFT AIR QUALITY MANAGEMENT PLAN

# Appendix VI

## Compliance with Other Clean Air Act Requirements



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General Conformity and Transportation Conformity  
Budget

To be included in  
the revised version

## Federal Clean Air Act Requirements for Nonattainment Areas

Section 172(c)(1) of the Clean Air Act (CAA) requires nonattainment areas to provide for implementation of all Reasonably Available Control Measures (RACM) as expeditiously as possible, including the adoption of reasonably available control technology (RACT). It also requires that nonattainment areas demonstrate Reasonable Further Progress (RFP) in achieving the emission reductions needed to attain the standard.

Subpart 2 provides additional provisions for ozone nonattainment areas. An attainment demonstration is required under Section 182(c)(2)(A) for areas classified as “serious” or above. Areas classified as “severe” or “extreme” nonattainment are required to demonstrate that sufficient transportation control strategies and transportation control measures have been identified to offset growth in emissions due to growth in vehicle miles traveled (VMT) under Section 182(d)(1)(A). Section 182(g) requires that each nonattainment area (other than an area classified as “marginal” or “moderate”) achieve specific emission reduction targets in the applicable milestone years.

Chapter 6 describes how the Draft 2022 AQMP demonstrates compliance with the federal CAA requirements for 2015 8-hour ozone NAAQS (Tables 6-1 and 6-2). Specifically, Appendices VI-A through C present the analyses/demonstrations that fulfill the CAA statutory requirements as listed in Table VI-1.

**TABLE VI-1**  
**DESCRIPTION OF APPENDICES VI-A THROUGH VI-C**

Appendix	Description
Appendix VI-A	Reasonably Available Control Measures Demonstration
Appendix VI-B	Reasonable Further Progress and Milestone Years
Appendix VI-C	General Conformity and Transportation Conformity Budget

# **DRAFT 2022 AQMP**

## **APPENDIX VI-A**

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### **REASONABLY AVAILABLE CONTROL MEASURES**

#### **DEMONSTRATION**

**MAY 2022**

## Overview

Appendix VI-A outlines how the federal Reasonably Available Control Measures (RACM) requirements are met in the 2022 Air Quality Management Plan (AQMP) to meet the 2015 8-hour ozone . Appendix VI-A – RACM Demonstration, also includes with the following four attachments.

- **Attachment VI-A-1** is a detailed evaluation of requirements in South Coast AQMD’s stationary source rules and regulations for VOC sources (Attachment VI-A-1a) and NOx sources (Attachment VI-A-1b), respectively, against those in other air agencies’ rules and federal guidance documents. The rules and regulations evaluated in this analysis primarily apply to the Basin and the Coachella Valley. The goal of this evaluation is to demonstrate that South Coast AQMD’s stationary and area source rules and regulations meet the federal RACM requirements. Prior Reasonably Available Control Technology (RACT) analysis was also updated in this RACM demonstration.
- **Attachment VI-A-2** is a detailed evaluation of seven potential RACM identified as a potentially feasible measure in the seven-step analysis included in this Appendix. Feasibility of each potential RACM was evaluated considering technological feasibility and economic cost-effectiveness.
- **Attachment VI-A-3** is the RACM analysis for mobile sources conducted by CARB.
- **Attachment VI-A-4** is the RACM assessment of the Transportation Control Measures (TCM) for Coachella Valley.

## Introduction

On October 1, 2015, U.S. EPA revised the 8-hour ozone standard from the previous standard of 0.075 parts per million (ppm) to a level of 0.070 ppm (70 parts per billion or ppb). Effective August 3, 2018, the South Coast Air Basin (Basin) was designated as an “extreme” nonattainment area and the Coachella Valley was designated as a “severe-15” nonattainment area for the 2015 8-hour ozone National Ambient Air Quality Standard (NAAQS or standard).<sup>1</sup> Pursuant to the Clean Air Act (CAA) Section 181(a)(1), the U.S. EPA requires that all areas with an “extreme” classification meet the ozone standard as expeditiously as practicable but no later than 20 years from the effective date of designation, and all areas with an “severe-15” classification meet the ozone standard no later than 15 years from the effective date of designation. The Basin is therefore required to attain the standard by August 3, 2038, and the Coachella Valley is required to attain the standard by August 3, 2033.<sup>2</sup> Table VI-A-1 shows the classifications and attainment dates for the South Coast Air Basin and Coachella Valley for 8-hour ozone standards.

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<sup>1</sup> 83 FR 25776.

<sup>2</sup> The U.S. EPA requires all control measures in the attainment demonstration must be implemented no later than the beginning of the attainment year ozone season. The U.S. EPA also defines the attainment year ozone season is the ozone season immediately preceding a nonattainment area’s maximum attainment date, thus, the attainment years are 2037 and 2032, respectively, for the South Coast Air Basin and Coachella Valley.



**TABLE VI-A-1  
8-HOUR OZONE NAAQS STATE DESIGNATION FOR MODERATE OR ABOVE NONATTAINMENT AREAS**

Nonattainment Area	1997 Ozone Standard		2008 Ozone Standard		2015 Ozone Standard	
	Classification	Attainment Year	Classification	Attainment Year	Classification	Attainment Year
South Coast Air Basin	Extreme	2024	Extreme	2032	Extreme	2038
Coachella Valley	Extreme <sup>a</sup>	2024	Severe-15	2027	Severe-15 <sup>b</sup>	2033

<sup>a</sup> Voluntary reclassification from “severe-15” to “extreme” in July 2019

<sup>b</sup> The South Coast AQMD seeks a voluntary bump up in classification to “extreme” nonattainment for the 2015 8-hour ozone standard for the Coachella Valley Planning Area with an attainment demonstration by 2037

Section 172(c)(1) of the CAA requires nonattainment areas to provide for implementation of all Reasonably Available Control Measures as expeditiously as possible, including the adoption of Reasonably Available Control Technology. Section 172(c)(1) of the CAA sets the overall framework for the RACM analysis and requires the nonattainment air districts to:

*“Provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards.”*

RACM is applicable to a wide range of sources (stationary, area, and mobile), and should include measures that are technologically and economically feasible. RACM should also include RACT, which applies to stationary sources and represents the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.<sup>3</sup> The U.S. EPA’s long-standing interpretation of the RACM provision is that nonattainment air districts should consider all candidate measures that are available and technologically and economically feasible to implement within the nonattainment areas, including those being implemented in other areas, and that a state must adopt measures for an area only if those measures are technologically and economically feasible and will advance the attainment date by, at a minimum, one year or are necessary for reasonable further progress (RFP) for the area.

In addition, the U.S. EPA recognizes that each nonattainment area has its own profile of emission sources, and thus does not require specific RACT/RACM to be implemented in every nonattainment area and does not include a specific source size threshold for the RACT/RACM analysis.

<sup>3</sup> 44 FR 53762.

In regard to economic feasibility, the U.S. EPA did not propose a fixed dollar per ton cost threshold, but recommended that air districts include health benefits in the cost analysis. As indicated in the preamble of the 1997 PM<sub>2.5</sub> Implementation Rule:<sup>4</sup>

*“In regard to economic feasibility, U.S. EPA is not proposing a fixed dollar per ton cost threshold for RACM, just as it is not doing so for RACT...Where the severity of the nonattainment problem makes reductions more imperative or where essential reductions are more difficult to achieve, the acceptable cost of achieving those reductions could increase. In addition, we believe that in determining what are economically feasible emission reduction levels, the States should also consider the collective health benefits that can be realized in the area due to projected improvements.”*

A RACT/RACM demonstration is required for ozone nonattainment areas. In August 2020, the South Coast AQMD submitted the RACT Demonstration for 2015 8-hour ozone standard to the U.S. EPA for inclusion in the State Implementation Plan (SIP) and the 2020 RACT Demonstration<sup>5</sup> is currently under U.S. EPA’s review. The RACT Demonstration provides a comprehensive assessment of current South Coast AQMD rules and regulations. The analysis indicated that South Coast AQMD rules and regulations met or exceeded federal RACT requirements for all applicable sources of VOC and NO<sub>x</sub>, meeting the U.S. EPA’s criteria for RACT acceptability and inclusion in the SIP, with the exception of Rule 1115 – Motor Vehicle Assembly Line Coating Operations. In the 2020 RACT Demonstration, Rule 1115 was found not as stringent as the U.S. EPA’s Control Techniques Guideline (CTG) requirements for several coatings and products for facilities emitting greater than 15 pounds per day. In addition, the VOC emission limits in Rule 1115 for several coating types were less stringent than those of other agencies;<sup>6</sup> accordingly, South Coast AQMD committed to amend Rule 1115 to address these deficiencies. On March 4, 2022, the South Coast AQMD Governing Board approved amendments to Rule 1115 to harmonize with U.S. EPA’s CTG requirements.

The objective of this Appendix is to demonstrate that the South Coast AQMD has conducted a thorough RACM analysis for the 2015 8-hour ozone standard to meet the requirements of the CAA consistent with U.S. EPA guidance. A seven-step analysis was conducted to identify potential RACM from various sources including update RACT/RACM analysis, U.S. EPA Technical Support Documents, control measures beyond RACM in 2016 AQMP, control measures by other California air districts and state agencies, U.S. EPA Menu of Control Measures, U.S. EPA guidance documents, and control measures workshop/AQMP working groups. The potential RACM are then evaluated in detail in the Attachment VI-A-2 to this Appendix – Assessment of Potential RACM, for technological and economic feasibility. South Coast AQMD’s goal is to develop and incorporate all feasible RACM to meet the requirements of the CAA as expeditiously as possible. Staff commits to refine the analysis of emission inventories, emission reductions, and cost-effectiveness during the rule development process, if found necessary. In addition, staff commits to monitor the rule development in other air districts and conduct further analysis if necessary, and has developed Control Measure MCS-01 – Application of All Feasible Measures, to facilitate this activity.

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<sup>4</sup> 72 FR 20586.

<sup>5</sup> <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/ract-draft-final-staff-report.pdf?sfvrsn=23>.

<sup>6</sup> Antelope Valley Air Quality Management District and San Joaquin Valley Air Pollution Control District.

The scope of this seven-step analysis includes, but is not limited to, attainment strategies for South Coast AQMD’s stationary sources, the rules and regulations of the air districts responsible for the nonattainment areas listed in Table IV-A-5, and potential control measures suggested by the U.S. EPA, CARB, Advisory Committee members, technical experts in air pollution control, as well as the public and a variety of stakeholders. The rules and regulations evaluated in this analysis primarily apply to the Basin and the Coachella Valley. The RACM analysis for Transportation Control Measures conducted by SCAG is shown in Appendix VI-C. Details of the control measures, emission reductions, technological and economic feasibility, prioritization, and implementation schedules are discussed in Chapter 4 and Appendix IV of Draft 2022 AQMP.

## List of Emission Sources

A detailed inventory of stationary emissions sources that emit VOC and NOx has been prepared for the 2022 AQMP. An up-to-date and comprehensive emissions inventory is essential to develop control measures that effectively reduce air pollution. Details on the methodology and development of the emissions inventory are discussed in Chapter 3 and Appendix III. The 2018 summer planning emissions inventory for NOx and VOCs, categorized by the 3-digit Equipment Identification Code (EIC), is presented in Table VI-A-2, along with applicable South Coast AQMD’s stationary source rules. A total of 46 major source categories are found in the base year emissions inventory.

**TABLE VI-A-2  
LIST OF EMISSION SOURCE CATEGORIES AND APPLICABLE RULES FOR NOX AND VOCs**

EIC	Description	Emission (tpd) <sup>7</sup>		Applicable South Coast AQMD Rule(s)
		NOx	VOCs	
010	Electric Utilities	0.63	0.33	1135, 1179.1
020	Cogeneration	0.02	0.02	1109.1, 1134
030	Oil and Gas Production (Combustion)	0.58	0.12	1109.1, 1110.2, 1134, 1135, 1146, 1146.1, 1146.2
040	Petroleum Refining (Combustion)	0.00	1.33	1109.1, 1134, 1146, 1146.1
050	Manufacturing and Industrial	4.95	0.78	1109.1, 1110.2, 1117, 1118.1, 1134, 1135, 1146, 1146.1, 1147
052	Food and Agricultural Processing	0.13	0.03	1118.1, 1146, 1146.1
060	Service and Commercial	8.62	1.90	1109.1, 1110.2, 1118.1, 1134, 1135, 1146, 1146.1, 1147, 1179.1
099	Other (Fuel Combustion)	3.40	0.72	1109.1, 1110.2, 1118.1, 1134, 1135, 1146, 1146.1, 1179.1
110	Sewage Treatment	0.00	0.27	1118.1
120	Landfills	0.48	8.64	1118.1

**TABLE VI-A-2 (CONTINUED)  
LIST OF EMISSION SOURCE CATEGORIES AND APPLICABLE RULES FOR NOX AND VOCs**

<sup>7</sup> Summer planning inventory in 2018.

EIC	Description	Emission (tpd) <sup>8</sup>		Applicable South Coast AQMD Rule(s)
		NOx	VOCs	
130	Incineration	1.01	0.04	1118.1, 1147
140	Soil Remediation	0.00	0.00	
199	Other (Waste Disposal)	0.01	7.68	1118.1, 1133.3
210	Laundering	0.00	0.17	
220	Degreasing	0.00	12.76	
230	Coatings and Related Processes	0.00	18.39	1104, 1106, 1107, 1115, 1126, 1128, 1129, 1136, 1141.1, 1145, 1151
240	Printing	0.00	0.75	
250	Adhesives and Sealants	0.00	5.14	1168
299	Other (Cleaning and Surface Coatings)	0.01	0.94	
310	Oil and Gas Production	0.01	2.35	1118.1, 1146, 1146.1
320	Petroleum Refining	0.23	4.44	1109.1, 1118.1
330	Petroleum Marketing	0.00	13.78	1118.1
399	Other (Petroleum Production and Marketing)	0.01	0.04	
410	Chemical	0.03	4.43	
420	Food and Agriculture	0.01	0.50	1147
430	Mineral Processes	0.02	0.39	1117, 1147
440	Metal Process	0.06	0.10	
450	Wood and Paper	0.00	0.20	
460	Glass and Related Products	0.00	0.00	
470	Electronics	0.00	0.01	
499	Other (Industrial Processes)	0.01	5.72	1147
510	Consumer Products	0.00	107.38	1143
520	Architectural Coatings and Related Solvent	0.00	10.62	1113
530	Pesticides/Fertilizers	0.00	1.39	
540	Asphalt Paving/Roofing	0.00	1.20	1108, 1108.1
610	Residential Fuel Combustion	11.70	2.28	445, 1111, 1121
620	Farming Operations	0.00	1.89	444
630	Construction and Demolition	0.00	0.00	
640	Paved Road Dust	0.00	0.00	
645	Unpaved Road Dust	0.00	0.00	
650	Fugitive Windblown Dust	0.00	0.00	
660	Fires	0.08	0.29	

**TABLE VI-A-2 (CONCLUDED)**  
**LIST OF EMISSION SOURCE CATEGORIES AND APPLICABLE RULES FOR NOX AND VOCs**

<sup>8</sup> Summer planning inventory in 2018.

EIC	Description	Emission (tpd) <sup>9</sup>		Applicable South Coast AQMD Rule(s)
		NOx	VOCs	
670	Waste Burning and Disposal	0.05	0.21	473
690	Cooking	0.00	1.08	1147
699	Other (Miscellaneous Processes)	0.00	0.00	
999	RECLAIM	18.15	0.00	2002
	<b>Total</b>	<b>50.15</b>	<b>235.41</b>	

## Identifying Potential RACM

Regarding the approach for identifying emission reduction strategies for RACM demonstration, the U.S. EPA recommends that nonattainment air districts first identify the emission reduction programs that have already been implemented at the federal, state, or local air district levels. Next, the U.S. EPA recommends that air districts examine additional control measures adopted in attainment plans for other nonattainment areas to attain the ambient air quality standards as expeditiously as practicable. Other potential approaches to identify emission reduction opportunities include a control technology symposium with technical experts and the public, most recent RACT SIP analysis, U.S. EPA Region 9 technical support documents for rule approvals, control measures beyond RACM reviewed in the prior air quality management plan, and U.S. EPA’s Menu of Control Measures. To demonstrate that the South Coast AQMD has considered all candidate measures that are available and technologically and economically feasible to implement within the Basin, the South Coast AQMD implements a comprehensive seven-step analysis for RACM demonstration for applicable stationary sources. The seven-step analysis consists of the following steps, as listed in Table VI-A-3.

**TABLE VI-A-3  
SEVEN-STEP ANALYSIS FOR IDENTIFYING POTENTIAL RACM**

Step Number	Element of Analysis
1	Updated RACT/RACM
2	U.S. EPA Technical Support Documents
3	Control Measures beyond RACM in 2016 AQMP
4	Control Measures by Other California Air Districts and State Agencies
5	U.S. EPA Menu of Control Measures
6	U.S. EPA Guidance Documents
7	Control Measures Workshop/AQMP Working Groups

The evaluation conducted for each of the seven-step is described in detail in the following sections.

<sup>9</sup> Summer planning inventory in 2018.

## Step 1 – Updated RACT/RACM

### *RACT/RACM Analysis*

This step evaluates the stringency of South Coast AQMD rules and regulations against the U.S. EPA’s Control Techniques Guidelines/Advanced Control Techniques (ACTs) or the analogous rules in other ozone nonattainment areas. South Coast AQMD periodically conducts RACT/RACM analysis as part of the SIP submittal for various federal air quality standards. In June 2020, a RACT demonstration was conducted for the 2015 8-hour ozone standard (referred as 2020 RACT Demonstration hereafter).<sup>10</sup> Three emission source categories were evaluated in the 2020 RACT Demonstration, including CTG sources in the South Coast Air Basin (Basin) and the Coachella Valley, non-CTG major stationary sources exceeding 10 tons per year of VOC or NOx emissions located in the Basin, and non-CTG major stationary sources exceeding 25 tons per year of VOC or NOx emissions located in the Coachella Valley. For non-CTG major stationary sources, South Coast AQMD rules and regulations were evaluated against other California air districts and states’ rules and regulations adopted from March 2014 to February 2020.<sup>11</sup> The 2020 RACT Demonstration concluded that with the exception of the CTG for Automobile and Light-Duty Truck Assembly Coatings, all applicable RACT emissions sources subject to the South Coast AQMD rules meet or exceed U.S. EPA’s RACT requirements. South Coast AQMD committed to amend Rule 1115 to address its less stringency for several coatings and products for facilities emitting greater than 15 pounds per day as they are subject to the CTG requirements for Automobile and Light-Duty Truck Assembly Coatings.

During the 2020 RACT analysis, staff initially identified fugitive VOC emission reductions from refinery cooling towers to be a potential feasible control measure by assessing Bay Area AQMD’s Regulation 11, Rule 10 (Hexavalent Chromium Emissions from All Cooling Towers and Total Hydrocarbons from Petroleum Refinery Cooling Towers; Amended December 19, 2018). South Coast AQMD does not have an existing rule that requires the applicable control technology to reduce VOC emissions from cooling towers at petroleum refineries. However, RACT does not apply to fugitive emissions and this measure was therefore not included in the final analysis for the 2020 RACT Demonstration. Instead, it was warranted for conducting more detailed assessment prior to pursuing to adopt a rule. In addition, in December 2020, a RACM evaluation was conducted for the Coachella Valley Extreme Area Plan for 1997 8-hour Ozone Standard (herein referred as 2020 RACM Evaluation).<sup>12</sup> It included assessment of South Coast AQMD’s VOC and NOx rules against other California air districts and California state policies adopted from February 2016 to August 2020.<sup>13</sup> Based on

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<sup>10</sup> Draft Final Staff Report for 2015 8-Hour Ozone Standard Reasonably Available Control Technology (RACT) Demonstration, South Coast AQMD, June 2020. Available at: <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2020/2020-Jun5-028.pdf?sfvrsn=8>.

<sup>11</sup> Other California air districts and other states rules adopted up to March 2014 were assessed in the 2016 AQMP RACT.

<sup>12</sup> Final Coachella Valley Extreme Area Plan for 1997 8-Hour Ozone Standard, South Coast AQMD, December 2020. Available at: <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/2-final-coachella-valley-extreme-area-plan-for-1997-8-hour-ozone-standard.pdf?sfvrsn=6>.

<sup>13</sup> Other California air districts rules and California state policies adopted up to January 2016 were assessed in the 2016 AQMP RACM.

the 2020 RACM Demonstration, staff concluded that the requirements in South Coast AQMD rules and regulations were generally as stringent as, or more stringent than, those in other California air districts and that no other feasible measures would advance attainment for the 1997 ozone standard.

For the Draft 2022 AQMP, this updated analysis builds upon the prior RACT/RACM analyses submitted in 2020 and evaluates the stringency of South Coast AQMD rules and regulations against the more recent rules in other ozone nonattainment air districts and state agencies. Since the 2020 RACT Demonstration, there has been no updates in the U.S. EPA's CTGs/ACTs. Requirements in recently adopted South Coast AQMD rules and regulations reflect currently available control technology considering cost-effectiveness. Rulemaking goes through a public process incorporating input from technical experts in the field. Thus, the 2020 RACT Demonstration still remains valid with respect to the evaluation of the U.S. EPA's CTGs/ACTs.

To evaluate the stringency of South Coast AQMD rules and regulations against emission reduction programs that have already been implemented at the federal, state, or local air district levels since the last RACT/RACM analyses, air agencies in areas which are highly impacted by ozone pollution are identified:

- Eastern Kern Air Pollution Control District (Eastern Kern APCD)
- Mojave Desert Air Quality Management District (Mojave Desert AQMD)
- Sacramento Metropolitan Air Quality Management District (Sac Metro AQMD)
- San Diego County Air Pollution Control District (San Diego APCD)
- San Joaquin Valley Air Pollution Control District (San Joaquin Valley APCD)
- Ventura County Air Pollution Control District (Ventura County APCD)
- Antelope Valley Air Quality Management District (Antelope Valley AQMD)
- Bay Area Air Quality Management District (Bay Area AQMD)
- Delaware Department of Natural Resources and Environment Control (Delaware DNREC)
- Maryland Department of the Environment (Maryland DOE)
- Texas Commission on Environmental Quality (TCEQ)

The top six air agencies from the above list were selected based on the severity of their ozone pollution. These agencies are classified as "severe" or above nonattainment areas for either or both the 2008 and 2015 8-hour ozone standards. Areas with severe ozone pollution are anticipated to adopt more stringent rules and regulations to reduce emissions and therefore, are helpful to identify candidate measures that are technologically and economically feasible to implement. In addition to the top six air agencies, Antelope Valley AQMD, Bay Area AQMD, Delaware, Maryland, and Texas air agencies were also selected because they were included in prior RACT evaluations. VOC and/or NO<sub>x</sub> rules adopted by these other air agencies from March 2020 to September 2021 were reviewed. March 2020 was selected as a starting point for this analysis because rules up to February 2020 were already reviewed in the 2020 RACT Demonstration. In addition to the state and local air districts rules and regulations, the federal regulations for VOC and/or NO<sub>x</sub> emission source categories were also included in this analysis, including U.S. EPA 40 Code of Federal Regulations (CFR) Parts 60 and 63. Table VI-A-4 lists the 29 rules recently adopted by federal, state, and local air agencies from March 2020 to September 2021, which were reviewed for this updated RACT/RACM analysis.



**TABLE VI-A-4**  
**RECENTLY ADOPTED (MARCH 2020 TO SEPTEMBER 2021) RULES AND REGULATIONS (VOC AND NOX ONLY)<sup>14</sup> IN SELECTED AIR QUALITY AGENCIES**

Agency	Rule Number (Title)
Antelope Valley AQMD	Rule 1107 (Coating of Metal Parts and Products)
Mojave Desert AQMD	Rule 1113 (Architectural Coatings); Rule 1114 (Wood Products Coating Operations); Rule 1115 (Metal Parts & Products Coating Operations); Rule 1117 (Graphic Arts and Paper, Film, Foil and Fabric Coatings); Rule 1118 (Aerospace Assembly, Rework and Component Manufacturing Operations); Rule 1168 (Adhesive and Sealant Applications)
San Diego County APCD	Rule 61.2 (Transfer of Organic Compounds into Mobile Transport Tanks); Rule 67.0.1 (Architectural Coatings); Rule 67.6.1 (Cold Solvent Cleaning and Stripping Operations); Rule 67.6.2 (Vapor Degreasing Operations); Rule 69.2.1 (Small Boilers, Process Heaters and Steam Generators); Rule 69.2.2 (Medium Boilers, Process Heaters and Steam Generators); Rule 69.4.1 (Stationary Reciprocating Internal Combustion Engines-Best Available Retrofit Control Technology)
San Joaquin Valley APCD	Rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3); Rule 4311 (Flares); Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater Than 5.0 MMBtu/hr); Rule 4601 (Architectural Coatings); Rule 4702 (Internal Combustion Engines); Rule 4905 (Natural Gas-Fired, Fan-Type Central Furnaces)
Ventura County APCD	Rule 71 (Crude Oil and Reactive Organic Compound Liquids); Rule 71.3 (Transfer of Reactive Organic Compound Liquids); Rule 74.2 (Architectural Coatings); Rule 74.6 (Surface Cleaning and Degreasing); Rule 74.6.1 (Batch Loaded Vapor Degreasers); Rule 74.15 (Boilers, Steam Generators and Process Heaters); Rule 74.24.1 (Pleasure Craft Coating and Commercial Boatyard Operations)
Delaware DNREC	Regulation 1124 (Control of Volatile Organic Compound Emissions) Section 26.0 (Gasoline Dispensing Facility Stage I Vapor Recovery) and Section 36.0 (Vapor Emission Control at Gasoline Dispensing Facilities)
Maryland DOE	The Code of Maryland Regulations (COMAR) Chapter 26.11.08 (Control of Incinerators)
U.S. EPA	40 CFR Part 60 (Standards of Performance for New Stationary Sources) Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984); 40 CFR Part 63 (National Emissions Standards for Hazardous Air Pollutants) Subpart VVVV (Boat Manufacturing), and Subpart WWWW (Reinforced Plastic Composites Production)

In conducting this analysis, staff first reviewed the requirements in the rules/regulations in Table VI-A-4. Staff then identified the corresponding rules and regulations in South Coast AQMD. Requirements such as emissions limits, applicability, exemptions, etc. were then compared to determine whether South Coast AQMD rules are as stringent as other agencies' rules and meet federal RACT/RACM requirements.

<sup>14</sup> Bay Area and Sacramento Metro AQMDs, Eastern Kern APCD, and TCEQ did not adopt any applicable NOx and/or VOC rule from March 2020 to September 2021.



A detailed evaluation of the corresponding South Coast AQMD rules and regulations is included in the Attachment 1 of this Appendix. Specifically, Attachment 1a is for South Coast AQMD's VOC rules and Attachment 1b is for South Coast AQMD's NO<sub>x</sub> rules. In Attachments 1a and 1b, South Coast AQMD rule number, rule title, and its key requirements are described in the first, second, and third columns, respectively. The fourth column includes requirements in other agencies' rules and federal guidance documents that may be more stringent than those in South Coast AQMD rules. The last column includes an evaluation of the stringency of the requirements in South Coast AQMD rules against those from other agencies. Based on this evaluation, staff identify potential feasible measures to meet the federal RACT/RACM requirements. The prior 2020 RACT Demonstration and 2020 RACM Evaluation are also included in Attachment 1 of Appendix VI-A for completeness of the updated RACT/RACM analysis.

After reviewing the requirements in the recently adopted rules and regulations in Table VI-A-4, staff concludes that South Coast AQMD rules are, at a minimum, as stringent as the U.S. EPA CTGs/ACTs and the corresponding rules in other air districts and state agencies. Out of the 29 recently adopted rules and regulations in Table VI-A-4, San Joaquin's Rule 4320 includes a more stringent emission limit of 2.5 ppm NO<sub>x</sub> compared to the 5–9 ppm NO<sub>x</sub> limits in South Coast AQMD Rule 1146 for boilers with a heat input rated greater than 20 MMBtu/hr. However, the emission limits in Rule 1146 are mandatory whereas the lower NO<sub>x</sub> limit in Rule 4320 is a technology-forcing limit with an option to comply by paying an annual emission fee in lieu of meeting the limit. Considering the two pathways to comply with the lower NO<sub>x</sub> limit in San Joaquin's rule (through retrofitting the equipment or paying a fee), the mandatory emission limit in Rule 1146 still meets U.S. EPA's RACT requirements. Nevertheless, staff conducted a more in-depth analysis to assess the feasibility of lowering NO<sub>x</sub> limits to 2.5 ppm as part of the Potential RACM Assessment section in Attachment 2 of this Appendix. The Potential RACM Assessment contains a detailed evaluation of potential RACM taking the technological feasibility and cost-effectiveness into consideration.

### *Evaluation of Latest Control Technologies*

RACT/RACM is a moving target that changes over time as new technologies and products become feasible and cost-effective. In addition to federal requirements, existing sources in the South Coast AQMD are required to meet California requirements for Best Available Retrofit Control Technology (BARCT) level of controls. BARCT is defined as "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source."<sup>15</sup>

BARCT assessments are performed periodically for emission sources to determine if current emission limits are representative of BARCT emission limits. The BARCT assessment process identifies current regulatory requirements for equipment categories established by South Coast AQMD and other air districts. Permit limits and source test data are analyzed to identify the emission limits being achieved with existing technology. Current and emerging technologies are also assessed to determine the feasibility of achieving lower emission levels. An initial BARCT emission limit is proposed based on the BARCT technology assessment. A cost-effectiveness calculation is then conducted to consider the cost to meet the initial proposed limit based on the technology assessment and the emission reductions that would occur to meet the initial proposed limit based on a specific technology. A final BARCT emission limit is established based on the BARCT assessment, including the cost-effectiveness analysis. BARCT can be considered a "technology-forcing standard designed

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<sup>15</sup> California Health and Safety Code Section 40406.

to compel the development of new technologies to meet public health goals.”<sup>16</sup> The BARCT assessment is conducted as part of South Coast AQMD rule development to establish BARCT emission limits for emission sources applicable to the rule. As such, the emission limits in South Coast AQMD rules reflect the latest control technologies considering cost feasibility for various source categories.

## Step 2 – U.S. EPA Technical Support Documents

This step identifies potential feasible measures from the Technical Support Documents (TSDs) prepared by the U.S. EPA. For newly adopted or amended rules to be incorporated in the California SIP, they must be submitted for the U.S. EPA’s review and approval. As part of the approval process, the U.S. EPA prepares TSDs that review the State’s submittals, outline the applicable Clean Air Act requirements, and provide evaluation and recommended actions. TSDs may include the U.S. EPA’s suggestions for future rule revisions that could be considered as potential feasible measures. In the 2016 AQMP, the U.S. EPA’s TSDs finalized by December 2015 were reviewed as part of the 2016 AQMP RACM evaluation. The 2022 AQMP evaluation includes TSDs that are issued since then. From January 2016 to September 2021, the following South Coast AQMD rules have been approved in the SIP by the U.S. EPA as follows:

- Rule 1111 (Reduction of NO<sub>x</sub> Emissions from Natural Gas-Fired, Fan Type Central Furnaces; Approved March 29, 2016)
- Rule 1147 (NO<sub>x</sub> Reductions from Miscellaneous Sources; Approved December 28, 2016)
- Rule 1153.1 (Emissions of Oxides of Nitrogen from Commercial Food Ovens; Approved December 28, 2016)

For Rules 1111 and 1147, the U.S. EPA had no additional recommendations provided in the TSDs. Below are U.S. EPA’s TSD recommendations for SIP-approved South Coast AQMD Rule 1153.1.

*“In section (c)(1), consider adopting a lower NO<sub>x</sub> limit similar to the limit in San Joaquin Valley APCD Rule 4309 for the next time rule revision. San Joaquin Valley APCD Rule 4309 (Dryers, Dehydrators, and Ovens) contains a NO<sub>x</sub> limit of 4.3 ppm at 19 percent oxygen for applicable units and is lower than the NO<sub>x</sub> emission limit of 60 ppm at 3 percent oxygen (6.5 ppm at 19 percent oxygen) in Rule 1153.1 for units run at temperatures greater than 500 °F.”*

An amendment to Rule 1153.1 is currently underway which is evaluating the U.S. EPA’s recommendations on the feasibility of lowering the NO<sub>x</sub> limit. This evaluation is described in the Potential RACM Assessment section included in Attachment 2 of this Appendix. The Potential RACM Assessment includes detailed assessment of technological feasibility, potential emission reductions, and cost-effectiveness of each potential RACM identified as a potentially feasible measure based on the seven-step RACM analysis described in this section.

## Step 3 – Control Measures beyond RACM in 2016 AQMP

In the 2016 AQMP, staff conducted a RACM evaluation for the 2008 8-hour ozone standard and the 2012 annual average PM<sub>2.5</sub> standard. As part of the 2016 ozone RACM evaluation, 11 potential RACMs were identified. A detailed evaluation was conducted to assess the technological feasibility and cost-effectiveness for these 11 potential RACMs, and four control measures were rejected because they were considered not

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<sup>16</sup> American Coatings Assn. v. South Coast Air Quality Management Dist., 54 Cal. 4<sup>th</sup> 446, 2012.

feasible either technologically or economically at the time of the assessment conducted in 2015. These rejected four ozone control measures are re-evaluated in this 2022 AQMP RACM demonstration as these technologies and products may have now become feasible and cost-effective. The feasibility of these measures is re-evaluated using the latest emissions inventory, current state of technology, and cost data. Below is the summary of the assessment of these four control measures that were rejected in the 2016 AQMP.

#### **Additional Enhancement in Reducing Existing Residential Building Energy Use**

In the 2016 AQMP, this control measure sought NO<sub>x</sub> emission reductions from unregulated residential space heating furnaces through regulatory programs and reductions from incentive programs to replace older boilers, water heaters, and space heating furnaces with zero emission and low NO<sub>x</sub> emission technologies. The assessment found that there were more efficient appliances along with zero emissions and low NO<sub>x</sub> emitting applications. These energy-efficient appliances could provide significant emission reductions and efficiency benefits above most existing appliances with the typical appliance replacement rate. However, the costs for a residential energy incentive program were estimated at \$230 to \$700 million to reduce emissions by 2.1 tons per day by 2031. Due to the high cost, this control measure was rejected in the 2016 AQMP.

This control measure is assessed as part of the 2022 AQMP for the feasibility of use of energy efficient residential appliances alone or in conjunction of zero emissions or low NO<sub>x</sub> emission technologies. Energy efficient residential appliances are available and are therefore technologically feasible to implement. More detailed technological and economic assessment is included in the Potential RACM Assessment section in Attachment VI-A-2 of this appendix.

#### **Lowering Emission Limit for Rule 462 for Gasoline Bulk Terminals**

South Coast AQMD Rule 462 limits VOC emissions at 0.08 pounds per 1,000 gallons of liquid loaded for a Class A facility loading 20,000 gallons or more. In the 2016 AQMP, this control measure proposed to lower VOC emission limit at gasoline bulk loading terminals to 0.04 pounds per 1,000 gallons of liquid loaded as required in Bay Area Regulation 8, Rule 33. Twenty-three major source bulk loading terminals were subject to Rule 462 at the time of assessment. The added costs for VOC reductions resulted in approximately \$95,000 per ton of reduction because of the negligible emission reductions realized and high costs ranging from \$100,000 for modifications to control devices to several millions of dollars for the control device replacement. This control measure was not economically feasible to implement at the time of assessment in the 2016 AQMP.

In the 2022 AQMP, the feasibility of this measure is re-evaluated based on the 2018 VOC inventory and costs data. More detailed technological and economic assessment is included in the Potential RACM Assessment section in Attachment 2 of this appendix.

#### **Lowering Emission Limits of Rule 1115 to Meet 2008 EPA CTG for Auto and Light-Duty Truck Assembly**

Rule 1115 was evaluated previously as part of Step 1 – Updated RACT/RACM. South Coast AQMD committed to amend Rule 1115 to address its less stringency for several coatings and products for facilities emitting greater than 15 pounds per day as they are subject to the CTG requirements for Automobile and Light-Duty Truck Assembly Coatings.

#### **Lowering the VOC Limit of Rule 1125 for Three-piece and Two-piece Can Interior Body Sprays, and Add a VOC Limit and Corresponding Definition for Exterior Body Spray**

Lower VOC content reformulations for three- and two-piece can interior body sprays exist, but usage was expected to be very limited. As such, potential future usage was not anticipated to be substantially increased. Three known facilities could be required to change their coating operations if the VOC limits are reduced. In the 2016 AQMP, it was estimated that the cost-effectiveness for this control measure was approximately \$200,000 per ton of VOC reduction achieved. This control measure was not economically feasible to implement at the time of assessment in the 2016 AQMP.

As part of the 2022 RACM analysis, the feasibility of this potential control measure is re-assessed using the 2018 VOC inventory and costs data. More detailed technological and economic assessment is included in the Potential RACM Assessment section in Attachment 2 of this appendix.

## Step 4 – Control Measures by Other California Air Districts and State Agencies

The U.S. EPA recommends that air districts examine additional control measures adopted in the attainment plans for other nonattainment areas to attain the national ambient air quality standards as expeditiously as practicable or by attainment deadlines. In addition to adopted rules and regulations, evaluation of control measures adopted in air quality plans for ozone nonattainment areas could help identify potential control measures. To conduct this evaluation, staff first identified ozone nonattainment areas that are designated as “serious” or above for the 2008 or 2015 8-hour ozone standards. Table VI-A-5 lists the ozone nonattainment areas based on the U.S. EPA’s Green Book.<sup>17</sup> Second, the ozone air quality plans adopted by these nonattainment areas from 2016 and 2021 were evaluated. Control measures included in pre-2016 ozone attainment plans were already evaluated as part of the 2016 AQMP and thus are not included here. The list of the ozone air quality plans adopted by other California air districts and state agencies in this section is included in Table VI-A-6.

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<sup>17</sup> U.S. EPA, Green Book, 8-Hour Ozone (2015 and 2008 Standards) Nonattainment Areas. Available at: <https://www.epa.gov/green-book>.

**TABLE VI-A-5  
NONATTAINMENT AREAS DESIGNATED AS “SERIOUS” OR ABOVE FOR 2008 AND 2015 OZONE NAAQS<sup>a</sup>**

Nonattainment Status	Nonattainment Area
<b><i>2015 8-Hour Ozone NAAQS</i></b>	
<b>Extreme</b>	Los Angeles-South Coast Air Basin, CA
	San Joaquin Valley, CA
<b>Severe-15</b>	Los Angeles-San Bernardino Counties (West Mojave Desert), CA
	Riverside County (Coachella Valley), CA
	San Diego County, CA
<b>Serious</b>	Morongo Band of Mission Indians, CA
	Ventura County, CA
<b><i>2008 8-Hour Ozone NAAQS</i></b>	
<b>Extreme</b>	Los Angeles-South Coast Air Basin, CA
	San Joaquin Valley, CA
<b>Severe-15</b>	Kern County (Eastern Kern), CA
	Los-Angeles-San Bernardino Counties (West Mojave Desert), CA
	Riverside County (Coachella Valley), CA
	Sacramento Metro, CA
	San Diego County, CA
<b>Serious</b>	Chicago-Naperville, IL-IN-WI
	Dallas-Fort Worth, TX
	Denver-Boulder-Greeley-Ft. Collins-Loveland, CO
	Greater Connecticut, CT
	Houston-Galveston-Brazoria, TX
	Morongo Band of Mission Indians, CA
	Nevada County (Western part), CA
	New York-N. New Jersey-Long Island, NY-NJ-CT
	Ventura County, CA

<sup>a</sup> Data is based on the U.S. EPA’s Green Book (as of July 31, 2021), but some may change to higher nonattainment classification pending U.S. EPA’s action

**TABLE VI-A-6  
OZONE ATTAINMENT PLANS ADOPTED BY OTHER CALIFORNIA AIR DISTRICTS AND STATE AGENCIES**

Nonattainment Area	Ozone Attainment Plan	Adoption Date
<b><i>California</i></b>		
Antelope Valley	Attainment Plan for 2008 8-hour Ozone Standard	3/21/2017
Eastern Kern County	RACT SIP for 2008 8-hour Ozone Standard	5/11/2017
	Attainment Plan for 2008 8-hour Ozone Standard	7/27/2017
Sacramento Region	Attainment and RFP Plan for 2008 8-hour Ozone Standard	7/24/2017
San Diego County	RACT for 2008 and 2015 National Standards for Ozone	10/2020
	Attainment Plan for 2008 and 2015 National Standards for Ozone	10/2020
San Joaquin Valley	Attainment Plan for 2008 8-hour Ozone Standard	6/16/2016
Ventura County	Attainment Plan for 2008 8-hour Ozone Standard	2/14/2017
Western Mojave Desert	SIP for 2008 8-hour Ozone Standard	2/17/2017
<b><i>Texas</i></b>		
Dallas-Fort Worth (DFW)	RACT Update SIP Revision for 2008 8-hour Ozone Standard	3/4/2020
DFW & Houston-Galveston-Brazoria	Serious Classification Attainment Demonstration and RFP SIP Revisions for 2008 8-hour Ozone Standard	3/4/2020
<b><i>New York-Northern New Jersey-Long Island (NY-NJ-CT)</i></b>		
Entire State of Connecticut	Final RACT SIP Revision for the Serious Designation for 2008 Ozone NAAQS	12/23/2020
Connecticut Portion of the NY-NJ-CT	Attainment Demonstration for 2008 8-hour Ozone Standard	8/8/2017
Greater Connecticut	Attainment Demonstration for 2008 8-hour Ozone Standard	1/17/2017
<b><i>Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI)</i></b>		
Indiana Portion (Lake and Porter Counties) of the IL-IN-WI	Attainment Demonstration for 2008-8-hour Ozone Standard	12/29/2020

The control measures included in the air quality plans listed in Table VI-A-6 were evaluated as part of the RACM analysis to identify any feasible control measures. A total of 15 air quality plans/RACT SIPs was reviewed in this process, and a summary of the evaluation is provided below.

### *Antelope Valley*

The Antelope Valley portion of Los Angeles County is part of the Western Mojave Desert Nonattainment Area (WMDNA). The WMDNA is classified as a “severe-15” nonattainment area for the 2008 and 2015 8-hour ozone

standards. Antelope Valley AQMD adopted the 75 ppb Ozone Attainment Plan<sup>18</sup> to demonstrate attainment of the 2008 8-hour ozone NAAQS on March 21, 2017. In its Ozone Attainment Plan, the Antelope Valley AQMD did not propose any additional control measures for reducing VOC and NOx emissions, but relied on continuing reductions resulting from adopted and proposed federal and state RACT rules. Therefore, no new control measures are identified from evaluation of 2017 Ozone Attainment Plan for Antelope Valley.

### *Eastern Kern County*

Eastern Kern County is classified as a “severe-15” nonattainment area for the 2008 8-hour ozone standard. In its 2017 RACT SIP evaluation,<sup>19</sup> deficiencies were identified in the following rules and the Eastern Kern APCD committed to amend these rules to correct RACT deficiencies.

- Rule 425: Cogeneration Gas Turbine Engines

In the 2017 RACT SIP, amendments were proposed to change the applicability of the rule to include smaller size stationary gas turbines and to establish different NOx limits by different unit size megawatt (MW) ratings.

Amendments to Rule 425 were adopted on December 11, 2017. The amendments included lowering the applicability of stationary gas turbines from 10 MW or greater to 0.88 MW or greater. NOx emission limits of cogeneration gas turbine were revised from 10 ppm for gas-fired and 40 ppm for oil-fired unit, to 9 to 42 ppm for gaseous fuel and 25 to 65 ppm for liquid fuel depending on the size MW ratings. For example, gas-fired units rated 0.88 to 2.9 MW are required to meet the NOx emission limit of 42 ppm, units rated 2.9 to 10 MW are required to meet the NOx emission limit of 25 ppm, and units greater than 10 MW are required to meet the NOx emission limit of 9 ppm. South Coast AQMD Rule 1134 applies to stationary gas turbines greater than or equal to 0.3 MW, while Eastern Kern APCD Rule 425 applies to stationary gas turbines greater than or equal to 0.88 MW. In addition, Rule 1134 has more stringent NOx emission limits, ranging from 2 to 15 ppm for gaseous fuel and 30 ppm for liquid fuel, than Rule 425 NOx limits that range from 9 to 42 ppm for gaseous fuel and from 25 to 65 ppm for liquid fuel. Therefore, the requirements in existing South Coast AQMD rule are more stringent than Eastern Kern APCD’s recently adopted amendments.

- Rule 425.2: Boilers, Steam Generators, and Process Heaters

In the 2017 RACT SIP, amendments were proposed to lower NOx emission limits (formerly at 70 ppm for gaseous fuel and 115 ppm for liquid fuel) applicable to any boiler, steam generator or process heater with rated heat input of 5 MMBtu/hr or more, fired with gaseous and/or liquid fuels.

Rule 425.2 was amended on March 8, 2018, establishing NOx limits of 30 ppm for gaseous fuel and 40 ppm for liquid fuel. South Coast AQMD Rule 1146 (Emissions of Oxides of Nitrogen from Industrial,

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<sup>18</sup> AVAQMD Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area), Antelope Valley AQMD, March 21, 2017. Available at: <https://avaqmd.ca.gov/files/de07ac191/AVAQMD+2016+75ppb+Final+Ozone+Attainment+Plan.pdf>.

<sup>19</sup> Reasonably Available Control Technology (RACT) State Implementation Plan (SIP) for the 2008 Ozone National Ambient Air Quality Standards (NAAQS), Eastern Kern APCD, May 11, 2017. Available at: <http://www.kernair.org/Documents/Announcements/Attainment/EK RACT SIP Adopted 5-11-17.pdf>



Institutional, and Commercial Boilers, Steam Generators, and Process Heaters) includes NOx limits of 5 to 30 ppm for gaseous fuels and 40 ppm for liquid fuels, Therefore, the requirements in existing South Coast AQMD rule are at least as stringent as Eastern Kern APCD's requirements.

- Rule 425.3: Portland Cement Kilns

In the 2017 RACT SIP, amendments were proposed to lower NOx emission limits from the production of clinkers (formerly at 6.4 pounds per ton (lbs/ton) of clinker produced).

In the amendments to Rule 425.3 on March 8, 2018, NOx emission limits were lowered from 6.4 lbs/ton of clinker produced to 2.8 lbs/ton of clinker produced, when averaging over 30 days. South Coast AQMD Rule 2002 (Allocations for Oxides of Nitrogen (NOx) and Oxides of Sulfur (SOx)) regulates NOx emissions from cement manufacturing facilities in the South Coast AQMD jurisdiction. Rule 2002 NOx limit for cement kilns is 0.5 lbs/ton of clinker produced, whereas Rule 425.3 limits NOx emissions from Portland cement kilns at 2.8 lbs/ton of clinker produced as 30-operating day rolling average and 3.4 lbs/ton of clinker produced if low NOx precalciner was operational prior to January 1, 2007, both of which limits are less stringent than that in Rule 2002. Therefore, the requirements in existing South Coast AQMD rule are more stringent than Eastern Kern APCD's adopted amendments.

In July 2017, Eastern Kern APCD adopted the 2017 Ozone Attainment Plan for 2008 8-hour Ozone Standard<sup>20</sup> (Attainment Plan) in which RACM for stationary sources was evaluated. The RACM evaluation found that their VOC rules met RACT, and the three NOx rules listed above would meet RACT requirements once amended. None of the potential additional control measures evaluated in the Attainment Plan were considered reasonably available and technologically feasible, and therefore, Eastern Kern APCD concluded no new control measures would be considered for the purposes of RACM analysis.

Since the requirements in existing South Coast AQMD rules are more stringent than or at least as stringent as the amendments in the three NOx rules listed above, no new control measures are identified from evaluation of 2017 RACT SIP and Ozone Attainment Plan for Eastern Kern County as applicable for South Coast AQMD's 2022 AQMP.

### *Sacramento Region*

The Sacramento region includes all of Sacramento and Yolo counties and portions of Placer, El Dorado, Solano, and Sutter counties. This area is referred to as the Sacramento Federal Nonattainment Area (SFNA). The SFNA is classified as a "severe-15" nonattainment area for the 2008 8-hour ozone standard. Sacramento Metro AQMD, in a joint effort with other SFNA air districts including El Dorado County AQMD, Feather River AQMD, Placer County APCD, and Yolo-Solano AQMD, adopted the 2008 8-hour Ozone Attainment and Reasonable Further Progress Plan<sup>21</sup> in July 2017 to provide the pathway toward attaining the 2008 ozone NAAQS by the

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<sup>20</sup> 2017 Ozone Attainment Plan for 2008 Federal 75 ppb 8-Hour Ozone Standard, Eastern Kern County APCD, July 27, 2017. Available at: [http://www.kernair.org/Documents/Announcements/Attainment/2017 Ozone Plan\\_EKAPCD\\_Adopted\\_7-27-17.pdf](http://www.kernair.org/Documents/Announcements/Attainment/2017 Ozone Plan_EKAPCD_Adopted_7-27-17.pdf).

<sup>21</sup> Sacramento Regional 2008 8-hour NAAQS Attainment and Reasonable Further Progress Plan, Sacramento Metro AQMP, July 24, 2017. Available at:



end of 2024. The SFNA relies on existing federal, state, and local control programs and adopted rules to achieve reductions of VOC and NOx emissions. Since the photochemical regional modeling results demonstrated that the SFNA will attain the 2008 ozone NAAQS by the end of 2024, two years earlier than the attainment deadline of 2026 for a “severe-15” nonattainment area, no new local, regional, or transportation control measure commitments were proposed in the plan. As such, no new control measures are identified from evaluation of Sacramento Metro AQMD’s Ozone Attainment and Reasonable Further Progress Plan as applicable for South Coast AQMD’s 2022 AQMP.

### *San Diego County*

San Diego County is reclassified as a “severe” nonattainment area for the 2008 8-hour ozone NAAQS. In October 2020, San Diego County APCD adopted the 2020 RACT Demonstration for the 2008 and 2015 8-hour NAAQS for Ozone,<sup>22</sup> demonstrating that all RACT requirements are satisfied in San Diego County. Concurrent to this RACT Demonstration, San Diego County APCD proposed to adopt the 2020 Plan for Attaining the National Ambient Air Quality Standards for Ozone.<sup>23</sup> This plan served as not only a revision to the previous 2008 ozone attainment SIP as a “moderate” nonattainment area, but also includes an attainment plan element applicable to the 2015 ozone standard.

As a result of the 2020 RACT and 2020 Plan, the following rules have been adopted/amended:

- Rule 69.2.1 (Small Boilers, Process Heaters, Steam Generators, and Large Water Heaters) was amended on July 8, 2020 and applies to a new unit (boiler, process heater (including pool heaters), steam generator, or water heater) with a heat input rating from 75,000 Btu/hr to 2 MMBtu/hr. Effective July 1, 2021, new natural gas-fired units between 75,000 Btu/hr to 2 MMBtu/hr are required to meet a NOx limit of 20 ppm. New natural gas-fired pool heaters between 75,000 Btu/hr to 400,000 Btu/hr are required to meet a 55 ppm NOx limit. Smaller size units (75,000 to 400,000 Btu/hr), fired on non-California Public Utilities Commission (CPUC) quality natural gas or liquid fuel, are required to meet 77 ppm NOx limit, while larger size units (400,000 Btu/hr to 2 MMBtu/hr) are required a lower level of NOx limit at 30 ppm. South Coast AQMD Rule 1146.2 applies to natural gas-fired water heaters, boilers, and process heaters with a rated heat input capacity less than or equal to 2 MMBtu/hr. As of January 1, 2010, any Type II unit, which is defined as a unit between 400,000 Btu/hr and 2 MMBtu/hr, is required to meet a 20 ppm NOx limit, and as of January 1, 2012, any Type I unit (except pool heaters), which is defined as a unit smaller than or equal to 400,000 Btu/hr, is required to meet 20 ppm NOx limit. Effective January 1, 2000, new Type I units including pool heaters are required to meet the 55 ppm NOx limit, and new Type II units are required 30 ppm NOx limit.

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<http://www.airquality.org/ProgramCoordination/Documents/Sac%20Regional%202008%20NAAQS%20Attainment%20and%20RFP%20Plan.pdf>.

<sup>22</sup> 2020 Reasonably Available Control Technology Demonstration for the National Ambient Air Quality Standards for Ozone in San Diego County, San Diego County APCD, October 2020. Available at: <https://www.sdapcd.org/content/sdc/apcd/en/air-quality-planning.html>.

<sup>23</sup> 2020 Plan for Attaining the National Ambient Air Quality Standards for Ozone in San Diego County, San Diego County APCD, October 2020. Available at: <https://www.sdapcd.org/content/sdc/apcd/en/air-quality-planning.html>.

Therefore, the requirements in existing South Coast AQMD rule are at least as stringent as those in the amended Rule 69.2.1.

- Rule 69.2.2 (Medium Boilers, Process Heaters and Steam Generators) was amended on July 8, 2020 and applies to boiler, process heater, steam generator, or water heater with a heat input rating from greater than 2 MMBtu/hr to less than 5 MMBtu/hr. Effective July 1, 2021, a new unit is required a NOx limit of 30 ppm for gaseous fuel and 40 ppm for liquid fuels. South Coast AQMD Rule 1146.1 has more stringent NOx limits compared to Rule 69.2, requiring 7 to 12 ppm NOx limits for natural gas-fired units and 30 ppm NOx limit for all other units.
- Rule 69.4.1 (Stationary Reciprocating Internal Combustion Engines-Best Available Retrofit Control Technology) was amended on July 8, 2020 and applies to stationary internal combustion engines with a brake horsepower (bhp) rating of 50 or greater. In Rule 69.4.1, NOx and VOC limits vary by engine type (rich- or lean-burn) and fuel type (fossil- or waste-derived gaseous fuel), ranging from 25 to 65 ppm for NOx and from 250 to 750 ppm for VOC, respectively. South Coast AQMD Rule 1110.2 applies to all stationary and portable engines over 50 bhp, and has a NOx limit of 11 ppm and a VOC limit of 30 ppm for stationary engines using natural gas, landfill gas, or digester gas. Therefore, the requirements in existing South Coast AQMD rule are more stringent than those in the amended Rule 69.4.1.
- Rule 61.2 (Transfer of Organic Compounds into Mobile Transport Tanks) was amended February 10, 2021 and is applicable to the transfer of any VOC into a mobile transport tank with a capacity of greater than 120 gallons. It is also applicable to the transfer of any liquid compound, regardless of its vapor pressure, into any mobile transport tank with a capacity of greater than 120 gallons where the transfer involves the displacement or results in the generation of VOC vapors. The transfer of VOC from any stationary storage tank into any mobile transport tank is required to have a California Air Resources Board (CARB) certified vapor recovery system requiring 95 percent VOC vapor control. South Coast AQMD Rule 461 requires a CARB-certified vapor recovery system with 98 percent control for underground storage tanks and such a system with 95 percent control for aboveground storage tanks. Therefore, the requirements in existing South Coast AQMD rule are at least as stringent as those in the amended Rule 61.2.
- Rule 67.6.1 (Cold Solvent Cleaning and Stripping Operations) was amended February 10, 2021 and is applicable to all cold solvent cleaning and all stripping operations. Cold solvent cleaning materials have a limit of VOC content not exceeding 25 grams per liter (g/L) of material. South Coast AQMD Rule 1171 has the same VOC content limit of 25 g/L for solvent cleaning materials which is as stringent as the requirements in Rule 67.6.1.

The following rules or control measures would also be considered for adoption or amendment as they are developed.

- Rule 69.3 (Stationary Gas Turbine Engines-Reasonable Available Control Technology; amended December 16, 1998) applies to any stationary gas turbine engine with a power rating of 0.3 megawatt (MW) or greater and Rule 69.3.1 (Stationary Gas Turbine Engines-Best Available Retrofit Control Technology; amended February 24, 2010) applies to any existing stationary gas turbine engine with a power rating of 1.0 MW or greater, or to any new stationary gas turbine engine with a power rating of 0.3 MW or greater. Rule 69.3 requires 42 ppm NOx on a gaseous fuel unit and 65 ppm for a liquid

fuel unit. Rule 69.3.1 has various levels of NOx limits depending on size of the units. For units greater than 0.3 MW but less than 2.9 MW, Rule 69.3.1 requires the same NOx limits as in Rule 69.3. For units greater than 2.9 MW but less than 10 MW, Rule 69.3.1 requires a reference NOx limit of 25 ppm and for units greater than 10 MW, a reference NOx limit of 9 ppm (with post-combustion control) or 15 ppm (without control). South Coast AQMD Rule 1134 applies to stationary gas turbines of 0.3 MW or greater. For units less than 2.9 MW, Rule 1134 requires a reference NOx limit of 25 ppm, and for units greater than 2.9 MW but less than 10 MW, 9 ppm (with SCR) or 15 ppm NOx (without SCR). For units greater than 10 MW, reference NOx limits of 9 ppm (with SCR) and 12 ppm (without SCR) are required. Therefore, the requirements in existing South Coast AQMD Rule 1134 are more stringent than those in Rules 69.3 and 69.3.1.

- Major Source Landfill Flare Control Measure

In San Diego County, four large landfills report VOC emissions to the San Diego APCD and some of these facilities operate flares that emit NOx emissions. According to the San Diego APCD's analysis, a potential flare rule controlling NOx emissions at the 0.06 pounds per million British thermal unit (lbs/MMBtu) level may be cost-effective and feasible. San Diego APCD does not currently have a local rule establishing NOx limits for non-refinery flares although some flare operational standards are found in Rules 59 and 59.1. A new rule, when proposed, would incorporate applicable flare requirements found in Subpart A (General Provisions) 40 CFR 60.18 (General Control Device and Work Practice Requirements) as needed, and mandate a cost-effective NOx control level that is comparable with NOx control levels found in other California air districts (i.e., between 0.06 and 0.025 lbs/MMBtu in South Coast AQMD Rule 1118.1 and a proposed measure (Biogas Flares) of Bay Area AQMD<sup>24</sup>). South Coast AQMD Rule 1118.1 limits NOx emissions at 0.06 to 0.025 lbs/MMBtu and VOC emissions at 0.008 to 0.038 lbs/MMBtu from non-refinery flare gases, including digester gas, landfill gas, produced gas, and other flare gas. The NOx limits in Rule 1118.1 are more stringent than the limit referenced in the San Diego APCD's control measure. South Coast AQMD staff will continue to track and evaluate the requirements as San Diego APCD adopted a new rule.

Based on the RACM evaluation included in the 2020 Plan, San Diego APCD determined that none of the potential additional control measures were considered reasonably available, and not proposed for adoption for the purposes of their 2015 ozone NAAQS RACM analysis and the corresponding 2020 ozone attainment plan. As such, no new control measures are identified from evaluation of San Diego 2020 RACT and 2020 Plan as feasible or applicable for South Coast AQMD's 2022 AQMP.

### *San Joaquin Valley*

San Joaquin Valley is classified as an "extreme" nonattainment area for the 2008 and 2015 8-hour ozone standards. In June 2016, the San Joaquin Valley adopted the 2016 Ozone Plan for 2008 8-Hour Ozone

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<sup>24</sup> Spare The Air – Cool the Climate. A Blueprint for Clean Air and Climate Protection in the Bay Area. Final 2017 Clean Air Plan. Volume 2 – Stationary Source Sector. Stationary Source Control Measure #SS23. Bay Area AQMD, April 19, 2017. Available at: [https://www.baaqmd.gov/~media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a\\_proposed-final-cap-volume-2-pdf.pdf?la=en](https://www.baaqmd.gov/~media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_proposed-final-cap-volume-2-pdf.pdf?la=en).

Standard<sup>25</sup> to bring the Valley into attainment of 2008 8-hour ozone NAAQS by 2031. In this plan, Rule 4311 (Flares) and Rule 4694 (Wine Fermentation and Storage Tanks) were proposed to be amended in the 2017–2018 period.

San Joaquin Valley APCD amended Rule 4311 on December 17, 2020, requiring VOC and NOx emissions limits for flares at oil and gas, chemical, landfill, digester, and organic liquid loading operations. South Coast AQMD Rule 1118.1 (Control of Emissions from Non-Refinery Flares; adopted 1/4/19) regulates emissions from non-refinery flares, and is at least as stringent as San Joaquin Valley Rule 4311. The VOC and NOx emission limits Rule 1118.1 and Rule 4311 are the same including flares at landfill and digester gas operations (0.038 lbs of VOC/MMBtu, 0.025 lbs of NOx/MMBtu), flares at oil and gas operations (0.008 lbs of VOC/MMBtu, 0.018 lbs of NOx/MMBtu), and flares at organic liquid loading operations (0.034 lbs of NOx/1,000 gallons loaded).

San Joaquin Valley APCD has not yet amended Rule 4694 to include additional requirements to further reduce emissions from wine fermentation processes. As such, no new control measures are identified as applicable for South Coast AQMD's 2022 AQMP.

### *Ventura County*

Ventura County is classified as a “serious” nonattainment area for both the 2008 and 2015 8-hour ozone standards. In the Final 2016 Ventura County AQMP for the 2008 8-hour ozone standard<sup>26</sup> adopted on February 14, 2017, four new stationary source control measures (Architectural Coatings, Composting and Organic Material Conversion Operations, Fan-Type Central Furnaces, and NOx Reductions from Miscellaneous Sources) were recommended as part of Ventura County's strategy to attain the federal 8-hour ozone standard. These control measures were intended to revise the emission limits to be consistent with South Coast AQMD's rules (i.e., Rules 1113, 1133.1/1133.3, 1111, and 1147). As such, the requirements in South Coast AQMD's rules are at least as stringent as the proposed amendments in the Ventura County's control measures. The Ventura County APCD also evaluated 18 “further study” control measures that were not proposed for adoption as District rules at the time of the plan adoption, due to inconclusive information about their technical or economic feasibility, or applicability for Ventura County. Ventura County APCD committed to continue to evaluate and adopt these measures if they are proven feasible in the future.

Since the Plan submittal, five of the 18 “further study” measures have been evaluated in recent rule amendments between 2018 and 2021, including Rule 71 (Crude Oil and Reactive Organic Compound Liquids), Rule 74.15 (Boilers, Steam Generators and Process Heaters), Rule 74.20 (Adhesives and Sealants), Rule 74.6 (Surface Cleaning and Degreasing), and Rule 74.6.1 (Batch Loaded Vapor Degreasers). These rules were updated to align VOC or NOx limits with those required in South Coast AQMD rules. For example, Rule 71 was revised to set lower leak definition thresholds to 10,000 ppm similar to South Coast AQMD Rule 1173 in which leak thresholds are 10,000 ppm from components in light liquid/gas/vapor service, 200 ppm from atmospheric pressure relief device, or 100 ppm in heavy liquid service pump. Rule 74.6 was revised to lower VOC limits for solvents used on electronics, electrical components, medical devices, and application equipment same as

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<sup>25</sup> 2016 Plan for the 2008 8-Hour Ozone Standard, San Joaquin Valley APCD, June 16, 2016. Available at: [http://www.valleyair.org/Air\\_Quality\\_Plans/Ozone-Plan-2016.htm](http://www.valleyair.org/Air_Quality_Plans/Ozone-Plan-2016.htm).

<sup>26</sup> Final 2016 Ventura County Air Quality Management Plan, Ventura County APCD, February 14, 2017. Available at: <http://www.vcapcd.org/pubs/Planning/AQMP/2016/Final/Final-2016-Ventura-County-AQMP.pdf>.

South Coast AQMD Rule 1171 which has emission limits at least as stringent as Rule 74.6. Rule 74.6.1 was also revised to limit vapor degreaser solvent to 25 grams of VOC per gallon which is the same VOC limit in South Coast AQMD Rule 1171. In addition, Rule 74.15 was revised to limit NO<sub>x</sub> emissions from boilers, steam generator, and process heaters same as South Coast AQMD Rule 1146. Lastly, Rule 74.20 was amended to align VOC content limits with those in South Coast AQMD Rule 1168. As such, the requirements in South Coast AQMD's rules are at least as stringent as the requirements in the recent rule amendments in Ventura County. Therefore, no new control measures are identified as applicable for South Coast AQMD's 2022 AQMP.

### *Western Mojave Desert*

Western Mojave Desert is classified as a "severe-15" nonattainment area for both the 2008 and 2015 8-hour ozone standards. Mojave Desert AQMD adopted the 75 ppb Ozone Attainment Plan<sup>27</sup> on February 27, 2017. In its Ozone Attainment Plan, the Mojave Desert AQMD did not propose to adopt any additional control measures for reductions of VOC and NO<sub>x</sub>. As such, no new control measures are identified as applicable for South Coast AQMD's 2022 AQMP.

### *Texas*

The Dallas-Fort Worth (DFW) and Houston-Galveston-Brazoria (HGB) areas are designated as "serious" nonattainment areas for the 2008 8-hour ozone standard. The Texas Commission on Environmental Quality (TCEQ) adopted the Serious Classification Attainment Demonstration and Reasonable Further Progress SIP Revision for the 2008 8-hour Ozone NAAQS<sup>28</sup> on March 4, 2020. The TCEQ continues to implement existing and voluntary control measures for NO<sub>x</sub> and VOC for meeting the "serious" nonattainment area RACT requirements. No new stationary source control measures were added in this SIP. In addition, all potential control measures evaluated for stationary sources were not committed to as RACM due to technological or economic feasibility, enforceability, adverse impacts, or ability of the measure to advance attainment date of the NAAQS. As such, no new control measures are identified as applicable for South Coast AQMD's 2022 AQMP.

### *New York-New Jersey-Connecticut (NY-NJ-CT)*

The Connecticut portion of NY-NJ-CT and the Greater Connecticut areas are classified as "serious" nonattainment areas for the 2008 8-hour ozone NAAQS. Under the previous "moderate" nonattainment designation, the Connecticut Department of Energy and Environmental Protection (DEEP) submitted two attainment demonstrations, one for the Connecticut portion of NY-NY-CT nonattainment area in August 2017 and one for the Greater Connecticut nonattainment area in January 2017.<sup>29</sup> Both plans summarized control

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<sup>27</sup> Federal 75 ppb Ozone Attainment Plan (Western Mojave Desert Nonattainment Area), Mojave Desert AQMD, February 27, 2017. Available at: [https://ww3.arb.ca.gov/planning/sip/planarea/wmdaqmp/2016sip\\_mdplan.pdf](https://ww3.arb.ca.gov/planning/sip/planarea/wmdaqmp/2016sip_mdplan.pdf).

<sup>28</sup> Serious Classification Attainment Demonstration and Reasonable Further Progress SIP Revision for the 2008 Eight-Hour Ozone NAAQS, TCEQ, March 4, 2020. Available at: <https://www.tceq.texas.gov/airquality/sip/dfw/dfw-latest-ozone>.

<sup>29</sup> Attainment Demonstrations for the 2008 Ozone NAAQS for Connecticut. Available at: <https://portal.ct.gov/DEEP/Air/Planning/Ozone/2008-Ozone-NAAQS-Attainment-Demonstrations>.

measures that constitute RACM for the 2008 ozone moderate designation. As these nonattainment areas were reclassified to “serious” nonattainment in July 2018, the DEEP submitted to the U.S. EPA the Final SIP Revision for the Serious Designation for the 2008 Ozone Standard<sup>30</sup> on December 23, 2020. The DEEP developed several RACM control measures for the reclassification to “serious” nonattainment designation for the 2008 ozone NAAQS. The emission sources under these RACM control measures are regulated in South Coast AQMD through existing NO<sub>x</sub> and VOC rules and regulations. Regulations of Connecticut State Agencies (RCSA) section 22a-174-22e regulates NO<sub>x</sub> emissions from fuel-burning equipment at major stationary sources. South Coast AQMD Rules 1134, 1135, 1146, and 1110.2 limit NO<sub>x</sub> emissions from fuel-burning equipment at major stationary sources at lower emission limits compared to the requirements in RCSA. For example, natural gas-fired boilers at electricity generating facilities have a lower NO<sub>x</sub> limit in Rule 1135 (5 ppm) than that in RCSA (245 ppm<sup>31</sup>). For industrial and commercial boilers firing natural gas, NO<sub>x</sub> limit is more stringent in Rule 1146 (5 ppm) than that in RCSA (164 ppm<sup>18</sup>). Likewise, lower NO<sub>x</sub> limits are found for simple-cycle and combined-cycle turbines have in Rule 1134 (2–2.5 ppm vs. 42–55 ppm). The lowest NO<sub>x</sub> limit is set at 1.5 grams per brake horsepower per hour (g/bhr-hr) for natural gas-fired engines in RCSA 22a-174-22e, while Rule 1110.2 sets the NO<sub>x</sub> limit at 11 ppm (equivalent to 0.15 g/bhr-hr). For VOC measures, RCSA section 22a-174-41a regulates architectural and industrial maintenance coatings. South Coast AQMD Rule 1113 (Architectural Coatings) established lower VOC emission limits for various categories, such as industrial maintenance coating (250 vs. 100 g/L), graphic arts (sign) coating (500 vs. 250 g/L), aluminum roof coating (450 vs. 100 g/L), concrete surface retarder (780 vs. 50 g/L), and fire-resistive coating (350 vs. 150 g/L), to list a few. As such, the requirements in existing South Coast AQMD rules are at least as stringent as those in Connecticut, and no new control measures are identified as feasible or applicable for South Coast AQMD’s 2022 AQMP.

### *Illinois-Indiana-Wisconsin (IL-IN-WI)*

In December 2020, the Indiana Department of Environmental Management (IDEM) submitted amendments to the Indiana SIP<sup>32</sup> for areas designated as “serious” nonattainment under the 2008 8-hour ozone NAAQS to the U.S. EPA. The Indiana SIP applies to the Indiana portion (Lake and Porter Counties) of the Chicago-Naperville, Illinois-Indiana-Wisconsin. Indiana SIP relies on several control measures already in place or being implemented over the next few years to reduce stationary and mobile source emissions. The SIP concluded that IDEM’s existing VOC rules fulfill VOC RACT requirements, and no additional reasonably available control measures in the 2020 SIP amendments could advance the attainment date. As such, no new control measures are identified as feasible or applicable for South Coast AQMD’s 2022 AQMP.

In summary, as part of Step 4 of the RACM evaluation, the control measures in adopted ozone attainment plans in “serious” or above ozone nonattainment areas were evaluated. Staff concluded that the requirements

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<sup>30</sup> Final RACT SIP Revision for the Serious Designation for the 2008 Ozone NAAQS and the Marginal/Moderate Designations for the 2015 Ozone NAAQS, Connecticut DEEP, December 23, 2020. Available at: <https://portal.ct.gov/DEEP/Air/Planning/Ozone/Reasonably-Available-Control-Technology>.

<sup>31</sup> Converted from lb/MMBtu using the ratio of 9 ppm NO<sub>x</sub> equivalent to 0.011 lbs/MMBtu at 3 percent O<sub>2</sub>.

<sup>32</sup> Lake and Porter Counties Attainment Demonstration for the 2008 8-hour Ozone Standard, Indiana DEM, December 29, 2020. Available at: <https://www.in.gov/idem/airquality/information-about/attainment-demonstrations/ozone-attainment-demonstrations/>.



in existing South Coast AQMD's NOx and VOC rules and regulations are at least as stringent as the control measures or adopted rules and regulations included in the ozone air quality SIPs in other air agencies. As such, no new control measures are identified as a potential control measure for South Coast AQMD's 2022 AQMP.

## Step 5 – U.S. EPA Menu of Control Measures

The Menu of Control Measures,<sup>33</sup> compiled by the State and Local Programs Groups within the U.S. EPA's Office of Air Quality Planning and Standards, was developed to provide information useful in the development of local emission reduction and NAAQS SIP scenarios, and to identify and evaluate potential control measures. The U.S. EPA's Menu of Control Measures provides a broad listing of potential emission reduction measures to assist states in identifying and evaluating potential measures. The potential measures are developed based in part on the results of a literature review of the current and proposed measures of various air quality agencies, including CARB, individual California Air Districts, the Ozone Transport Commission, the Lake Michigan Air Directors Consortium, and others. For each category, one or more emission reduction measures, the respective control efficiency, and cost effectiveness are provided.

As part of the 2016 AQMP RACM evaluation, control measures for point, area, and mobile sources of PM2.5, SOx, NOx, and VOC were reviewed based on the U.S. EPA's Menu of Control Measures. Staff concluded that for VOC and NOx, the control measures adopted in the South Coast AQMD results in similar or higher levels of emission reductions than those listed in the menus.

Since the 2016 RACM evaluation, no new control measures have been added to the U.S. EPA's Menu of Control Measures. Thus, the evaluation in the 2016 AQMP remains up-to-date, and no new potential control measures are identified from the U.S. EPA's Menu of Control Measures.

## Step 6 – U.S. EPA Guidance Documents

In addition to the U.S. EPA's CTGs/ACTs and TSDs, the U.S. EPA issues Guidance Documents for control strategies on reducing emissions from various sources. In March 2013, the U.S. EPA revised the "Strategies for Reducing Residential Wood Smoke" to provide new information and tools to help state, tribal, and local air officials reduce fine particle pollution from residential wood smoke. This document provided a comprehensive list of strategies to help identify appropriate wood smoke reduction measures. As part of the 2016 AQMP RACM evaluation, a list of U.S. EPA's suggested regulatory options for reducing residential wood smoke was outlined and evaluated. The 2016 RACM evaluation concluded that except for the two suggested options, all the suggested options are already codified as South Coast AQMD's current control strategies in Rules 445 and 401. The two suggested options—the removal of old wood stove upon resale of a home and ban the use of non-EPA certified wood stoves—targeted reductions of PM2.5 emissions. Since the issuance of residential wood smoke guidance document in March 2013, no new guidance document for VOC or NOx control strategies has been released/updated by the U.S. EPA for stationary sources. Thus, the evaluation in the last AQMP remains up-to-date, and no new potential control measures are identified from U.S. EPA's Guidance Documents.

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<sup>33</sup> U.S. EPA, Menu of Control Measures, <https://www.epa.gov/sites/default/files/2016-02/documents/menueofcontrolmeasures.pdf>, as of September 30, 2021.

## Step 7 – Control Measures Workshop/AQMP Working Groups

On November 10, 2021, the South Coast AQMD and the CARB hosted a joint Control Measures Workshop to solicit input from all stakeholders on control strategies being developed and/or considered for the 2022 AQMP. Specific control measures for mobile and stationary sources were presented by the South Coast AQMD and CARB staff, followed by discussion and questions from all participants. In the morning session, a total of 30 South Coast AQMD stationary source measures (19 NO<sub>x</sub> measures, three co-benefits program measures, six VOC measures,<sup>34</sup> and three other measures) were presented, as well as a discussion of what is needed to transition across all sectors to a different fuels mix, with a heavy emphasis on zero emissions or low NO<sub>x</sub> emissions technology. In the afternoon session, a total of 19 South Coast AQMD measures (three emission growth management measures, five facility-based mobile source measures, six on-road and off-road mobile source measures, two incentive-based measures, and three other measures) were presented. CARB also presented the Draft 2022 State SIP Strategy including measures for on-road and off-road mobile sources, other area sources, and federally/internationally regulated measures. In general, the following concepts were proposed for stationary source emissions:

- Promoting zero emission technology for residential appliances and industry equipment;
- Permitting for low VOC emissions technology for coatings, adhesives, and lubricants;
- Coordination of incentive funding to maximize NO<sub>x</sub> emission reductions, including zero emission or low NO<sub>x</sub> products for coatings category; and
- Methodology for cost-effectiveness determination.

No new measures were suggested at the Control Measures Workshop in addition to those draft control measures presented by staff.

The South Coast AQMD established six specialized Working Groups to support the development of the 2022 AQMP. The Working Groups includes one stationary source Working Group (Residential and Commercial Buildings) and five mobile source Working Groups (Aircraft, Ocean-Going Vessels, Construction and Industrial Equipment, Heavy Duty Trucks, and Zero Emissions Infrastructure). These Working Groups conducted several in-depth public meetings throughout the AQMP development process in order to facilitate more specialized discussions. The Residential and Commercial Buildings Working Group has been developed to explore measures to further reduce NO<sub>x</sub> emissions from residential and commercial appliances through replacement with zero emissions and low NO<sub>x</sub> appliances. The five Mobile Source Working Groups focus on development of various mobile source measures outside of the South Coast AQMD's jurisdiction that require coordination with CARB and the U.S. EPA. The schedule for these Working Group Meetings is provided in detail in Chapter 9 of the 2022 AQMP.

## Summary of Potential RACM Identified

Based on the seven-step RACM analysis, several potential RACM for stationary sources were identified as shown in Table VI-A-7. These measures will be further assessed for technological and economic feasibility in the Attachment 2 of this appendix.

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<sup>34</sup> Includes L-CMB-04 that is a NO<sub>x</sub> control measure with co-benefits of VOC reductions.



**TABLE VI-A-7  
POTENTIAL STATIONARY SOURCE RACM IDENTIFIED FOR THE 2022 AQMP**

#	Potential RACM	South Coast AQMD Applicable Rule	Source of Information
1	Lowering NOx emission limits for boilers, steam generators, and process heaters	Rule 1146 Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters	Step 1 – Updated RACT/RACM
2	VOC Emission Reductions from Cooling Towers	N/A <sup>a</sup>	Step 1 – Updated RACT/RACM
3	Lowering NOx emission limit for commercial food ovens	Rule 1153.1 Emissions of Oxides of Nitrogen from Commercial Food Ovens	Step 2 – U.S. EPA Technical Support Documents
4	Additional Enhancement in Reducing Existing Residential Building Energy Use	N/A <sup>a</sup>	Step 3 – Control Measures beyond RACM in 2016 AQMP
5	Lowering VOC Emission Limit for Gasoline Bulk Terminals	Rule 462 Organic Liquid Loading	Step 3 – Control Measures beyond RACM in 2016 AQMP
6	Lowering VOC Emission Limit for Auto and Light-Duty Truck Assembly	Rule 1115 Motor Vehicle Assembly Line Coating Operations	Step 3 – Control Measures beyond RACM in 2016 AQMP
7	Lowering VOC Limits Interior Body Sprays for Metal Container, Closure, and Coating Operations	Rule 1125 Metal Container, Closure and Coil Coating Operation	Step 3 – Control Measures beyond RACM in 2016 AQMP

<sup>a</sup> Not Applicable

## Detailed Assessment of Potential RACM Identified

For the potential RACM identified in Table VI-A-7, a comprehensive feasibility analysis is conducted in this section. Several data sources including, but not limited to, South Coast AQMD’s Annual Emission Reporting (AER) program, AQMP’s updated emissions inventory (Chapter 3 and Appendix III of Draft 2022 AQMP), and equipment statistics obtained from South Coast AQMD’s past rulemaking efforts were used to quantify emission inventory, estimated reductions in emissions, and costs associated with each potential RACM. For each potential RACM, with quantifiable emission reductions, the technological and economic feasibilities are assessed. Detailed assessment of the seven potential RACM identified is presented in Attachment VI-A-2 of this Appendix. Emission inventories, emission reductions, and cost-effectiveness will be further refined during the rule development process, if committed to rulemaking.

**DRAFT 2022 AQMP**  
**APPENDIX VI-A**  
**ATTACHMENT VI-A-1**

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**EVALUATION OF SOUTH COAST AQMD'S STATIONARY SOURCE  
RULES AND REGULATIONS**

## Introduction

This Attachment VI-A-1 includes a detailed evaluation of the requirements in South Coast AQMD's stationary and area source rules and regulations for VOC and NO<sub>x</sub> against those in other air agencies' rules and federal guidance documents that were adopted or amended from March 2020 to September 2021. March 2020 was selected as a starting point for this analysis because rules up to February 2020 were already reviewed in the 2020 RACT Demonstration.<sup>35</sup>

Attachment VI-A-1 consists of Attachment VI-A-1a, which is evaluation of South Coast AQMD's VOC rules and Attachment VI-A-1b, which is evaluation of South Coast AQMD's NO<sub>x</sub> rules. Both Attachments VI-A-1a and VI-A-1b have South Coast AQMD rule number in the first column, rule title in the second column, and its key requirements including emissions limits, applicability, and exemptions in the third column. The fourth column includes requirements in other agencies' rules and federal guidance documents that may be more stringent than those in South Coast AQMD rules. The last column includes an evaluation of the stringency between the requirements in South Coast AQMD rules and those from other agencies. Based on this evaluation, potential feasible control measures are identified, and it is concluded as to whether South Coast AQMD rules and regulations meet the federal RACT/RACM requirements.

Attachments VI-A-1a and VI-A-1b serve as an updated RACT/RACM evaluation for the 2022 AQMP. For completeness of evaluation, the prior RACT/RACM evaluation conducted as part of the 2020 RACT Demonstration is also included in Attachments VI-A-1a and VI-A-1b, and key requirements are also updated with recent rule amendments, if needed.

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<sup>35</sup> South Coast AQMD, Draft Final Staff Report for 2015 8-Hour Ozone Standard Reasonably Available Control Technology (RACT) Demonstration, May 2020. <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/ract-draft-final-staff-report.pdf?sfvrsn=23>.

ATTACHMENT VI-A-1A

EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES

Rule No	Rule Title	Current Rule Requirements	Other Agencies’ Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
461 <sup>b</sup>	Gasoline Transfer and Dispensing (Amended 4/6/12)	For Phase I, underground storage tanks: an enhanced vapor recovery system having 98% control efficiency and emission factor not exceeding 0.15 lbs/1,000 gallons; aboveground storage tanks: a vapor recovery system having 95% control efficiency. For Phase II, a vapor recovery system having 95% efficiency and emission factor not exceeding 0.38 lbs/1,000 gallons.	n/a <sup>c</sup>	Meets RACT.
462 <sup>d</sup>	Organic Liquid Loading (Amended 5/14/99)	Applicable to facilities loading organic liquids with a true vapor pressure of 1.5 psi or greater. Class A facilities (≥20,000 gals/day loading) are required to meet a VOC emissions limit at 0.08 lbs/1,000 gallons. Class B facilities (4,000–20,000 gals/day loading) are required a CARB certified vapor recovery system with 90% recovery efficiency.	Mojave Desert Rule 462 (Amended 1/22/18) requires a CARB certified vapor recovery and/or disposal system with 95% recovery efficiency for Class B facilities.  Ventura County Rule 71.3 (Amended 5/11/21) requires a vapor recovery or removal efficiency of 95% for Class B facilities.	For a subcategory of applicable sources (Class B facilities), South Coast AQMD rule is not as stringent as Mojave Desert AQMD Rule 462 and Ventura County APCD Rule 71.3 (90 vs. 95% of minimum vapor recovery efficiency required to obtain a CARB certification). However, South Coast AQMD’s compliance records indicate that the actual control efficiency exceeds 95%. Together with other requirements in Rule 462, Rule 462 meets the RACT requirements.
463 <sup>b</sup>	Organic Liquid Storage (Amended 11/4/11)	Applicable to ≥ 19,815 gallons of aboveground organic liquids storage tanks or between 215 and 19,815 gallons of aboveground gasoline storage tanks. Not holding any organic liquid having a minimum vapor pressure 0.5 psia in a tank ≥ 39,630 gallons, or any organic liquid having a minimum true vapor pressure 1.5 psia in a tank ≥ 19,815 gallons. The minimum control efficiency of a vapor recovery system is at 95%.	n/a <sup>c</sup>	Meets RACT.
1103 <sup>d</sup>	Pharmaceuticals and Cosmetics Manufacturing Operations (Amended 3/12/99)	Applicable to pharmaceutical and cosmetics manufacturing facilities and processes. For reactors, distillation columns, crystallizers, or centrifuges: 15 lbs/day VOC limit for each permit unit unless vented to surface condensers. For the basic permit unit for production equipment including air dryers: 90% control efficiency. Also include other various operating and equipment requirements. Facilities that emit, at the design production rating, 15 lbs/day or less VOC are exempt.	Sacramento Metro Rule 464 (Amended 4/28/16) has various requirements that apply to chemical manufacturing and industrial operations including pharmaceutical and cosmetic manufacturing. For pharmaceutical and cosmetics manufacturing plants, a facility exemption limit at 10 lbs/day VOC; for other organic chemical plants, a facility exemption limit at 15 lbs/day VOC. Additional VOC vapor pressure requirements for Liquid Transfer and Storage Tanks.	While Sacramento Rule 464 has a lower exemption limit for small stationary source than Rule 1103 (10 lbs/day in Sacramento vs. 15 lbs/day in South Coast), both rules have same equipment level of control (i.e., 15 lbs/day VOC and/or 90% minimum control efficiency) for reactors, distillation columns, crystallizers, or centrifuges at pharmaceutical/cosmetic manufacturing plants. Liquid transfer and storage tank categories are regulated in different South Coast AQMD rules (Rules 462 and 463) meeting RACT. Thus, in general, Rule 1103 provides RACM level of control for this source category.

<sup>a</sup> Other agencies’ rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is updated here.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>d</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

**ATTACHMENT VI-A-1A**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1104 <sup>b</sup>	Wood Flat Stock Coating Operation (Amended 8/13/99)	2.1 lbs/gal, less water and exempt solvent. In lieu of VOC limit, use control device having 95% control efficiency (or 50 ppm outlet) and 90% collecting efficiency	n/a <sup>c</sup>	Meets RACT.
1106 <sup>d</sup>	Marine and Pleasure Craft Coatings (Amended 5/3/19)	For pleasure craft coatings, antifoulant coatings-other substrate emission limit 330 g/L and clear wood coatings-sealers emission limit 550 g/L.	n/a <sup>c</sup>	Rule 1106 meets or exceeds EPA CTG requirements.
1107 <sup>b</sup>	Coating of Metal Parts and Products (Amended 2/7/20)	Coating-specific emission limits from 2.3 to 3.5 lbs/gal. In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 5 ppm outlet) and 90% capture efficiency. Solvent cleaning operations must comply with Rule 1171.	Mojave Desert Rule 1115 (Amended 6/8/20) has coating-specific VOC limits (2.8 – 4.2 lbs/gal) for Drum and Chemical Agent Resistant categories that are not included in South Coast AQMD Rule 1107. Overall, a minimum capture and control system combine efficiency is 90%.	Rule 1107 meets or exceeds EPA CTG requirements. For example, South Coast AQMD Rule 1107 requires General One-Component VOC limit at 2.3 lbs/gal, while the similar rule at Mojave Desert has VOC limit at 2.8 lbs/gal. Similarly, in Rule 1107, Prefabricated Architectural Component VOC limits are at 2.3–2.8 lbs/gal for Air-Dried coating, whereas the Mojave Desert rule has VOC limits of 3.5 lbs/gal for the same category. Although Mojave Desert rule has additional coating categories that are not in South Coast, South Coast AQMD Rule 1107 is as stringent as or more stringent than the same categories in both rules. Overall, Rule 1107 is as stringent as Mojave Desert AQMD's rule, and provides RACT level of control.
1110.2 <sup>d</sup>	Emissions from Gaseous- and Liquid Fueled Engines (Amended 11/1/19)	The following VOC limits apply to all stationary and portable engines over 50 brake horsepower (bhp). 1) Stationary, non-emergency engines and biogas (landfill and digester gas) engines: • 30 ppm VOC 2) New non-emergency engines with electrical generators: • 0.10 lbs VOC/MW-hr (or 10 ppm VOC) 3) General low-useage engines: • 250 ppm VOC 4) Low-usage biogas engines: • 40 ppm VOC, landfill gas • 250 x Efficiency Correction Factor (ECF) ppm VOC, digester gas	n/a <sup>c</sup>	Rule 1110.2 meets RACT.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as a component of the Final Coachella Valley Extreme Area Plan for 1997 8-hour Ozone Standard and is included here for completeness.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>d</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is updated here.

**ATTACHMENT VI-A-1A  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies’ Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1113 <sup>b</sup>	Architectural Coatings (Amended 2/5/16)	Coating-specific emission limits from 50 to 730 g/L. The VOC content for Industrial Maintenance Coatings for color indicating safety coatings limits to 480 g/L, that is created to address hydrofluoric acid indicating paint use at refineries.	n/a <sup>c</sup>	Meets RACT.
1115 <sup>d</sup>	Motor Vehicle Assembly Line Coating Operations (Amended 5/12/95)	The VOC limits for electrophoretic primer at 145 g/L; spray primer, primer-surfacer, and topcoat at 1,880 g/L.	Antelope Valley Rule 1151.1 (Adopted 6/20/17) has VOC limits for electrophoretic primer at 84 g/L; primer-surfacer, topcoat, and primer-sealer at 1,440 g/L.  CTG has VOC limits for electrophoretic primer at 84 g/L (145 g/L in Rule 1115); sprayable primer, primer-surfacer, and topcoat at 1,440 g/L (1,800 g/L in Rule 1115); and trunk coatings, interior coatings, sealers, and deadeners at 650 g/L (Rule 1115 provides an exemption for these categories).	For several coating categories, Rule 1115 is less stringent than the requirements in EPA CTG and other Districts. Also, in recent years, there are new light-duty motor vehicles manufacturing facilities in the South Coast Air Basin that are subject to this CTG. As part of the 2020 RACT, South Coast AQMD staff committed to amend Rule 1115 to provide RACT level of control for these coating categories. This rule was amended March 4, 2022.
1118.1	Control of Emissions from Non-Refinery Flares (Adopted 1/4/19)	VOC emission limits range from 0.008 lbs/MMBtu for produced gas to 0.038 lbs/MMBtu for digester gas/landfill gas.	n/a <sup>c</sup>	Meets RACT.
1122 <sup>d</sup>	Solvent Degreasers (Amended 5/1/09)	Apply to solvent cleaning operations containing more than 25 g/L of VOC. Contain various work practice and design requirements. Combined capture and control efficiency of at least 85.5% by weight is required.	n/a <sup>d</sup>	Meets RACT.
1124	Aerospace Assembly and Component Manufacturing Operations (Amended 9/21/01)	Coating-specific content limits from 160–1,000 g/L. Specific high transfer coating applications (e.g., HVLP spray). In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 50 ppm outlet) and 90% capture efficiency.  Solvent cleaning operations must comply with Rule 1171.	Mojave Desert Rule 1118 (Amended 6/8/20) has the following limits that are more stringent than those in Rule 1124:  <ul style="list-style-type: none"> <li>• High-Temperature Coating (720 vs 850 g/L)</li> <li>• Rain Erosion-Resistant Coating (600 vs 800 g/L)</li> <li>• Clear Topcoat (420 vs 520 g/L)</li> <li>• Non-Autoclavable Structural Adhesive (700 vs 850 g/L).</li> </ul>	Rule 1124 meets or exceeds the CTG requirements.  The categories with lower limits in Mojave Desert rule are low usage categories. Additionally, several high usage categories are bifurcated allowing higher VOC coatings including Commercial Exterior Aerodynamic Structure Primer, Cryogenic Flexible Primer, Elevated-Temperature Skydrol-Resistant Commercial Primer, cryptoprotective coating, EMI Coating, Lacquer Coating, Part Making Coating, Rocket Nozzle Coating, Specialized Function Coating, Cyanacrylate Adhesive, Compatible Substrate Primer, among others. In totality, South Coast AQMD Rule 1124 is as stringent as or more stringent than the Mojave Desert rule, and provides RACT level of control for this source category.

<sup>a</sup> Other agencies’ rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is updated here.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>d</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

**ATTACHMENT VI-A-1A  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1127 <sup>b</sup>	Emission Reductions from Livestock Waste (Adopted 8/6/04)	Requires Good housekeeping practices for dairy farms with 50 or more cows, heifers and/or calves.  Note: The South Coast AQMD adopted Rule 223 in June 2006 to reduce emissions for large confined animal facilities. Rule 223 targets various types of large confined animal facilities and includes series of best management practices that are more stringent than Rule 1127.	Sacramento Rule 496 – Large Confined Animal Facilities (Adopted 8/24/06), has more stringent control and good management practices than South Coast Rule 1127 (e.g., venting to control system with at least 80% control efficiency). The more stringent requirements are targeted towards silage emissions, which is not applicable in South Coast for dry feed lot operations.  San Joaquin Valley Rule 4570 (Amended 10/21/10) has required best management practices for manure management and other areas to reduce VOC and ammonia emissions. Note that direct comparison with Rule 1127 is difficult due to the significant differences in source operations (dry feed lot in South Coast vs. flushing and lagoon operations in San Joaquin, the focus on corral waste control in South Coast AQMD vs. feed and silage and milk parlor in San Joaquin Valley APCD, etc.). In addition, San Joaquin Valley Rule 4570 applies to all types of large confined animal facilities, while Rule 1127 applies only to dairies with a much lower applicability threshold.	Together with Rule 223, Rule 1127 achieves RACT equivalency for this source category.
1128 <sup>b</sup>	Paper, Fabric, and Film Coating Operations (Amended 3/8/96)	Coating-specific VOC content limits from 20–265 g/l. Alternatively, operator can also use control system with at least 95% control efficiency (or 50 ppm outlet) and 90% capture efficiency (combined 85.5% efficiency). Solvent cleaning operations must contain 15% or less VOC or 85% VOC must be collected and disposed of.	The 2007 EPA CTG requires an overall 90% control efficiency for facilities emitting > 15 lbs/day and coating lines emitting > 25 tpy. Rule 1128 is not as stringent as the 2007 EPA CTGs (85.5% overall control efficiency in Rule 1128). CTG alternative compliance emission limit of 80 g/L is also more stringent than the limit of 265 g/L in Rule 1128.	Rule 1128 is not as stringent as the 2007 EPA CTGs (CTG 80 g/L vs. Rule 1128 265 g/L) for facilities emitting > 15 lbs/day and coating lines emitting > 25 tpy. To the best of staff's knowledge, out of the active Title V facilities without add-on control, no facilities exceed the CTG applicable threshold (25 tpy of VOC per coating line) in the South Coast AQMD. In addition, the incremental increase from 85.5% to 90–97% in control efficiency is not cost-effective for the existing sources. Rule 1128 does not include a trigger for when it is considered implementable and the rule pertains to all paper, fabric, and film coating operations. Rule 1128 covers more sources/facilities regardless of potential emission level. As such, Rule 1128 provides RACT level of control for this source category.

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<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

**ATTACHMENT VI-A-1A  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies’ Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1130	Graphic Arts (Amended 5/2/14)	VOC content limits: 16–85 g/L for fountain solution, 150 g/L for adhesives, 225–300 g/L for inks and coatings. In lieu of meeting specific content limits, control device with overall VOC capture and control efficiency at 85.5% can be used to achieve equal or better emission reductions.	n/a <sup>b</sup>	Meets RACT.
1131 <sup>c</sup>	Food Product Manufacturing and Processing Operations (Amended 6/6/03)	VOC content limits from 120–200 g/L, or air pollution control system with at least 95% control efficiency and 90% capture efficiency. Solvent cleaning operations must contain 15% or less VOC or 85% VOC must be collected and disposed of.	n/a <sup>b</sup>	Meets RACT.
1133.2, 1133.3 <sup>c</sup>	Rule 1133.2 – Emission Reductions from Co-Composting Operations (Adopted 1/10/03)  Rule 1133.3 – Emission Reductions from Greenwaste Composting Operations (Adopted 7/8/11)	Rule 1133.2 establishes various performance standards. Baseline emission factors are 1.78 lbs VOC/ton throughput and 2.93 lbs NH3/ton throughput.  Rule 1133.3 establishes operational best management practices for greenwaste composting operations. For the facility processing >5,000 tons/year of foodwaste, any active phase of composting containing more than 10% foodwaste, by weight, must use an emission control device with an overall control efficiency of at least 80% by weight of VOC.  For operations ≤5,000 tons/year, require the composting piles to be covered, watered, and turned, or operated with measures that reduce at least 40% VOC emission and 20% NH3 emissions.	San Joaquin Rule 4565 (Adopted 3/15/07) and Rule 4566 (Adopted 8/18/11) have various operational requirements for these operations as well as the operators who landfills, composts, or co-composts these materials. The applicability of Rules 4565/4566 is broader than the applicability of Rule 1133.2/1133.3. Rules 4565/4566 include additional mitigation measures to control VOC from composting active piles (e.g., maintain minimum oxygen concentration of 5%, moisture content of 40-70%, carbon to nitrogen ratio of 20:1).	South Coast AQMD Rule 1133.2 is more stringent than San Joaquin Valley Rule 4565 for larger co-composting facilities and less stringent for smaller co-composting facilities. While South Coast AQMD Rule 1133.2 requires either 70 or 80% overall emission reductions from all parts of composting process, San Joaquin’s Rule 4565 requires add-on controls to apply only to the active composting phase. Rule 1133.2 also has more stringent requirements for in-vessel composting.  San Joaquin’s rule does not address chipping and grinding as in Rule 1133.1.  Overall, Rules 1133.2 and 1133.3 are as stringent as or more stringent than other Districts’ rules, and meets the RACT requirement for this source category.
1136	Wood Products Coatings (Amended 6/14/96)	VOC content limits range from 275–750 g/L VOC. Averaging provisions and add-on control are allowed. Transfer efficiency is at least 65%, or operator must use certain type of equipment (e.g., HVLP). Solvent cleaning operations must comply with Rule 1171. VOC limits are 350 g/L for high-solids stains and 275 g/L for clear sealers categories.	Mojave Desert Rule 1114 (Amended 8/24/20) has a VOC limit for high-solid stains at 240 g/L.	Rule 1136 varies in stringency when compared to Mojave Desert’s requirements. The high solids stain limit in Mojave Desert Rule 1114 is bifurcated into new wood products (240 g/L) and refinishing wood products (700 g/L). The South Coast AQMD limit is 350 g/L for all products. For majority of the categories, Rule 1136 is as stringent as or more stringent than the Mojave Desert’s rule, and provides RACT level of control for this source category.

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<sup>b</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>c</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.



**ATTACHMENT VI-A-1A**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1138 <sup>b</sup>	Control of Emissions from Restaurant Operations (Adopted 11/14/97)	Pursuant to the Protocol Determination of PM and VOC Emissions from Restaurant Operations of Rule 1138, 83% reduction of VOC emissions from chain-driven charbroilers are required.	San Joaquin Valley Rule 4692 (Amended 6/21/18) requires 86% reduction of VOC emissions from chain-driven charbroilers.	Rule 1138 is primarily intended to reduce PM emissions. However, existing controls are expected to achieve similar level of VOC reductions because San Joaquin Valley requires chain-driven charbroilers/catalytic oxidizers combinations be certified by South Coast AQMD test protocol that are deemed compliant with their Rule 4692. South Coast AQMD Rule 1138 VOC control requirements are similar to San Joaquin Valley Rule 4692 and meet RACT.
1141 <sup>b</sup>	Control of Volatile Organic Compound Emissions from Resin Manufacturing (Amended 11/17/00)	95–98% control or 0.12–0.5 lbs/1,000 lbs of resin produced.	n/a <sup>c</sup>	Meets RACT.
1143 <sup>b</sup>	Consumer Paint Thinners and Multi-purpose Solvents (Amended 12/3/10)	Set VOC content of 25 g/l for consumer paint thinner and multi-purpose solvent beginning 1/1/2011.	n/a <sup>c</sup>	Meets RACT.
1144 <sup>b</sup>	Metalworking Fluids and Direct-contact Lubricants (Amended 7/9/10)	Various limits from 50–340 g/L. Add-on control at 90% capture efficiency, 95% control efficiency (or 5 ppm outlet)	n/a <sup>c</sup>	Meets RACT.
1145 <sup>b</sup>	Plastic, Rubber, Leather and Glass Coatings (Amended 12/4/09)	VOC limits: 50–800 g/L (0.4–6.7 lbs/gal). Average provisions and add-on control at 95% control efficiency (50 ppm outlet), 90% capture efficiency. High transfer coating equipment (e.g. HVLP). Solvent cleaning operations must comply with Rule 1171.	n/a <sup>c</sup>	Meets RACT.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

**ATTACHMENT VI-A-1A  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1149 <sup>b</sup>	Storage Tank Degassing (Amended 5/2/08)	Degassing operations must be controlled such that the VOC concentration within the tank is reduced to less than 5,000 ppm for a minimum time limit estimated in the rule based on volume of the gas to be freed in the tank and the flow rate through control device.	n/a <sup>c</sup>	Meets RACT.
1150.1 <sup>b</sup>	Control of Gaseous Emissions from Municipal Solid Waste Landfills (Amended 4/1/11)	98% control or 20 ppm non-methane organic compounds. 50–500 ppm total organic compounds above background	n/a <sup>c</sup>	Meets RACT.
1151 <sup>b</sup>	Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations (Amended 9/5/14)	VOC content limits range from 250–840 g/L. Averaging provisions are allowed. High transfer coating equipment (e.g. HVLP) is required. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4602 (Amended 9/17/09) is more stringent in the following areas: 1) adhesive at 250 g/L (540 g/L in Rule 1151) and 2) truck bed liner coating at 200 g/L (310 g/L in Rule 1151)  Sacramento Rule 459 (Amended 8/25/11) is more stringent in the following areas: 1) multi-color coating at 520 g/L for mobile equipment driven on rails (680 g/L in Rule 1151) and 2) truck bed liner coating at 200 g/L (310 g/L in Rule 1151).	South Coast AQMD Rule 1151 varies in stringency when compared to other Districts' requirements. For the majority of the categories, Rule 1151 is as stringent as or more stringent than other Districts' rules, and provides RACT level of control for this source category. South Coast AQMD will consider amending Rule 1151 to address concerns on certain VOC species be carcinogenic. During the rule making process, the VOC limits will be revisited and can be lowered.
1153 <sup>b</sup>	Commercial Bakery Ovens (Adopted 1/13/95)	Emission reduction of 70% or more is required for existing ovens emitting between 50–100 lbs VOC/day, 95% or more for ovens emitting more than 100 lbs/day, and 95% or more for new ovens.	n/a <sup>c</sup>	Meets RACT.

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<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

**ATTACHMENT VI-A-1A**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1162	Polyester Resin Operations (Amended 7/8/05)	<p>Various application techniques requirements when applying resin or gel coat materials to open mold surface. Monomer (VOC) content limits from 10 to 48% by weight:            Clear gel coat: 40–44%</p> <p>Pigmented gel coat: 28–37%            Specialty gel coats: 48%            General purpose resins: 10–17%            Others polyester resins: 35%</p> <p>Alternatively, 90% overall capture and control efficiency for add-on control.</p>	<p>U.S. EPA 40 CFR 63 Subpart VVVV (Amended 3/20/20) VOC limits:</p> <ul style="list-style-type: none"> <li>• Pigmented Gel Coat Operations is 33%</li> <li>• Tooling Resin is 30–39% Tooling Get Coat is 40%</li> </ul>	<p>Rule 1162 meets or exceeds the CTG requirements.</p> <p>Although 40 CFR 63 has a lower VOC limit than Rule 1162 for Tooling Get Coat (40% vs. 48%), Rule 1162 has more stringent VOC limits than 40 CFR 63 for other categories, such as Clear Gel Coats (40–44% vs. 48%) and Production resin operations (10–17% vs. 28–35%). In addition, 40 CFR 63 provides VOC limits for 7 source categories, whereas Rule 1162 has VOC limits for 14 categories. Thus, Rule 1162 provides RACT level of control for this source category.</p>
1164 <sup>b</sup>	Semiconductor Manufacturing (Amended 1/13/95)	VOC limit for cleanup solvents is 200 g/L or low vapor pressure of 0.64 psia at 68 degrees Fahrenheit. Photoresist applications must be vented to control.	n/a <sup>c</sup>	Meets RACT.
1166 <sup>b</sup>	Volatile Organic Compound Emissions from Decontamination of Soil (Amended 5/11/01)	<p>Requires that contaminated soil (50 ppm or greater VOC emissions) be covered and removed within 30 days. Treatment facilities using negative pressure enclosures are required to treat low VOC contaminated soil (&lt; 1,000 ppm) within 30 days of excavation and high VOC contaminated soil (≥ 1,000 ppm) should immediately be placed in a sealed container or trucked off-site or by any other alternative approved by the Executive Officer.</p> <p>Requires from the responsible contractors as follows:</p> <ol style="list-style-type: none"> <li>1. Prompt monitoring and detection of contaminated soil;</li> <li>2. Mitigation of VOC emissions through spraying and prompt covering of stockpiles;</li> <li>3. Prompt transport and/or treatment of soil; and</li> <li>4. Maintenance of verifiable chain of custody records for the soil that is handled and treated.</li> </ol>	<p>Ventura Rule 74.29 – Soil Decontamination Operations (Amended 4/8/08) has standards for soil decontamination (e.g., 50–100 ppm). Leaking agricultural tanks is exempted.</p> <p>Bay Area Rule 8-40 (Amended 6/15/05) for soil decontamination and tank degassing. All vapor exceeding the specified limit based on organic content and aeration rate must be vented to control devices with ≥ 90% efficiency until meeting 5,000 ppm.</p> <p>San Joaquin Valley Rule 4651 (Amended 9/20/07) employs management practices similar to those in South Coast AQMD. For ex-situ decontamination, VOC emissions must be vented to control devices with 95% efficiency or more.</p>	<p>South Coast AQMD Rule 1166 varies in stringency when compared to other Districts' requirements. For high concentration spills, e.g., &gt;1,000 ppm, Rule 1166 requires contaminated soil to be placed in a sealed container sooner than other district rules (15 minutes versus 30 minutes). Overall, Rule 1166 provides RACT level of control for this source category.</p>
1168	Adhesive and Sealant Applications (Amended 10/6/17)	Various VOC content limits for adhesives (30–850 g/L), sealants (65–760 g/L), and primers (150–785 g/L).	n/a <sup>c</sup>	Meets RACT.

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EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1171	Solvent Cleaning Operations (Amended 5/1/09)	VOC content limits for cleaning solutions for printing presses range from 25 g/L for flexographic printing to 100 g/L for lithographic printing. VOC content limit in a solvent for general solvent cleaning operations is 25 g/L. Combined collection and destruction efficiency of control equipment is required 85.5% of VOC or an output of less than 50 ppm C.	n/a <sup>b</sup>	Meets RACT.
1173 <sup>c</sup>	Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants (Amended 2/6/09)	Requires connecting atmospheric pressure relief devices (PRDs) to vapor recovery or add-on control by first turnaround, if the facility experiences: <ul style="list-style-type: none"> <li>• a second release of &gt; 500 lbs VOC within any five year period, or</li> <li>• any release of 2,000 lbs VOC in any 24 hour period.</li> </ul> In lieu of connecting PRDs to control, operator may elect to pay mitigation fee of \$350,000 for any release exceeding the threshold.  Leak Detection and Repair (LDAR) program to reduce fugitive emissions. Leak thresholds are: <ul style="list-style-type: none"> <li>• for light liquid/gas/vapor service &gt;10,000 ppm,</li> <li>• for PRDs &gt; 200 ppm,</li> <li>• for pumps in heavy liquid &gt; 100 ppm.</li> </ul>	n/a <sup>b</sup>	Meets RACT.
1174 <sup>c</sup>	Control of Volatile Organic Compound Emissions from the Ignition of Barbecue Charcoal (Amended 10/5/90)	VOC emissions less than 0.02 lbs VOC per start.	n/a <sup>b</sup>	Meets RACT.
1175 <sup>c</sup>	Control of Emissions from the Manufacture of Polymeric Cellular (Foam) Products (Amended 11/5/10)	VOC limit for expandable polystyrene molding operations is less than 2.4 lbs/100 lbs of raw material processed.	n/a <sup>b</sup>	Meet RACT.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>c</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

**ATTACHMENT VI-A-1A**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – VOC RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1176 <sup>b</sup>	VOC Emissions from Wastewater Systems (Amended 9/13/96)	<ul style="list-style-type: none"> <li>• Wastewater and closed vent systems: 500 ppm</li> <li>• Sumps and wastewater separators must have floating cover with seals; or fixed cover vented to control</li> <li>• Sewer lines: totally enclosed</li> <li>• Process drains: with South Coast AQMD approved water seals</li> <li>• Junction boxes: totally enclosed</li> <li>• Control device: 95% efficiency or 500 ppm leak above background</li> <li>• Monthly to annually inspection.</li> </ul>	Bay Area Rule 8-8 (Amended 9/15/04) in general is similar to South Coast Rule 1176, with the following exceptions: <ul style="list-style-type: none"> <li>• Floating covers must have double seals; and</li> <li>• Semi-annual inspection is allowed.</li> </ul>	Rule 1176 is as stringent as or more stringent than Bay Area's rule, and provides RACT level of control for this source category.
1177 <sup>b</sup>	Liquefied Petroleum Gas Transfer and Dispensing (Adopted 6/1/12)	Requires all LPG bulk loading facilities to have an LPG vapor recovery or equalization system. LPG transfer and dispensing facilities equip a low emission fixed liquid level gauge (FLLG), use low emission connector, and conduct daily inspections.	n/a <sup>c</sup>	Meets RACT.
1178	Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities (Amended 11/6/20)	Applicable to high emitting facility that has 20 tpy VOC emissions or more and tanks ≥ 19,815 gallons organic liquids with true vapor pressure > 0.1 psia. Doming for high emitting external floating roof tanks, better seals and better control for all tanks.	n/a <sup>c</sup>	Meets RACT.
1179 <sup>b</sup>	Publicly Owned Treatment Works Operations (Amended 3/6/92)	Include recordkeeping and emission testing requirements.	n/a <sup>c</sup>	Meets RACT.
1183 <sup>b</sup>	Outer Continental Shelf (OCS) Air Regulations (Adopted 3/12/93)	Adopt by reference Code of Federal Regulations, Part 55, Title 40.	n/a <sup>c</sup>	Meets RACT.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

**ATTACHMENT VI-A-1B  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – NOX RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies’ Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
476 <sup>b</sup>	Steam Generating Equipment (Amended 10/8/76)	For equipment with maximum heat input rate > 50 MMBTU/hr, NOx emission limits are 125 ppm at 3% O2 on gas-fired equipment and 225 ppm at 3% O2 on liquid or solid-fired equipment, averaged over 15 minutes.  In South Coast AQMD, one facility (Long Beach City SERFF) has 3 combustors subject to NOx limit of 150 ppm (24-hr average) per 40 CFR Part 60 Subpart Ea and Eb.	Maryland (Section 26.11.08 Control of Incinerators)_NOx emission limits for two applicable facilities are 140 and 150 ppm respectively at 24-hr average, and 105 and 145 ppm respectively at 30-day average.	Steam generating equipment in South Coast AQMD is subject to requirements similar to those in Maryland on a 24-hr average basis (140 to 150 ppm in Maryland vs. 150 ppm in South Coast). Thus, the emission source is subject to RACT level of control.
1110.2	Emissions from Gaseous- and Liquid-Fueled Engines (Amended 11/1/19)	The following NOx limits apply to all stationary and portable engines over 50 bhp. Stationary, non-emergency engines and biogas (landfill and digester gas) engines: <ul style="list-style-type: none"> <li>• 11 ppm NOx</li> </ul> New non-emergency engines with electrical generators: <ul style="list-style-type: none"> <li>• 0.07 lbs NOx/MW-hr (or 2.5 ppm NOx)</li> </ul> General low-useage engines: <ul style="list-style-type: none"> <li>• 36 ppm NOx, engines ≥500 hbp</li> <li>• 45 ppm NOx, engines &lt;500 hbp</li> </ul> Low-usage biogas engines: <ul style="list-style-type: none"> <li>• 36 x ECF ppm NOx, engines ≥500 hbp</li> <li>• 45 x ECF ppm NOx, engines &lt;500 hbp</li> </ul>	n/a <sup>c</sup>	Meets RACT.
1111 <sup>d</sup>	Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces (Amended 10/1/21)	The maximum NOx limit from fan-type central furnaces is 40 ng/J. On or after 10/1/12, NOx limit is 14 ng/J for residential and commercial fan-type central furnaces. Mobile home furnaces NOx limit is lowered to 14 ng/J by 10/1/18. Alternate compliance plan with mitigation fees with varying compliance dates.	n/a <sup>c</sup>	Meets RACT/RACM.

<sup>a</sup> Other agencies’ rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>d</sup> This evaluation was conducted as a component of the Final Coachella Valley Extreme Area Plan for 1997 8-hour Ozone Standard and is updated here.

**ATTACHMENT VI-A-1B**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – NOX RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1118.1	Control of Emissions from Non-Refinery Flares (Adopted 1/4/19)	Flare gas NOx emission limits range from 0.018 lbs/MMBtu for produced gas to 0.025 lbs/MMBtu for major digester gas and landfill gas. All other flare gas including minor digester gas is required NOx emission limits at 0.06 lbs/MMBtu. Organic liquid storage has NOx emission limit at 0.25 lbs/MMBtu and organic liquid loading has NOx limit at 0.034 lbs/1,000 gallons loaded.	n/a <sup>b</sup>	Meets RACT.
1121 <sup>c</sup>	Control of Nitrogen Oxides from Residential Type, Natural Gas-Fired Water Heaters (Amended 9/3/04)	For natural gas-fired water heaters rated <75,000 Btu/hr, NOx emission limits: <ul style="list-style-type: none"> <li>• 55 ppm for mobile home</li> <li>• 30 ppm for residential home</li> <li>• 15 ppm for water heaters ≤50 gallons</li> </ul>	n/a <sup>b</sup>	Meets RACT.
1134 <sup>d</sup>	Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Amended 4/5/19)	Requirements that will remain in effect until 2024:  Standard = Reference Limit x (Unit Efficiency/25%), where reference limit depends on size of units, varying from 9 ppm to 25 ppm.  New emission limits become effective 1/1/24: <ul style="list-style-type: none"> <li>• Liquid fuel turbines located on Outer Continental Shelf (OCS): 30 ppm NOx / 5 ppm NH3</li> <li>• Natural gas, combined cycle turbine: 2 ppm NOx / 5 ppm NH3</li> <li>• Natural gas, simple cycle turbine: 2.5 ppm NOx / 5 ppm NH3</li> <li>• Produced gas: 9 ppm NOx / 5 ppm NH3</li> <li>• Produced gas turbine located on OCS: 15 ppm NOx / 5 ppm NH3</li> </ul> Other: 12.5 ppm NOx / 5 ppm NH3.	San Joaquin Rule 4703 (Amended 9/20/07) has standards from 5–50 ppm depending on size of units. Combined cycle units > 10 MW has limit of 3 ppm.	NOx emissions range has a lower limit in San Joaquin Rule 4703 (5 ppm) than South Coast Rule 1134 (9 ppm), while the upper limit is lower in South Coast Rule 1134 (25 ppm) than San Joaquin Rule 4703 (50 ppm). Therefore, for the majority of the categories, Rule 1134 is as stringent as the other District's rules.  In early 2019, South Coast AQMD staff performed a BARCT analysis based on technological and economic feasibility, and established BARCT emission limits for equipment subject to Rule 1134. As such, Rule 1134 reflects up to date BARCT requirement, which is by definition more stringent than RACT, and provides RACT level of control for this source category.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>c</sup> This evaluation was conducted as a component of the Final Coachella Valley Extreme Area Plan for 1997 8-hour Ozone Standard and is updated here.

<sup>d</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.



**ATTACHMENT VI-A-1B  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – NOX RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies’ Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1135 <sup>b</sup>	Emissions of Oxides of Nitrogen from Electricity Generating Facilities (Amended 11/2/18)	Electricity generating facilities (EGF) have NOx emission limits at 5 ppm for boilers (at 3% O2), 2 ppm for combined cycle gas turbines, and 2.5 ppm for simple cycle gas turbines (at 15% O2) that are fired on natural gas. Internal combustion engines firing diesel limit NOx emissions at 45 ppm (at 15% O2). All NOx limits are 60 minutes average.	n/a <sup>c</sup>	Meets RACT.
1146, 1146.1	<p>Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Amended 12/4/20)</p> <p>Rule 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Amended 12/7/18)</p>	<p>Rule 1146 NOx emission limits for industrial/commercial boilers, steam generators, and process heaters ≥ 5 MMBtu/hr:</p> <ul style="list-style-type: none"> <li>• Gaseous fuel: 30 ppm</li> <li>• Non-gaseous fuel: 40 ppm</li> <li>• Landfill gas: 25 ppm</li> <li>• Digester gas: 15 ppm</li> <li>• Atmospheric units (5–10 MMBtu/hr): 12 ppm</li> <li>• Group I (≥75 MMBtu/hr burning natural gas): 5 ppm</li> <li>• Group II (≥20 &amp; &lt;75 MMBtu/hr with gaseous fuels)                             <ul style="list-style-type: none"> <li>▪ Fire-tube boilers with previous limits 5–9 ppm: 7 ppm</li> <li>▪ All other units (with previous limits 5–12 ppm): 9 ppm</li> <li>▪ All others: 5 ppm</li> </ul> </li> <li>• Group III (≥5 &amp; &lt;20 MMBtu/hr with gaseous fuels)                             <ul style="list-style-type: none"> <li>▪ Fire-tube boilers with previous limits 9–12 ppm: 7 ppm</li> <li>▪ All others: 9 ppm</li> </ul> </li> <li>• Thermal fluid heaters: 12 ppm.</li> </ul> <p>Rule 1146.1 NOx emission limits for industrial/commercial boilers, steam generators, and process heaters between 2-5 MMBtu/hr:</p> <ul style="list-style-type: none"> <li>• Landfill gas: 25 ppm</li> <li>• Digester gas: 15 ppm</li> <li>• Atmospheric units (5–10 MMBtu/hr): 12 ppm</li> <li>• Fire-tube boilers: 7 ppm</li> <li>• Natural gas units: 9 ppm</li> <li>• Thermal fluid heaters: 12 ppm</li> <li>• All other units: 30 ppm</li> </ul>	<p>San Joaquin Valley Rules 4306 and 4320 (Amended 12/17/20) require NOx limits for boilers, steam generators, and process heaters ≥ 5 MMBtu/hr. Rule 4306 Tier 2 NOx limits by 2023–2029:</p> <ul style="list-style-type: none"> <li>• Category A (&gt;5–20 MMBtu/hr):                             <ul style="list-style-type: none"> <li>▪ Thermal fluid heaters: 9 ppm</li> </ul> </li> </ul> <p>San Joaquin Valley Rule 4320 (Amended 12/17/20) provides advanced emission reduction options: (1) meet the specific NOx emission limits, (2) pay an annual emissions fee, or (3) comply with low-use provision. Rule 4320 Tier 2 NOx limits are technology-forcing limits with compliance deadline by 2023:</p> <ul style="list-style-type: none"> <li>• Category A (&gt;5–20 MMBtu/hr):                             <ul style="list-style-type: none"> <li>▪ Fire-tube boilers: 5 ppm</li> <li>▪ Thermal fluid heaters: 9 ppm</li> <li>▪ All others: 5 ppm</li> </ul> </li> <li>• Category B (&gt;20 MMBtu/hr):                             <ul style="list-style-type: none"> <li>▪ Fire-tube boilers &gt;20–75 MMBtu/hr: 2.5 ppm</li> <li>▪ All others &gt;20–75 MMBtu/hr: 2.5 ppm</li> <li>▪ All others &gt;75 MMBtu/hr: 2.5 ppm</li> </ul> </li> </ul>	<p>Rules 1146/1146.1 currently limit NOx emissions from thermal fluid heaters to 12 ppm, while Rule 4306 Tier 2 NOx limit is 9 ppm. Based on the Rules 1146/1146.1 staff report, an emission limit of 12 ppm was feasible for retrofits at the time of rule development, but an emission limit of 9 ppm is feasible for new burners upon replacement. For lowering the emission limit from 12 ppm to 9 ppm, the cost-effectiveness ranges from \$58,000 to \$523,000 per ton of NOx reduced based on the assumption of 10–90% operating capacity of the thermal fluid heaters at different heat capacity sizes. Therefore, due to high cost-effectiveness of a 9 ppm emission limit, the 12 ppm NOx emission limit in Rule 1146 series is considered the RACT level of control for the thermal fluid heaters.</p> <p>In general, the emission limits in San Joaquin Valley Rule 4320 are more stringent than those in Rule 1146 for boilers &gt;5 MMBtu/hr. The NOx limits in Rule 4320 are technology-forcing limits with an option to comply by paying an annual emission fee in lieu of meeting the limits. Because Rule 4320 provides the flexibility to comply through mitigation fees, it is not evaluated against Rule 1146, which includes mandatory emission limits. A more extensive analysis (Potential RACM 1) is included in Attachment VI-A-2 to evaluate the feasibility of these emission limits as a potential control measure.</p>

<sup>a</sup> Other agencies’ rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

**ATTACHMENT VI-A-1B**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – NOX RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1146, 1146.1 (concluded)	<p>Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Amended 12/4/20)</p> <p>Rule 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Amended 12/7/18)</p>	<p>Rules 1146/1146.1's compliance dates:</p> <ul style="list-style-type: none"> <li>• Non-RECLAIM facilities <ul style="list-style-type: none"> <li>• 12/7/18</li> <li>• 12/7/33 with a permit limit ≤ 20 ppm</li> <li>• 1/1/22 with a permit limit &gt; 20 ppm</li> </ul> </li> <li>• RECLAIM facilities <ul style="list-style-type: none"> <li>▪ 12/7/33 with a permit limit ≤ 20 ppm</li> <li>▪ 1/1/22 with a permit limit &gt; 20 ppm</li> </ul> </li> </ul>		
1146.2	Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters (Amended 12/7/18)	Applicable to natural gas-fired water heaters, boilers, and process heaters with heat rating ≤2 MMBTU/hr. As of January 1, 2010, any Type II unit between 400,000 Btu/hr and 2 MMBtu/hr is required to meet a 20 ppm NOx limit, and as of January 1, 2012, any Type I unit (except pool heaters) ≤400,000 Btu/hr is required to meet 20 ppm NOx limit. Effective January 1, 2000, new Type I units including pool heaters are required to meet the 55 ppm NOx limit, and new Type II units are required 30 ppm NOx limit.	n/a <sup>b</sup>	Meets RACT/RACM.
1147	NOx Reductions from Miscellaneous Sources (Amended 7/7/17)	<p>Multiple NOx emission limits for gas and liquid fuel fired units. For unit heat rating ≥ 325,000 Btu/hr:</p> <ul style="list-style-type: none"> <li>• Gaseous fuel-fired equipment, including burnoff furnace, incinerator with or without integrated afterburner, requires 60 ppm NOx at process temperature either below or above 1,200 degrees Fahrenheit.</li> <li>• Asphalt manufacturing operations are at 40 ppm.</li> </ul> <p>Liquid fuel fired units are set at 40 ppm at process temperature below 1,200 degrees Fahrenheit and 60 ppm above 1,200 degrees Fahrenheit.</p>	n/a <sup>b</sup>	Meets RACT.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

**ATTACHMENT VI-A-1B  
EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – NOX RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
1153.1 <sup>b</sup>	Rule 1153.1 - Emissions of Oxides of Nitrogen from Commercial Food Ovens (Amended 11/7/14)	Commercial in-use food ovens set NOx limit at 40 ppm at process temperature ≤ 500 deg F and 60 ppm at > 500 ppm.	n/a <sup>c</sup>	Meets RACT.
1179.1	Emission Reductions from Combustion Equipment at Publicly Owned Treatment Works Facilities (Adopted 10/2/20)	<p>Rule 1179.1 NOx emission limits for digester gas units at publicly owned treatment works facilities:</p> <p>1) Digester gas or dual fuel boilers/process heaters</p> <ul style="list-style-type: none"> <li>• 90% digester gas &gt;2 MMBtu/hr: 15 ppm</li> <li>• 100% natural gas &gt;2 MMBtu/hr: 9 ppm</li> <li>• 100% natural gas ≤2 MMBtu/hr: 30 ppm</li> </ul> <p>2) Turbines</p> <ul style="list-style-type: none"> <li>• 60% digester gas ≥0.3 MW: 18.8 ppm</li> <li>• 100% natural gas, simple cycle ≥0.3 MW: 2.5 ppm</li> <li>• 100% natural gas, combined cycle ≥0.3 MW: 2 ppm</li> <li>• Digester gas/dual fuel/natural gas &lt;0.3 MW: 9 ppm</li> </ul> <p>3) Digester gas and dual fuel engines</p> <ul style="list-style-type: none"> <li>• Engines &gt;50 hp: 11 ppm</li> </ul>	San Joaquin Valley Rules 4306 and 4320 (Amended 12/17/20) require NOx limits for boilers fired on digester gas >5–20 MMBtu/hr to be at 9 ppm.	For boilers fired on digester gas, the NOx limit in Rule 1179.1 (15 ppm) is not as stringent as the limit in San Joaquin Valley Rules 4306/4320 (9 ppm). A total of 33 boilers is subject to Rule 1179.1, which is a bigger universe than San Joaquin Valley's of 2 digester gas fired units <sup>d</sup> . Based on the Rule 1179.1 staff report and vendor discussions, achieving 9 ppm is feasible for only part of the Rule 1179.1 universe. However, the emissions inventory for these digester gas fired units are small at 0.015 tpd in 2017. Due to this small emissions inventory from generally low usage units and the relatively small emission reductions, the cost-effectiveness is estimated to be \$135,000/ton to achieve 9 ppm and \$185,000/ton to achieve 12 ppm. As such, it is considered not cost effective to lower the emission limit from 15 ppm to 9 ppm for digester gas boilers in the South Coast AQMD jurisdiction, and Rule 1179.1 meets the RACT level of control.

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

<sup>b</sup> This evaluation was conducted as part of the 2020 RACT Demonstration and is included here for completeness.

<sup>c</sup> There are no analogous requirements in other air agencies that are more stringent than the South Coast AQMD rule being evaluated.

<sup>d</sup> San Joaquin Valley APCD, Appendix B Emissions Reduction Analysis for Proposed Amendments to Rule 4306 and Rule 4320, December 17, 2020.

**ATTACHMENT VI-A-1B**  
**EVALUATION OF SOUTH COAST AQMD RULES AND REGULATIONS – NOX RULES**

Rule No	Rule Title	Current Rule Requirements	Other Agencies' Rules and Federal Guidance <sup>a</sup> That Are More Stringent	RACT/RACM Evaluation (2022 AQMP)
2002	Allocations for Oxides of Nitrogen (NOx) and Oxides of Sulfur (SOx) (Amended 10/5/18)	<p>Includes facility allocations for NOx for Regional Clean Air Incentives Market (RECLAIM) facilities. Each RECLAIM facility is required to have adequate RECLAIM trading credits (RTCs) to offset its quarterly and annual NOx emissions. Emission reduction target is set by decreasing level of allocations, and these RECLAIM allocations are established and updated based on Best Available Retrofit Control Technology (BARCT) emission limits.</p> <p>RECLAIM NOx emission limits for refinery boilers, heaters, and steam generators are:</p> <ul style="list-style-type: none"> <li>• &lt;20 MMBtu/hr: 12 ppm</li> <li>• 20–40 MMBtu/hr: 9 ppm</li> <li>• &gt;40 MMBtu/hr: 2 ppm</li> </ul>	<p>San Joaquin Valley Rule 4306 (Amended 12/17/20) requires Tier 2 NOx limits for refinery boilers, steam generators, and process heaters <math>\geq</math> 5 MMBtu/hr as follows with compliance deadline by 2023:</p> <ul style="list-style-type: none"> <li>• <math>\leq</math>40 MMBtu/hr: <ul style="list-style-type: none"> <li>○ Boilers: 30 ppm &amp; 5 ppm upon replacement</li> </ul> </li> </ul> <p>San Joaquin Valley Rule 4320 (Amended 12/17/20) provides advanced emission reduction options, whereby either (1) meet the specific NOx emission limits, (2) pay an annual emissions fee, or (3) comply with low-use provision. Rule 4320 Tier 2 NOx limits for refinery units are technology-forcing limits with compliance deadline by 2023 as follows:</p> <ul style="list-style-type: none"> <li>• Boilers/process heaters &gt;5–40 MMBtu/hr: 5 ppm</li> </ul>	<p>Refinery boilers and heaters are currently regulated under the RECLAIM (Regulation XX) in the South Coast AQMD. For the units <math>\leq</math>40 MMBtu/hr, NOx emission limits are at 9–12 ppm, while San Joaquin Valley Rule 4306 NOx limits are at 30 ppm and 5 ppm upon replacement at the end of the useful life of the equipment to increase the cost-effectiveness of the requirement. Therefore, the NOx limits in Rule 2002 are more stringent than in Rule 4306 for existing units. Because Rule 4320 has an option to comply through mitigation fees, it is not evaluated against Rule 2002.</p> <p>As the RECLAIM program transitions to the command-and-control regulatory structure, refinery boilers are required to meet NOx emission limits under Rule 1109.1 (Emissions of Oxides of Nitrogen from Petroleum Refineries and Related Operations), adopted 11/5/21. Rule 1109.1 requires boilers &lt;40 MMBtu/hr to be 40 ppm on or before 7/1/22 and 5 ppm afterwards. These limits were determined from a comprehensive BARCT assessment that took both technological feasibility and cost-effectiveness into account. Lowering NOx limit for refinery boilers to 30 ppm was not cost-effective. Refer to Rules 1146 and 1146.1 for the evaluation for non-refinery units. Overall, staff concludes that South Coast AQMD's RECLAIM NOx emission limits for refinery boilers and heaters are at least as stringent as San Joaquin Valley Rule 4306, and meet RACT.</p>

<sup>a</sup> Other agencies' rules and regulations amended/adopted between March 2020 and September 2021 are included in this updated RACT/RACM evaluation.

**DRAFT 2022 AQMP**  
**APPENDIX VI-A**  
**ATTACHMENT VI-A-2**

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**ASSESSMENT OF POTENTIAL REASONABLY AVAILABLE CONTROL  
MEASURES**

## Introduction

Based on the seven-step RACM analysis as described in Appendix VI-A, a list of potential RACM for stationary sources have been identified, as shown in Attachment VI-A-2a. Detailed assessment of technological feasibility, potential emission reductions, and cost-effectiveness of each potential RACM identified are described in this attachment under “Potential RACM Assessment.” In this attachment, each potential RACM is identified as either a feasible measure or an infeasible measure.

**ATTACHMENT VI-A-2A  
POTENTIAL STATIONARY SOURCE RACM IDENTIFIED FOR THE 2022 AQMP**

Potential RACM	Title	South Coast AQMD Applicable Rule	Target Pollutant
1	Lowering NOx Emission Limits for Boilers, Steam Generators, and Process Heaters	Rule 1146	NOx
2	VOC Emission Reductions from Cooling Towers	Not applicable	VOC
3	Lowering NOx Emission Limit for Commercial Food Ovens	Rule 1153.1	NOx
4	Additional Enhancement in Reducing Existing Residential Building Energy Use	Not applicable	NOx
5	Lowering VOC Emission Limit for Gasoline Bulk Terminals	Rule 462	VOC
6	Lowering VOC Emission Limit for Auto and Light-Duty Truck Assembly	Rule 1115	VOC
7	Lowering the VOC Limits for Interior Body Sprays for Metal Container, Closure, and Coating Operations	Rule 1125	VOC

## Potential RACM Assessment

### Potential RACM 1 – Lowering NOx Emission Limits for Boilers, Steam Generators, and Process Heaters

#### Synopsis

South Coast AQMD Rule 1146 (Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters; Amended December 4, 2020) establishes NOx emission limits for boilers, steam generators, and process heaters equal to or greater than 5 million British thermal units per hour (MMBtu/hr) rated heat input capacity. San Joaquin Valley APCD Rule 4320 (Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr; Amended December 17, 2020) has more stringent NOx emission limits than South Coast AQMD Rule 1146 for boilers, steam generators, and process heaters greater than or equal to 5 MMBtu/hr. For natural gas-fired boilers between 5 and 20 MMBtu/hr, the NOx limit is 5 ppm in Rule 4320, while the corresponding NOx limits are 7 to 9 ppm via ultra-low NOx burner (ULNB) in Rule 1146. In addition, for natural gas-fired units that are greater than 20 MMBtu/hr, the NOx limit is 2.5 ppm in Rule 4320. This limit is lower than the one for South Coast, which is a NOx limit of 5 ppm via selective catalyst reduction (SCR) for natural gas burning Group I units (greater than or equal to 75 MMBtu/hr) and Group II units (greater than or equal to 20 and less than 75 MMBtu/hr). Rule 4320 has an option for facilities to pay an annual emission mitigation fee in lieu of meeting the NOx limits specified in the rule, until the NOx limits can be met. While Rule 4320 provides the flexibility to comply through mitigation fees, Rule 1146 includes mandatory emission limits.

#### Potential Emission Reduction

The 2018 baseline emissions inventory is 0.35 tpd for NOx for this source category.  
The 2031 planning baseline emissions inventory is 0.39 tpd for NOx for this source category.  
The 2032 planning baseline emissions inventory is 0.39 tpd for NOx for this source category.  
The 2037 planning baseline emissions inventory is 0.37 tpd for NOx for this source category.  
Potential emission reduction is 0.09 tpd (2037 planning baseline).

#### Technological Feasibility

NOx emissions from boilers, steam generators, and process heaters can be controlled with combustion modifications such as ULNB system or with post-combustion controls such as SCR. SCR is used to control NOx emissions from combustion sources such as boilers. It uses a precious metal catalyst that selectively reduces NOx in the presence of ammonia. However, incomplete reactions of NOx and ammonia result in emissions of unreacted ammonia (also known as ammonia slip). Depending on the type of combustion equipment utilizing SCR technology, the amount of ammonia slip can vary between less than 5 ppm when the catalyst is fresh and 20 ppm at the end of the catalyst life. SCR technology is considered to be a Best Available Retrofit Control Technology (BARCT), if cost-effective, for controlling NOx emissions from existing combustion sources such as boilers and process heaters. SCR technology is scalable and generally utilized for units greater than 10 MMBtu/hr. Based on the information obtained through vendor discussions, achieving 5 ppm NOx limit with an ULNB without SCR is feasible only for certain applications and for new installations, and an SCR system would be needed to achieve a NOx limit below 5 ppm.



The NOx emission limit specified in Rule 1146 for natural gas-fired Group I units (i.e., units greater than or equal to 75 MMBtu/hr) is 5 ppm, which is met with the use of SCR. In addition, existing permitted, natural gas-fired Group II units (i.e., units between 20 and 75 MMBtu/hr) in South Coast AQMD are equipped with SCR. Based on the information obtained through vendor discussions, it is potentially feasible for some retrofit units to meet a NOx limit of 4 ppm or less through SCR control. However, there are several technical limitations for SCR retrofits to meet 4 ppm or less, such as the age, flow, and size of the catalyst bed of the existing SCR system. Another technical limitation is a potentially higher ammonia slip may occur to achieve a lower NOx limit. The typical ammonia slip permit limit on the existing SCR system is at 5 ppm. The existing catalyst bed might not be large enough to comply with both the lower NOx limit and the 5 ppm ammonia slip permit limit. For example, NOx emissions of 2.5 ppm could be potentially feasible for some units, but the level of ammonia slip might also be higher (i.e., 10 ppm). The most significant constraint is the inadequate safety margin between the permitted limit and the actual emissions to account for fluctuations in external factors, such as ambient temperature or fuel heat input (i.e., gas Btu).

For natural gas-fired Group III units between 5 and 20 MMBtu/hr, the NOx emission limits specified in South Coast AQMD Rule 1146 are 7 to 9 ppm, which are primarily achieved through the use of ultra-low NOx burners. Based on the information obtained through vendor discussion, ULNB replacements on existing units could potentially meet 7 ppm or less and achieving the 5 ppm NOx limit without SCR is only feasible for certain applications and for new installations. Therefore, achieving a NOx limit of 5 ppm as specified in San Joaquin's rule would not be feasible and/or cost-effective for burner retrofits of all existing units.

San Joaquin Valley APCD Rule 4320's Tier 2 NOx limits require units between 5 and 20 MMBtu/hr input rating to meet 5 ppm and units with greater than a 20 MMBtu/hr input rating to meet 2.5 ppm by December 21, 2023, with an option to comply with a mitigation fee. In San Joaquin Valley, a very small subset of universe between 5 and 20 MMBtu/hr are currently permitted with a NOx emission limit of 5 ppm. In addition, only one unit is currently permitted with a NOx emission limit of 2.5 ppm, which is equipped with low NOx burners and an SCR system. According to San Joaquin Valley APCD's final draft staff report,<sup>36</sup> the 5 ppm and 2.5 ppm NOx limits in Rule 4320 may be not achievable for all units due to space limitations and economic considerations. Most affected units have typically had several layers of controls and can only reach these new limits with post-combustion controls including SCR. Therefore, both 5 ppm and 2.5 ppm NOx emission limits are rather considered technology-forcing limits and in lieu of meeting these technology-forcing limits, facility operators can pay an annual emission mitigation fee until their units become ready to comply with the limits.

Based on the staff's analysis as well as the information from San Joaquin Valley's staff report, staff concluded that achieving the emission limits of 5 ppm or lower (e.g., 2.5 ppm) is not available for all applicable units in this source category in South Coast AQMD and thus, is not a technologically feasible measure. Proposed Control Measure L-CMB-02 addresses emissions from boilers subject to Rule 1146 as part of the 2022 AQMP. Staff will continue to monitor and assess feasibility of obtaining a lower NOx limit for boilers which is to be addressed as part of L-CMB-02.

#### Economic Feasibility

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<sup>36</sup> [https://www.valleyair.org/Board\\_meetings/GB/agenda\\_minutes/Agenda/2020/December/final/13.pdf](https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/13.pdf).

To be determined once the lower emission limits become technologically feasible to be implemented for this source category.

Summary Table

This measure is deemed to be not feasible as a potential RACM because it is not technologically feasible. Feasibility of lowering NOx limit for boilers is to be addressed as part of the proposed Control Measure L-CMB-02.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	Not Feasible	0.09 tpd	TBD	No

## Potential RACM 2 – VOC Emission Reductions from Cooling Towers

Synopsis

Industrial cooling towers are used to remove large amounts of heat absorbed in the circulating cooling water systems at power plants, petroleum refineries, petrochemical plants, natural gas processing plants, and a wide variety of industrial operations. Atmospheric emissions from cooling towers consist of fugitive VOC and gases stripped from the cooling water as the air and water come in contact. U.S. EPA’s AP-42 (Compilation of Air Emissions Factors) identifies the applicable VOC control strategy for cooling towers to be the minimization of hydrocarbon leaks into cooling water systems and monitoring of cooling water for hydrocarbons.

In 2015, the Bay Area AQMD adopted amendments to Rule 11-10 (Hexavalent Chromium Emissions from All Cooling Towers and Total Hydrocarbons from Petroleum Refinery Cooling Towers) to minimize total hydrocarbon emissions through leak monitoring and repair requirements. The regulation was amended again in 2018 to modify and clarify leak monitoring, action, and reporting requirements consistent with the provisions of an Enforcement Agreement. Under Rule 11-10, a leak is determined by sampling the cooling tower water at each cooling tower return line and/or at each heat exchanger exit line prior to exposure to air. Sampling frequency is based on the cooling tower recirculation rate but is generally once per week. However, this can be reduced if sampling results are below the leak action level for a specified consecutive time period. The leak action level threshold is 84 ppb, by weight (as methane) in the cooling tower water for existing units in operation prior to July 1, 2016 and 42 ppb, by weight (as methane) for new or modified cooling towers.

Rule 11-10 also allows use of a continuous hydrocarbon analyzer to monitor hydrocarbon concentrations. The leak action level threshold for stripped air as measured by a continuous hydrocarbon analyzer (or an alternative method approved by the Air Pollution Control Officer) is 6 ppm, by volume (as methane). Rule 11-10 specifies that if the hydrocarbon concentrations exceed any leak action level, the facility is required to minimize the leak within seven days and conduct leak repair or removal of the defective piece of equipment from service within 21 calendar days after identification the leak. A delay in the completion of a leak beyond 21 days must meet the criteria included in 40 Code of Federal Regulations (CFR) 63.654(f)-(g) of the U.S. EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart CC for Petroleum Refineries

(MACT<sup>37</sup> CC). Additionally, Rule 11-10 requires the facility to conduct an analysis to speciate and quantify the Toxic Air Contaminates from leaks within 72 hours of discovering the leak. Rule 11-10 also includes reporting requirements for facilities when sampling of cooling tower water exceeds an applicable leak action level. 40 CFR Section 63.654 (Heat Exchange Systems) requires refineries to conduct periodic monitoring of heat exchangers in organic hazardous air pollutant service. Section 63.654 requires leaks to be repaired as soon as practicable after discovered but no later than 45 days after detecting the leak unless the repair is not feasible. Not all refinery cooling towers are subject to the leak monitoring and repair requirements of Section 63.654.

Ten refineries and 12 other industrial facilities report VOC emissions from cooling towers under South Coast AQMD's Annual Emissions Reporting (AER) program. According to the reported emissions from the AER program in 2015 to 2020, VOC emissions from cooling towers were higher at refineries than those reported from all other industrial facilities. Refinery cooling tower VOC emissions can vary widely year to year and facility to facility. Annual cooling tower VOC emissions varied ranging from 33 to 294 tons per year in 2015 to 2020. The vast majority of cooling tower VOC emissions come from one or two refineries instead of all refineries. For example, one refinery contributed 80 percent of 149 tons of cooling tower VOC emissions in 2018, and another refinery contributed 90 percent of 294 tons of cooling tower VOC emissions in 2019. The reported cooling tower VOC emissions from refineries were less than 0.4 tons per day on a six-year average from all refineries. Cooling tower leaks have the potential to emit a large amount of VOC emissions, but they are a rare occurrence. In refineries, most of the fugitive emissions come from sources other than cooling towers, such as storage tanks and they are regulated under Rule 1178.

#### Potential Emission Reduction

The 2018 baseline emissions inventory is 0.4 tpd for VOC for this source category.

The 2031 planning baseline emissions inventory is 0.4 tpd for VOC for this source category.

The 2032 planning baseline emissions inventory is 0.4 tpd for NOx for this source category.

The 2037 planning baseline emissions inventory is 0.4 tpd for VOC for this source category.

Potential emission reduction is TBD tpd (2037 planning baseline).

#### Technological Feasibility

The potential approach is to reduce emissions by identifying leaks through frequent monitoring of cooling tower heat exchangers and frequent sampling of hydrocarbons from cooling waters and/or stripped air, by repairing leaked heat exchangers as quickly as operationally practicable, and by other control requirements. An increase in monitoring frequency and additional leak repair requirements, beyond those already required by the U.S. EPA, is feasible. In addition, matching the frequent monitoring and leak repair requirements implemented by the Bay Area AQMD is feasible.

Proposed Control Measure FUG-02 addresses emissions from refinery cooling towers. FUG-02 would be assessed in two phases. Phase I will consist of an assessment to evaluate the need for additional controls and practices that can reduce VOC emissions from industrial cooling towers. The Phase I assessment will include an emissions inventory review based on throughput information from Rule 222 registration program and AER data. The Phase I assessment will also include an evaluation of control requirements established by other jurisdictions. Evaluation of costs for purchase, installation, and operation and maintenance of the monitoring

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<sup>37</sup> Maximum Achievable Control Technology.

equipment will also be assessed. The findings from the Phase I assessment will be the basis for potential future control requirements. Phase II will be the final technical and economic feasibility analysis in conjunction with potential rule development to establish requirements for industrial cooling towers, if the results from the Phase I assessment suggest the need for controls.

Economic Feasibility

Additional monitoring and leak repair requirements have the potential to reduce excess VOC emissions. Potential emission reductions are to be determined. Costs depend on the requirements and frequency of monitoring and leak repairs. Economic feasibility will be determined as part of the rulemaking when rule development begins in the future.

Summary Table

Industrial cooling towers are already subject to federal requirements of heat exchange systems under 40 CFR 63.654. VOC emissions from cooling towers are considered fugitive emissions. Based on the AER data from 2015 to 2020, the emissions inventory varied largely year to year and facility to facility. Technological feasibility, as well as potential emission reductions and costs, would be addressed in the proposed Control Measure FUG-02.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	Feasible	TBD	TBD	TBD

## Potential RACM 3 – Lowering NOx Emission Limit for Commercial Food Oven

Synopsis

South Coast AQMD Rule 1153.1 (Emissions of Oxides of Nitrogen from Commercial Food Ovens) was adopted on November 7, 2014 and approved in the SIP on December 28, 2016. Rule 1153.1 targets to reduce NOx emissions from gaseous and liquid fuel-fired combustion equipment, and applies to in-use ovens, dryers, smokers, and dry roasters with NOx emissions from fuel combustion that are used to prepare food or products for making beverages for human consumption. As part of the SIP approval, the U.S. EPA prepared a Technical Support Document (TSD) that reviewed the State’s submittal, outlined the applicable Clean Air Act requirements, and provided evaluation and recommended actions. The TSD for Rule 1153.1<sup>38</sup> included a recommendation to consider adopting a lower NOx limit similar to the limit in San Joaquin Valley APCD Rule 4309 during the next rule amendment. San Joaquin Valley APCD Rule 4309 (Dryers, Dehydrators, and Ovens; Amended December 15, 2005) includes a NOx limit of 4.3 ppm at 19 percent oxygen for applicable units, which is more stringent than the requirement in South Coast AQMD Rule 1153.1 (60 ppm at 3 percent oxygen,

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<sup>38</sup> U.S. EPA, Technical Support Document for South Coast AQMD Rule 1153.1, August 2016. Available at: <https://www.regulations.gov/document/EPA-R09-OAR-2016-0444-0003>.

equivalent to 6.5 ppm at 19 percent oxygen) for units run at temperatures greater than 500 degrees Fahrenheit. San Joaquin Valley Rule 4309 applies to any dryer, dehydrator, or oven that is fired on gaseous fuel and/or liquid fuel and is 5.0 MMBtu/hr or greater. Units used to bake or fry food for human consumption are exempt from the rule requirements. Therefore, Rule 4453.1 and Rule 4309 are not compared in the same manner. However, a similar combustion technology may still be used and thus, this potential RACM is included in the assessment.

#### Potential Emission Reduction

The 2018 baseline emissions inventory is 0.2 tpd for NO<sub>x</sub> for this source category.

The 2031 planning baseline emissions inventory is 0.23 tpd for NO<sub>x</sub> for this source category.

The 2032 planning baseline emissions inventory is 0.23 tpd for NO<sub>x</sub> for this source category.

The 2037 planning baseline emissions inventory is 0.23 tpd for NO<sub>x</sub> for this source category.

Potential emission reduction is to be estimated during rule amendment process.

#### Technological Feasibility

There are six RECLAIM facilities and 92 non-RECLAIM facilities that operate permitted food ovens, dryers, smokers, or dry roasters, and the number of permitted equipment units is 237 (66 units at RECLAIM facilities and 171 units at non-RECLAIM facilities). Amendments to Rule 1153.1 are currently underway and staff gathering information for rule development. As part of the rule amendment, a BARCT assessment will be conducted for each equipment category and fuel type to evaluate the technological and economic feasibility of lowering the NO<sub>x</sub> limit. BARCT assessment has two main components – one is technology assessment and the other is cost-effectiveness and incremental cost-effectiveness analyses. Elements of technology assessment include assessments of South Coast AQMD regulatory requirements, emission limits of existing units, other regulatory requirements, and pollution control technologies. And then, cost-effectiveness and incremental cost-effectiveness analyses are conducted to propose a BARCT emission limit of NO<sub>x</sub> that is cost-effective. Results of BARCT analysis will be shared at the future working group meetings.

#### Economic Feasibility

Economic feasibility is to be determined through upcoming BARCT assessment.

#### Summary Table

Amendments to Rule 1153.1 are currently underway. As part of the rule amendment, a BARCT assessment will be conducted for each equipment category and fuel type to evaluate the technological and economic feasibility of lowering the NO<sub>x</sub> limits in the rule. The feasibility of lowering the NO<sub>x</sub> limit for units run at temperatures greater than 500 degrees Fahrenheit will be determined as part of the BARCT assessment, which is expected to take place in summer 2022.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	TBD	TBD	TBD	TBD

## Potential RACM 4 – Additional Enhancement in Reducing Existing Residential Building Energy Use

### Synopsis

Commercial and residential buildings account for nearly 70 percent of California’s electricity consumption and 55 percent of its natural gas consumption.<sup>39</sup> Residential buildings produce roughly two-thirds of the State’s building emissions, while commercial buildings produce approximately one-third. Existing buildings provide a significant opportunity to reduce overall energy use, save money, improve air quality, and cut greenhouse gas emissions. Strategies to improve energy efficiency, maximize use of clean energy, optimize demand flexibility, and accelerate building electrification provide pathways to achieve California’s near-term and long-term climate and air quality goals while saving money over time. This control measure seeks emission reductions from unregulated residential appliances and reductions from incentive programs to replace older, low energy efficiency appliances with newer, high energy efficiency appliances with zero emission and low NOx technologies.

Residential incentive programs include weatherization, upgrading older appliances with high-efficiency technologies, and renewable energy sources to reduce energy use for water heating, lighting, cooking, and other large residential energy sources. In the 2016 AQMP, the costs for these residential energy incentive programs were estimated at \$230 to \$700 million to reduce emissions by 2.1 tons per day by 2031. Due to high cost, this control measure was rejected as RACM for the 2016 AQMP. This evaluation aims to re-assess the potential to reduce NOx emission from reducing energy use in existing buildings, especially focusing on residential building water heating, space heating, and cooking sources. Heating (water and space) and cooking sources combined contribute 64 percent to the 2018 NOx emissions from residential fuel combustion.

### Potential Emission Reduction

The 2018 baseline emissions inventory is 15.35 tpd for NOx for this source category.

The 2031 planning baseline emissions inventory is 5.73 tpd for NOx for this source category.

The 2032 planning baseline emissions inventory is 5.6 tpd for NOx for this source category.

The 2037 planning baseline emissions inventory is 5.16 tpd for NOx for this source category.

Potential emission reduction is 3.3 tpd (2037 planning baseline).

### Technological Feasibility

Residential gas appliances including gas water heaters, gas furnaces, or gas cooktops account for the majority of direct emissions within the residential combustion sector. These appliances are considered durable goods and many appliances often last one or two decades before needing replacement. Energy efficient appliances alone or in conjunction with zero emission or low NOx technologies could result in significant emission reductions. For example, electric residential appliances such as heat pumps or induction cooktops are readily available zero emission or low NOx technologies. Also, heat pump water or space heaters are more energy efficient than conventional gas water heaters or gas furnaces. Likewise, induction cooktops are more energy efficient than gas or electric cooktops. In addition, weatherization of existing residential buildings is feasible.

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<sup>39</sup> <http://calenergycommission.blogspot.com/2018/07/building-energy-use-program-changing.html>.

Thus, it is technologically feasible to reduce emissions using energy efficient and lower (or zero) emitting appliances in residential buildings.

#### Economic Feasibility

Implementation costs vary widely depending on the existing infrastructure. Retrofitting existing residential buildings to more energy efficient homes involve costs of replacing existing low-efficiency natural gas or electric appliances for heating/cooling, cooking, and clothes drying with high-efficiency gas or electric appliances (e.g., heat pumps or induction cooktops). The cost to install a new energy efficient heat pump varies depending on the size, efficiency rating, brand, and sources (air-to-air, water-to-air, geothermal, dual fuel/hybrid, mini-split, or solar), but is approximately \$4,000 to \$8,000 for an average home using a 3 to 4 ton unit.<sup>40</sup> Modifications to existing electrical infrastructure (e.g., electric panel upgrade) may be needed to accommodate energy efficient appliances. The most common type of heat pump water heater or add-on electric heat pump for dual-fuel and hybrid Heating, Ventilation, and Air Conditioning (HVAC) system requires a dedicated 240-volt outlet. It generally costs about 150 dollars to add a dedicated 240-volt outlet. In addition, an estimated 50 percent of existing single-family homes in California were built before California Building Energy Efficiency Standards went into effect in 1970s.<sup>41</sup> These older homes tend to have electric panels that are less than 150 amperes. Electric panel upgrades may be needed for older homes due to the additional amperage added by certain zero-emission appliances, which can cost a couple thousand dollars.<sup>42</sup> Rewiring may also be needed. Rewiring cost depends on the home's size and the wiring accessibility and the cost to rewire a house is about \$2 to \$4 per square foot. Additional costs apply for an add-on or ductwork. It is estimated that the infrastructure cost could vary widely depending on the age, size, and existing electrical infrastructure in the residential buildings. The cost of utility is potentially another contributing factor for costs, and the incremental costs vary depending on the type of appliances, the utility rates, and whether solar panels are installed.

While it could be cost effective for certain newer homes to replace their gas appliances to zero emissions energy efficient appliances at the end of the equipment life, the potential cost for infrastructure upgrades could be high in existing residential homes that are older and electrical upgrades are needed.

#### Summary Table

From a regulatory standpoint, South Coast AQMD regulates NO<sub>x</sub> emissions from space heaters in Rule 1111 and water heaters in Rule 1121. Rule 1111 applies to residential and commercial fan-type central furnaces for heating with a rated heat input capacity of less than 175,000 Btu/hr, or for combined heating and cooling units, a cooling rate of less than 65,000 Btu/hr. The NO<sub>x</sub> emission limits for residential home appliances are

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<sup>40</sup> <https://homeguide.com/costs/heat-pump-cost>.

<sup>41</sup> <https://www.energy.ca.gov/data-reports/reports/building-decarbonization-assessment>.

<sup>42</sup> Residential Building Electrification in California: Consumer economics, greenhouse gases and grid impacts, Energy and Environmental Economics, Inc. April 2019.



14 nanograms per Joule (ng/J) for natural gas-fired furnaces<sup>43</sup> and 10 ng/J for natural gas-fired water heaters,<sup>44</sup> respectively. In other words, no other air districts have adopted rules that are more stringent than South Coast AQMD’s rules for residential appliances. Considering the costs of retrofits described above, this potential RACM is not considered as reasonably available for this source category due to the as the average cost is too high. However, the 2022 AQMP includes control measures for the residential combustion equipment, which targets to reduce NOx emissions from residential buildings. CARB’s draft State SIP Strategy has a measure targeting space heating and water heating in residential and commercial buildings. This measure will be implemented in coordination with the State’s effort. Potential approaches include a combination of regulatory approaches for new zero emission residential appliances (e.g., water heaters, space heaters, cooking devices, etc.) and use of incentives to encourage purchase of zero emission appliances.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	Feasible	3.3 tpd	Cost may be higher than RACT measure	No

## Potential RACM 5 – Lowering VOC Emission Limit for Gasoline Bulk Terminals

### Synopsis

Bay Area AQMD, Regulation 8, Rule 33 (Amended April 15, 2009) regulates VOC emissions from vapor recovery systems used at gasoline bulk loading terminals with an emission limit of 0.04 pounds per 1,000 gallons of organic liquid loaded for storage tanks over 250 gallons. The limit in South Coast AQMD Rule 462 (Organic Liquid Loading; Amended May 14, 1999) is 0.08 pounds per 1,000 gallons of liquid loaded for a Class A facility loading 20,000 gallons or more on any one day. Rule 462 regulates emissions from additional sources, including chemical plants that load organic liquid with a vapor pressure above 1.5 psia. Lowering the emission limit from 0.08 to 0.04 pounds per 1,000 gallons of liquid loaded for gasoline bulk terminals is evaluated as a potential RACM.

### Potential Emission Reduction

The 2018 baseline emission inventory is 0.34 tpd for this source category.  
 The 2031 planning baseline emission inventory is 0.26 tpd for this source category.  
 The 2032 planning baseline emission inventory is 0.26 tpd for this source category.

<sup>43</sup> Rule 1111 (Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces; Amended October 1, 2021).

<sup>44</sup> Rule 1121 (Control of Nitrogen Oxides from Residential Type, Natural Gas-Fired Water Heaters; Amended September 3, 2004).

The 2037 planning baseline emission inventory is 0.24 tpd for this source category. Potential emission reduction is 0.17 tpd.

#### Technological Feasibility

Rule 462 requires a CARB-certified vapor recovery system required for major source gasoline bulk loading terminals transferring gasoline into any truck, trailer, or railroad tank car. The transfer equipment is operated and maintained to ensure that there is no overfills, facility vapor leaks, liquid leaks, or liquid leaks from connect/disconnect operations. The backpressure at the cargo tank/vapor hose interface shall not exceed 18.0 inches of water column during product loading operations. Bay Area AQMD's Regulation 8, Rule 33 requires that a gasoline bulk terminal liquid fill connector, vapor hose connector, or pressure/vacuum valve shall be vapor leak free, meaning no leak vapor in excess of 3,000 ppm (expressed in methane) or 6 percent of the Lower Explosive Limit (LEL), measured according to the procedures set in CARB TP-204.3, Determination of Leak(s). Bay Area AQMD's Rule 33 requires a vapor recovery system to emit no more than 0.04 pounds of VOC per 1,000 gallons of organic liquid loaded at gasoline bulk terminals and has leak free vapor recovery system requirements in place. The current vapor recovery technology to reduce VOC emissions from bulk loading terminals is a feasible technology achieved in practice.

#### Economic Feasibility

Reducing the emission rate from 0.08 to 0.04 pounds per 1,000 gallons could cost between \$100,000 for modifications to the vapor recovery control device and several millions of dollars to replace the control device. Using the 2018 Annual Emissions Reporting (AER) data, all 23 major source bulk loading terminals meet the Rule 462 limit of 0.08 pounds per 1,000 gallons of liquid loaded. The VOC emission rates reported by 22 terminals ranged from 0.018 to 0.034 pounds per 1,000 gallons of liquid loaded, and one bulk loading terminal reported a VOC emission rate of 0.051 pounds per 1,000 gallons of liquid loaded, which is higher than the proposed rate of emission.

Cost-effectiveness was calculated using two different scenarios. The first scenario determines emission reductions based on the VOC emission rate of 0.08 pounds per 1,000 gallons required in Rule 462, and the second scenario determines emission reductions based on the actual emission rates reported by the terminals. In the first scenario, the potential VOC emission reductions are 0.17 tons per day when reducing the emission rate from the current limit of 0.08 to the proposed 0.04 pounds per 1,000 gallons of organic liquid loaded. A major modification to the existing vapor recovery control device was assumed to be needed at an average cost of \$3 million per terminal. Annualized over a 10-year period, cost-effectiveness is calculated to be over \$110,000 per ton of VOC reduced in this case. For the second scenario, the actual emission rates reported by the terminals are used to determine emission reductions. Majority of the terminals reported emission rates below the limit of 0.04 pounds per 1,000 gallons of liquid loaded. As the reported emission rates are calculated on an annual average basis in the AER and the operational emission rates could be higher than the reported rates due to operational variability, it is assumed that all 23 terminals would need minor modifications to their existing vapor recovery control devices to meet the lower limit in the rule. Therefore, a minor modification cost of \$100,000 was used for the applicable terminals. Annualized over a 10-year period, the cost-effectiveness is calculated to be over \$250,000 per ton of VOC reduced. Based on the cost effectiveness calculations described above, this control measure is considered not cost-effective and thus, not a potential RACM for the 2015 8-hour ozone standard.

#### Summary Table

The current vapor recovery technology to reduce VOC emissions from bulk loading terminals is a feasible technology achieved in practice. However, this control measure is not cost-effective and thus, is not a feasible measure for potential RACM.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	Feasible	0.17 tpd	Not feasible	No

## Potential RACM 6 – Lowering VOC Emission Limits for Auto and Light-Duty Truck Assembly

### Synopsis

South Coast AQMD Rule 1115, last amended in 1995, is not as stringent as the U.S. EPA’s 2008 CTG for Auto and Light-Duty Truck Assembly for several coatings and products for facilities emitting greater than 15 pounds per day. The U.S. EPA’s CTG has more stringent limits for electrophoretic primer at 84 grams per liter (145 grams per liter in Rule 1115); spray primer, primer-surfacer, and topcoat at 1,440 grams per liter (1,800 grams per liter in Rule 1115); and trunk coatings, interior coatings, sealers, and deadeners at 650 grams per liter (Rule 1115 provides an exemption for these categories). Since the 2014 RACT analysis, new light-duty motor vehicle manufacturing facilities are operating in the South Coast Air Basin that are also subject to this CTG. As part of the 2020 RACT, South Coast AQMD staff committed to amend Rule 1115 to address the U.S. EPA’s CTG requirements. Amendments to Rule 1115 were adopted in March 2022 to meet the VOC limits recommended by the 2008 CTG, which includes lowering the current VOC limit of 15 pounds/gallon of deposited solids to 12 pounds/gallon of deposited solids for any spray primer, primer surfacer or topcoat in any vehicle assembly line processes.

### Potential Emission Reduction

The 2018 baseline inventory is 0.036 tpd for VOC for this source category.  
 The 2031 planning baseline inventory is 0.039 tpd for VOC for this source category.  
 The 2032 planning baseline inventory is 0.039 tpd for VOC for this source category.  
 The 2037 planning baseline inventory is 0.041 tpd for VOC for this source category.  
 No potential VOC emission reduction is anticipated with this source category.

### Technological Feasibility

Lower VOC content reformulations for electrophoretic primer and trunk coating already exist. Within the jurisdiction of the South Coast AQMD, nine facilities were identified that would be subject to Rule 1115. During site visits, staff noted that operators at the nine affected facilities are already using coatings that would meet the proposed lowered VOC emission limits and using an equivalent high volume low pressure (HVL) or better transfer-efficient application method. Thus, it is considered technologically feasible to meet the emission limits in the 2008 EPA CTG for Auto and Light-Duty Truck Assembly. In addition to using coatings compliant to Proposed amendments to Rule 1115, facilities that used high volumes of coatings had already installed emissions control equipment to reduce the overall amount of emissions emitted from the facility, including thermal oxidizers. Thermal oxidizers destroy VOC emissions through incineration and usually operate with a

90 percent or greater destruction efficiency. The net effect on the lower VOC content of a coating, along with the use of thermal oxidizer, is a significant reduction of VOCs on a per gallon basis.

Economic Feasibility

Although amendments to Rule 1115 propose to lower the VOC emission limits for coatings used in the motor vehicle assembly line and to include VOC emission limits for miscellaneous materials used at motor vehicle assembly coating operations, there are no anticipated emissions reductions or costs associated with meeting the proposed VOC limits in Rule 1115 because operators are already using coatings that would meet the proposed lowered VOC emission limits and using an equivalent high volume low pressure (HVLP) or better transfer-efficient application method. It is also noted that compliant coatings are sold by different manufacturers. Thus, the coatings manufacturing industry can provide viable and compliant material without incurring additional production costs to comply with proposed amendments to Rule 1115.

Summary Table

This control measure is technologically feasible. Emission reductions or costs associated are expected to be negligible because operators are already using coatings that would meet the proposed lowered VOC emission limits. As such, this control measure is considered a feasible measure for potential RACM.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	Feasible	Negligible	Feasible	Yes

**Potential RACM 7 – Lowering VOC Limit for Can Interior Body Sprays**

Synopsis

Rule 1125 (Metal Container, Closure, and Coil Coating Operations; Amended 3/7/08) limits the emissions of VOC from coating operations in manufacturing and/or reconditioning of metal cans, drums, pails, lids, and closures. The rule also applies to coating of the surface of flat metal sheets, strips, rolls, or coils. The analogous rules in San Joaquin Valley APCD (Rule 4604 - Can and Coil Coating Operations; Amended 9/20/07) and Bay Area AQMD (Rule 8-11 – Metal Container, Closure and Coil Coating; Amended 11/19/97) have lower emission limits for three-piece can interior body sprays (360 g/L versus 510 g/L in South Coast AQMD) and two-piece can interior body sprays (420 g/L versus 440 g/L in South Coast AQMD). They also have VOC limits and definition of the category of exterior body spray that is not included in Rule 1125.

Potential Emission Reduction

The 2018 baseline inventory is 0.007 tpd for VOC for this source category.  
 The 2031 summer planning baseline inventory is 0.009 tpd for VOC for this source category.  
 The 2032 summer planning baseline inventory is 0.009 tpd for VOC for this source category.  
 The 2037 summer planning baseline inventory is 0.008 tpd for VOC for this source category.  
 Potential VOC emission reduction is 0.0003 tpd.

Technological Feasibility

Lower VOC content reformulations for three- and two-piece can interior body sprays exist, but current usage is known to be very limited. As such, while not known, potential future usage is not anticipated to substantially increase. Three- and two-piece can interior body sprays usage is a subset of the overall can, coil, metal parts, and products coatings inventory, and so, no substantial change is anticipated. Regardless, there is potential technological feasibility because the other air districts have identified known uses at lower VOC content limits.

Economic Feasibility

To meet the lower VOC limits, four existing facilities subject to Rule 1125 could potentially be required to change their coating operations. This would involve approximately a year-long process to test multiple new coating formulation in the spray lines, conduct performance testing of new coatings, as well as training of technicians for proper application. Thus, the costs to successfully implement new coating limits for the affected coatings would include product capital costs, substrate costs, and labor costs to test for quality assurance and training. The labor cost would be based on a professional level rate since educated and experienced workers would be necessary. Staff estimates the cost-effectiveness is approximately \$260,000 per ton based on the cost to fully implement the testing and transition compared to achieve very low VOC emission reductions given the small inventory of these coatings. Thus, this potential RACM is considered not cost-effective.

Summary Table

The potential emission reduction from this control measure is less than 0.001 tons per day. Given the small reductions and the potential cost with implementation, this control measure is rejected as RACM due to economic infeasibility.

	<b>Technological Feasibility</b>	<b>Emission Reduction</b>	<b>Economic Feasibility</b>	<b>Feasible Measure</b>
RACM for 8-hour Ozone	Potentially feasible	0.0003 tpd	Not feasible	No

## Summary of Potential RACM Assessment

A total of seven control measures were assessed for technological feasibility and cost-effectiveness as part of RACM assessment. The potential RACM assessment is summarized in Attachment VI-A-2b. One control measure (Potential RACM 6 – Lowering VOC Emission Limits for Auto and Light-Duty Truck Assembly) is considered as a feasible measure as potential RACM. One potential RACM (Potential RACM 1 - Lowering NOx Emission Limits of Rule 1146 for Boilers, Steam Generators, and Process Heaters) is deemed infeasible because the proposed NOx emission limit is technology forcing and not readily available for the source category. Three measures (potential RACM 4, 5, and 7) are considered not feasible because they are found to be not cost-effective to implement. For the remaining two measures (potential RACM 2 and 3), the feasibility will be determined as part the rulemaking process. For potential RACM 2, technological feasibility, as well as potential emission reductions and costs, would be addressed in the proposed Control Measure FUG-02. For potential RACM 3, amendments to Rule 1153.1 are currently underway. As part of the rule amendment, a BARCT assessment will be conducted for each equipment category and fuel type to evaluate the technological and

economic feasibility of lowering the NOx limits in the rule. The feasibility of lowering the NOx limit for units run at temperatures greater than 500 degrees Fahrenheit will be determined as part of the BARCT assessment.

**ATTACHMENT VI-A-2B**  
**SUMMARY OF POTENTIAL RACM ASSESSMENT**

Potential RACM	Title	Target Pollutant	Feasible Measure	Reason
1	Lowering NOx Emission Limits for Boilers, Steam Generators, and Process Heaters	NOx	No	Technologically not feasible
2	VOC Emission Reductions from Cooling Towers	VOC	TBD	Pending technology assessment
3	Lowering NOx Emission Limit for Commercial Food Ovens	NOx	TBD	Rulemaking underway
4	Additional Enhancement in Reducing Existing Residential Building Energy Use	NOx	No	Cost may be higher than RACT measure
5	Lowering VOC Emission Limit for Gasoline Bulk Terminals	VOC	No	Economically not feasible
6	Lowering VOC Emission Limits for Auto and Light-Duty Truck Assembly	VOC	Yes	Not applicable
7	Lowering the VOC Limit Can Interior Body Sprays	VOC	No	Economically not feasible

**DRAFT 2022 AQMP**  
**APPENDIX VI-A**  
**ATTACHMENT VI-A-3**

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**CARB'S REASONABLY AVAILABLE CONTROL MEASURES FOR  
MOBILE SOURCES**



## Ozone Reasonable Available Control Measures Assessment – State Sources

The Clean Air Act (CAA) requires the implementation of all reasonably available control measures (RACM) as expeditiously as practicable and shall provide for attainment of the air quality standards. This section demonstrates that for the 70 parts per billion (ppb) 8-hour ozone standard, California’s mobile source and consumer products measures meet the RACM requirement in the South Coast Air Basin.

### RACM Requirements

U.S. EPA has interpreted RACM to be those emission control measures that are technologically and economically feasible and when considered in aggregate, would advance the attainment date by at least one year. Section 172(c)(1) of the CAA requires State Implementation Plans (SIPs) to provide for the implementation of RACM as expeditiously as practicable. Given the severity of California’s air quality challenges, CARB has implemented the most stringent mobile source emissions control program in the nation. CARB’s comprehensive strategy to reduce emissions from mobile sources includes stringent emissions standards for new vehicles, in-use programs to reduce emissions from existing vehicle and equipment fleets, cleaner fuels that minimize emissions, and incentive programs to accelerate the penetration of the cleanest vehicles beyond that achieved by regulations alone. Taken together, California’s mobile source program meets RACM requirements in the context of ozone nonattainment.

To ensure it continue to meet RACM requirements and achieve its emissions reductions goals in the future, California continues to develop new programs and regulations to strengthen its overall mobile source program and to achieve new emissions reductions from mobile sources.

### RACM For Mobile Sources

#### Waiver Approvals

While section 209 of the CAA preempts other states from adopting emission standards and other emission-related requirements for new motor vehicles and engines that differ from the federal standards set by U.S. EPA, the CAA provides California with the ability to seek a waiver or authorization from the federal preemption clause in order to enact emission standards and other emission-related requirements for new motor vehicles and engines, as well as new and in-use off-road vehicles and engines<sup>45</sup> – provided that the California standards are at least as protective as applicable federal standards.

Over the years, California has received waivers and authorizations for over 100 regulations. The most recent California standards and regulations that have received waivers and authorizations are: the Advanced Clean Cars (ACC) regulations for light-duty vehicles (including the Zero Emission Vehicle (ZEV) and the Low Emission Vehicle III (LEV III) regulations); the On-Board Diagnostics (OBD) regulation; the Heavy-Duty Idling, Malfunction and Diagnostics System Regulation; the In-Use Off-Road Diesel Fleets Regulation; the Large Spark

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<sup>45</sup> Locomotives and engines less than 175 horsepower (hp) used in farm and construction equipment are exempt from California’s waiver authority.

Ignition (LSI) Fleet Regulation; and the Mobile Cargo Handling Equipment (CHE) regulation. Further, CARB has recently submitted waiver requests for: the Advanced Clean Transit (ACT) regulation; the Zero Emission Airport Shuttle Buses Regulation; the Zero Emission Powertrain Certification Regulation, and the Heavy-Duty Omnibus Regulation. Other authorizations include the Off-Highway Recreational Vehicles and the Portable Equipment Registration Program (PERP).

Additionally, CARB obtained an authorization from U.S. EPA to enforce adopted emission standards for off-road engines used in yard trucks and two-engine sweepers. CARB adopted the off-road emission standards as part of its “Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles,” (Truck and Bus Regulation). The bulk of the regulation applies to in-use heavy-duty diesel on-road motor vehicles with a gross vehicle weight rating in excess of 14,000 pounds, which are not subject to preemption under section 209(a) of the CAA and do not require a waiver under section 209(b).

The waiver and authorizations California has received are integral to the success and stringent emission requirements that characterize CARB’s mobile source program. Due to California’s unique waiver authority under the CAA, no other state or nonattainment area has the authority to promulgate mobile source emission standards at levels that are more stringent than the federal standards. Other states can elect to match either the federal standards or the more stringent California standards. As such, no state or nonattainment area has a more stringent suite of mobile source emission control programs than California, implying a de-facto level of control that at least meets, if not exceeds, RACM.

### CARB’s Mobile Source Controls

CARB’s current mobile source control program, along with efforts at the local and federal level, have been tremendously successful in reducing emissions of air pollutants, resulting in significantly cleaner vehicles and equipment in operation today.

CARB is developing its 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy)<sup>46</sup> through a multi-step measure development process, including extensive public consultation, to develop and evaluate potential strategies for mobile source categories under CARB’s regulatory authority that could contribute to expeditious attainment of the 70 ppb 8-hour ozone standard (70 ppb ozone standard), as well as supporting attainment for the other national and State air quality standards. This effort builds on the measures and commitments already made in the 2016 State SIP Strategy, and expands on the scenarios and concepts included in the 2020 Mobile Source Strategy, CARB’s multi-pollutant planning effort that identifies the pathways forward to achieve the State’s many air quality, climate, and community risk reduction goals.

With the 2022 State SIP Strategy, CARB is exploring and proposing an unprecedented variety of new measures to reduce emissions from the sources under our authority using all mechanisms available. The proposed measures included in the Draft 2022 State SIP Strategy encompass actions to establish requirements for cleaner technologies (both zero emissions and near zero emissions), deploy these technologies into the fleet, and to accelerate the deployment of cleaner technologies through incentives.

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<sup>46</sup> CARB 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy)

<https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy>.

## Light- and Medium-Duty Vehicles

Since setting the nation's first motor vehicle exhaust emission standards in 1966 that led to the first pollution controls, California has dramatically tightened emission standards for light-duty vehicles. Through CARB regulations, today's new cars pollute 99 percent less than their predecessors did thirty years ago. In 1970, CARB required auto manufacturers to meet the first standards to control NO<sub>x</sub> emissions along with hydrocarbon emissions, which together form smog. The simultaneous control of emissions from motor vehicles and fuels led to the use of cleaner-burning gasoline that has removed the emissions equivalent of 3.5 million vehicles from California's roads.

Light- and medium-duty vehicles are currently regulated under California's Advanced Clean Cars (ACC) program, which includes the Low Emission Vehicle III (LEV III) and Zero Emission Vehicle (ZEV) programs. The ACC program combines the control of smog, soot-causing pollutants, and greenhouse gas emissions into a single coordinated package of requirements for model years 2015 through 2025. Since first adopted in 1990, CARB's LEV I and LEV II, and the ZEV Programs have resulted in the production and sales of hundreds of thousands of ZEVs in California. Advanced Clean Cars 2 (ACC2), a measure in the 2016 State SIP Strategy, is a significant effort critical to meeting air quality standards and will be finalized this year. ACC2 has the goal of cutting emissions from new combustion vehicles while taking all new vehicle sales to 100 percent zero emission no later than 2035.

For passenger vehicles, the 2022 State SIP Strategy includes actions to increase the penetration of ZEVs by targeting ride-hailing services offered by transportation network companies through the Clean Miles Standard regulation in order to reduce GHG and criteria pollutant emissions, and promote electrification of the fleet. For motorcycles, the 2022 State SIP Strategy proposes more stringent exhaust and evaporative emissions standards along with zero emissions sales thresholds. The primary goal of the On-Road Motorcycle New Emissions Standard measure is to reduce emissions from new, on-road motorcycles by adopting more stringent exhaust and evaporative emissions standards along with zero emissions sales thresholds.

CARB is also active in implementing in-use programs for owners of older dirtier vehicles to retire them early. The "car scrap" programs, like Clean Cars 4 All and Clean Vehicle Rebate Project provide monetary incentives to replace old vehicles with zero emission vehicles. The Moyer Program a voluntary incentive program to fund clean vehicles. Other California programs and goals such as the 2012 Governor's Executive Order to put 1.5 million zero emission vehicles on the road by 2025 and will produce substantial and cost-effective emission reductions from the light-duty vehicle sector.

Taken together, California's emission standards, fuel specifications, and incentive programs for on-road light- and medium-duty vehicles represent all measures that are technologically and economically feasible within California.

## Heavy-Duty Vehicles

California's heavy-duty vehicle emissions control program includes requirements for increasingly stringent new engine emission standards and addresses vehicle idling, certification procedures, on-board diagnostics, emissions control device verification, and in-use measures to ensure that emissions from the existing vehicle fleet remain adequately controlled. Taken together, the on-road heavy-duty vehicle program is designed to achieve an on-road heavy-duty diesel fleet with 2010 engines emitting 98 percent less NO<sub>x</sub> and PM<sub>2.5</sub> than trucks sold in 1986.

Other significant in-use control measures CARB has in place include: the On-Road Heavy-Duty Diesel Vehicle (In-Use) Regulation; the Drayage (Port or Rail Yard) Regulation; the Public Agency and Utilities Regulation; the Solid Waste Collection Vehicle Regulation; the Heavy-Duty (Tractor-Trailer) Greenhouse Gas (GHG) Regulation, the Airborne Toxic Control Measures (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling; the Heavy-Duty Diesel Vehicle Inspection Program; the Periodic Smoke Inspection Program (PSIP); the Fleet Rule for Transit Agencies; the Lower Emission School Bus Program; and the Heavy-Duty Truck Idling Requirements.

In 2013, California recognized the heavy-duty engines could be cleaner and established optional low NOx standards for heavy-duty diesel engines (Optional Reduced Emissions Standards for Heavy-Duty Engines regulation), with the most aggressive standard being 0.02 grams per brake horsepower-hour (g/bhp-hr), 90 percent below the 2010 federal standard. Further, in 2021, CARB adopted the Heavy-Duty Engine and Vehicle Omnibus Regulation (Omnibus Regulation) which made the 0.02 g/bhp-hr a mandatory standard, and comprehensively overhauled how NOx emissions from new heavy-duty engines are regulated in California. The Omnibus Regulation also includes in-use standards that significantly reduce tailpipe NOx emissions during most vehicle operating modes, and revisions to the emissions warranty, useful life, emissions warranty and reporting information and corrective action procedures, and durability demonstration procedures.

To further control emissions from the in-use fleet, CARB adopted in 2021 the Heavy-Duty Inspection and Maintenance Regulation, which requires periodic demonstration that vehicles' emissions control systems are properly functioning in order to legally operate within the State. This regulation is designed to achieve criteria emissions reductions by ensuring that malfunctioning emissions control systems are timely repaired.

In June 2020, CARB adopted the Advanced Clean Trucks regulation (ACT), a first of its kind regulation requiring medium- and heavy-duty manufacturers to produce ZEVs as an increasing portion of their sales beginning in 2024. This regulation is expected to result in roughly 100,000 ZEVs by 2030 and nearly 300,000 ZEVs by 2035. Most recently in the ongoing efforts to go beyond federal standards and achieve further reductions, the Draft 2022 State SIP Strategy includes the complementary Advanced Clean Fleets measure. Through this program, CARB is developing a medium and heavy-duty zero-emission fleet regulation with the goal of achieving a zero emission truck and bus California fleet by 2045 everywhere feasible, and significantly earlier for certain market segments such as last mile delivery and drayage applications.

The Draft 2022 State SIP Strategy also proposes the Zero Emissions Trucks Measure, which would accelerate the number of zero emission heavy-duty vehicles beyond existing measures and the proposed Advanced Clean Fleets regulation. The Zero Emissions Trucks Measure was developed in response to comments from the public related to turning over heavy-duty trucks at the end of their useful life. The Zero Emissions Trucks Measure targets the replacement of older trucks in order to increase the number of heavy-duty ZEVs as soon as possible and reduces emissions from fleets not affected by the Advanced Clean Fleets measure. CARB is exploring new methods to replace older trucks, including market signal tools, that would not unduly burden low-income truckers, provide flexibility and target reductions in the areas that need it most.

In addition, CARB's significant investment in incentive programs provides an additional mechanism to achieve maximum emission reductions from this source sector. California has a variety of programs to incentive clean heavy-duty vehicles that include the Carl Moyer Air Quality Standards Attainment Program, the Hybrid and Zero Emission Truck and Bus Voucher Incentive Project, the Truck Loan Program, and AB 617 Community Air Protection Funds.

Taken together, California’s emission standards, fuel specifications, and incentive programs for on-road heavy-duty vehicles represent all measures that are technologically and economically feasible within California.

## Off-Road Vehicles and Engines

California regulations for off-road equipment include not only increasingly stringent emission standards for new off-road diesel engines, but also in-use requirements and idling restrictions. CARB has programs in place to control emissions from various new off-road vehicles and equipment. CARB also has in-use programs for off-road vehicles and equipment, including the In-Use Off-Road Diesel Fueled Fleets Regulation (Off-Road Regulation) and Large Spark-Ignition Engine Fleet Requirements Regulation, as well as incentive programs including the Clean Off-Road Equipment (CORE) Voucher Incentive Project. CARB adopted amendments to the small off-road engine regulations in December 2021, the Transport Refrigeration Unit Part 1 regulatory action in February 2022, and will be proposing the Zero Emission Off-Road Forklift regulation in the next year.

The In-Use Off-Road Diesel-Fueled Fleets Regulation (Off-Road Regulation), adopted in 2010, is an extensive program designed to accelerate the penetration of the cleanest equipment into California’s fleets, and impose idling limits on off-road diesel vehicles. The program goes beyond emission standards for new engines through comprehensive in-use requirements for legacy fleets. CARB is also including in the Draft 2022 State SIP Strategy a measure for amendments to the existing Off-Road Regulation. These amendments would create additional requirements to the currently regulated fleets by targeting the oldest and dirtiest equipment that is allowed to operate indefinitely under the current regulation’s structure, potentially through an operational ban on the oldest and dirtiest equipment and limitations on vehicles added to a fleet.

The Large Spark-Ignition (LSI) Engine Fleet Requirements Regulation applies to operators of forklifts, sweeper/scrubbers, industrial tow tractors, and airport ground support equipment (GSE). The 2006 LSI rulemaking and 2010 amendments required operators of in-use fleets to achieve specific hydrocarbon + NOx fleet average emission level standards that became more stringent over time. CARB adopted amendments to the small off-road engine (SORE) regulations in December 2021 that will accelerate the transition of SORE equipment to Zero Emission Equipment (ZEE). Deployment of ZEE is key to meeting the expected emission reductions in the 2016 State SIP Strategy.

As discussed in the 2016 State SIP Strategy, CARB is also developing new requirements to transition diesel-powered transport refrigeration unit (TRU) to zero emission technology in two phases. CARB adopted the Part 1 amendments to the existing TRU Airborne Toxic Control Measure (ATCM) in February 2022, which requires the transition of diesel-powered truck TRUs to zero emission. As discussed in the 2022 State SIP Strategy, CARB plans to develop a subsequent Part 2 regulation to require zero-emission trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets, for future Board consideration.

Additionally, the 2022 State SIP Strategy includes the proposed Tier 5 Off-Road New Compression-Ignition Engine Standards measure to reduce NOx and PM emissions from new, off-road compression-ignition engines by adopting more stringent exhaust standards for all power categories. Compression-ignition engines are used in a wide range of off-road equipment including tractors, excavators, bulldozers, graders, and backhoes. The standards considered for this measure would be more stringent than required by current U.S. EPA and European Stage V nonroad regulations and would require the use of best available control technologies for both PM and NOx.

CARB is also developing a proposed measure, as described in the Draft 2022 State SIP Strategy, to accelerate the development and production of zero emission off-road equipment and powertrains through the Off-Road Zero Emission Targeted Manufacturer Rule. Existing zero emission regulations and regulations currently under development target a variety of sectors (e.g., forklifts, cargo handling equipment, off-road fleets, small off-road engines, etc.) however, as technology advancements occur, more sectors, including wheel loaders, excavators, and bulldozers) could be accelerated through this measure.

Further, CARB implements a number of incentive programs and projects to advance the turnover of off-road equipment to cleaner technologies. The Moyer Program has provided funding towards on- and off-road equipment for decades. The Clean Off-Road Equipment Voucher Incentive Project (CORE) is a newer project that is intended to accelerate deployment of advanced technology in the off-road sector and targets commercial-ready products that have not yet achieved a significant market foothold. For engines and equipment used in agricultural processes, CARB has the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) program to support fleet turnover to cleaner engines.

Taken together, California's comprehensive suite of emission standards, fuel specifications, and incentive programs for off-road vehicles and engines represent all measures that are technologically and economically feasible within California and when considered in aggregate, would advance the attainment date by at least one year.

## Marine Sources

Commercial harbor craft include any private, commercial, government, or military marine vessels including, but not limited to ferries, excursion vessels, tugboats (including oceangoing tugboats), barges, and commercial and non-commercial passenger fishing boats. CARB's Commercial Harbor Craft Regulation (CHC Regulation) was adopted in 2007 to reduce toxic and criteria emissions to protect public health and subsequently amended in 2010. As described in the Draft 2022 State SIP Strategy, the CARB Board also adopted amendments to the CHC Regulation in March 2022, which establish expanded and more stringent in-use requirements to cover more vessel categories and mandate accelerated deployment of zero emission and advanced technologies in vessel categories where technology feasibility has been demonstrated.

To reduce emissions from Ocean Going Vessels (OGV), CARB has adopted to date the Ocean-Going Vessel Fuel Regulation "Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline" (2008) and the Ocean-Going Vessels At-Berth Regulation (2007). The At-Berth Regulation requires container ships, passenger ships, and refrigerated-cargo ships at six California ports to meet compliance requirements for auxiliary engines while they are docked, including emission or power reduction requirements. Reduced vessel speeds also provide emission reduction benefits, and programs are operated by local air districts along the California coast to incentivize lower speeds. CARB staff received comments during the public process about including a statewide vessel speed reduction program. In the 2022 State SIP Strategy, the CARB measure for 'Future Emissions Reductions from Ocean-Going Vessels' discusses pursuing options available under CARB authority to achieve further emissions reductions, including developing a statewide vessel speed reduction program.

To control emissions from personal watercraft, CARB staff is also exploring development of Spark-Ignition Marine Engine Standards, as described in the Draft 2022 State SIP Strategy. For this measure, CARB would develop and propose catalyst-based standards for outboard and personal watercraft engines greater than or equal to 40 kilowatt (kW) in power that will gradually reduce emission standards to approximately 70 percent



below current levels, and consider actions that would require a percentage of outboard and personal watercraft vessels to be propelled by zero emission technologies for certain applications.

Taken together, California’s comprehensive suite of emission standards, fuel specifications, and incentive programs for marine vehicles and engines represent all measures that are technologically and economically feasible within California and when considered in aggregate, would advance the attainment date by at least one year.

## Fuels

As mentioned earlier, cleaner burning fuels also play an important role in reducing emissions from motor vehicles and engines in these source categories. CARB has adopted standards to ensure that the fuels sold in California are the cleanest in the nation. These programs include the California Reformulated Gasoline program (CaRFG), which controls emissions from gasoline, and the Ultra-Low Sulfur Diesel requirements (2006), which provide the nation’s cleanest diesel fuel specifications and help to ensure that diesel fuels burn as cleanly as possible and work synergistically with cleaner-operating heavy-duty trucks equipped with advanced emission control systems that debuted in 2007, and the Low Carbon Fuel Standard. These fuel standards, in combination with engine technology requirements, ensure that California’s transportation system achieves the most effective emission reductions possible.

Taken together, California’s emission standards, fuel specifications, and incentive programs for other mobile sources and fuels represent all measures that are technologically and economically feasible within California.

## Mobile Source Summary

California’s long history of comprehensive and innovative emissions control has resulted in the most stringent mobile source control program in the nation. U.S. EPA has previously acknowledged the strength of the program in their approval of CARB’s regulations and through the waiver process. In its 2019 approval of the South Coast’s 75 ppb 8-hour ozone plan,<sup>47</sup> which included the State’s current program and new measure commitments, U.S. EPA found that there were no further reasonably available control measures that would advance attainment of the standard in South Coast.

In addition, U.S. EPA has provided past determinations that CARB’s mobile source control programs meet Best Available Control Measure (BACM) requirements, which are more stringent than RACM, as part of their 2019 approval of the South Coast’s 24-hour PM<sub>2.5</sub> Plan<sup>48</sup>:

*“Overall, we believe that the program developed and administered by CARB and SCAG provide for the implementation of BACM for PM<sub>2.5</sub> and PM<sub>2.5</sub> precursors in the South Coast nonattainment area.”*

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<sup>47</sup> 84 FR 52005 <https://www.federalregister.gov/documents/2019/10/01/2019-21325/approval-of-air-quality-implementation-plans-california-south-coast-air-basin-1-hour-and-8-hour>.

<sup>48</sup> 83 FR 5923 <https://www.federalregister.gov/documents/2018/02/12/2018-02677/air-quality-state-implementation-plans-approvals-and-promulgations-california-south-coast-moderate>.

Since then, CARB has continued to substantially enhance and accelerate reductions from our mobile source control programs through the implementation of more stringent engine emissions standards, in-use requirements, incentive funding, and other policies and initiatives as described in the preceding sections.

The CARB process for developing the proposed State measures included an extensive public process and is consistent with U.S. EPA RACM guidance. Through this process, CARB found that with the current mobile source control program and proposed measures, there are no additional reasonable available control measures that would advance attainment of the 70 ppb 8-hour ozone standard in the South Coast Air Basin nonattainment area. There are no reasonable regulatory control measures excluded from use in this plan; therefore, there are no emissions reductions associated with unused regulatory control measures. As a result, California's mobile source control programs fully meet the requirements for RACM.

## RACM for Consumer Products

Consumer products are defined as chemically formulated products used by household and institutional consumers. For 30 years, CARB has taken actions pertaining to the regulation of consumer products. Three regulations have set VOC limits for 129 consumer product categories. These regulations, referred to as the Consumer Product Program, have been amended frequently, and progressively stringent VOC limits and reactivity limits have been established. These are Regulation for Reducing VOC Emissions from Antiperspirants and Deodorants; Regulation for Reducing Emissions from Consumer Products; and Regulation for Reducing the Ozone Formed from Aerosol Coating Product Emissions, and the Tables of Maximum Incremental Reactivity Values. Additionally, a voluntary regulation, the Alternative Control Plan has been adopted to provide compliance flexibility to companies. The program's most recent rulemaking occurred in 2021 with amendments to Consumer Products Regulation and Method 310.

U.S. EPA also regulates consumer products. U.S. EPA's consumer products regulation was promulgated in 1998, however, federal consumer products VOC limits have not been revised since their adoption. U.S. EPA also promulgated reactivity limits for aerosol coatings. As with the general consumer products, California's requirements for aerosol coatings are more stringent than the U.S. EPA's requirements. Other jurisdictions, such as the Ozone Transport Commission states, have established VOC limits for consumer products which are modeled after the California program. However, the VOC limits typically lag those applicable in California.

In summary, California's Consumer Products Program, with the most stringent VOC requirements applicable to consumer products, meets RACM.



**DRAFT 2022 AQMP  
APPENDIX VI-B**

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**Reasonable Further Progress and Milestone Years**

**MAY 2022**

## Reasonable Further Progress (RFP) and Milestone Years

The Clean Air Act (CAA) requires that State Implementation Plans (SIPs) for most nonattainment areas demonstrate reasonable further progress (RFP) towards attainment through emission reductions phased in from the time of the SIP submission until the attainment date. The RFP requirements in the CAA are intended to ensure that there are sufficient ozone and precursor emission reductions in each nonattainment area to attain the National Ambient Air Quality Standards (NAAQS) by the applicable attainment date.

Per CAA Section 171(1), RFP is defined as “such annual incremental reductions in emissions of the relevant air pollutant as are required by this part or may reasonably be required by the Administrator for the purpose of ensuring attainment of the applicable national ambient air quality standard by the applicable date.” As stated in subsequent federal regulation, the goal of the RFP requirements is for areas to achieve generally linear progress toward attainment. To determine RFP for the attainment date, U.S. EPA guidance states that the plan should rely only on emission reductions achieved from sources within the nonattainment area.

Section 172(c)(2) of the CAA requires that nonattainment area plans show ongoing annual incremental emissions reductions toward attainment, which is commonly expressed in terms of benchmark emissions levels or air quality targets to be achieved by certain interim milestone years. The U.S. EPA recommends that the RFP inventories include precursors such as NO<sub>x</sub> and VOCs that have been determined to be significant.

## Ozone

Subpart 2 sections 182 (b)(1) and 182(c)(2)(B) contain specific emission reduction targets to ensure that each ozone nonattainment area provides for sufficient precursor emission reductions to attain the ozone national ambient air quality standard. Section 182(b)(1)(A) requires that each “moderate” or above area provide for VOC reductions of at least 15 percent from baseline emissions within six years after November 15, 1990. The U.S. EPA final rule of *“Implementation of the 2015 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements”*<sup>1</sup> states that if an area has already met the 15 percent requirement for VOCs under either the 1-hour ozone NAAQS or the 1997 ozone NAAQS, such requirement under 182(b)(1) would not have to be fulfilled again. Instead, such areas would need to meet the CAA requirements under Section 182(c)(2)(B), which requires that “serious” and above areas provide VOC and/or NO<sub>x</sub> reductions (CAA, Section 182(c)(2)(C)) of 18 percent over the first six years after the baseline year for the 2015 8-hour ozone NAAQS, and an additional 3 percent per year averaged over each consecutive 3-year period until the attainment date.

Tables VI-B-1 and VI-B-2 summarize the RFP calculations. Figure VI-B-1 depicts the target level and projected baseline VOC emissions for the RFP demonstration. Projected baseline VOC and NO<sub>x</sub> emissions used for the RFP demonstration incorporate emission reduction benefits from the California Air Resources

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<sup>1</sup> 83 FR 62998.

Board’s (CARB) Heavy-Duty Inspection and Maintenance Plan (HD I&M) and Small Off-Road Engines (SORE) regulations adopted by CARB’s Governing Board in December 2021. For each of the milestone years, South Coast AQMD is able to show that the required progress is met on the basis of reductions from the existing regulatory program using a combination of VOC and NOx reductions. No reductions from the proposed control measures in the 2022 AQMP are needed for RFP purposes. For all milestone years, the baseline VOC emission levels are below the target levels. Projected NOx baseline emission reductions are needed to show compliance with the targeted VOC thresholds. For the attainment year 2037 (2015 8-hour NAAQS, 70 ppb), compliance is shown using projected NOx baseline emission reductions. Section 182(c)(2)(C) of the CAA provides for NOx reductions to substitute for RFP reductions not achieved by VOC emissions. The following demonstration will take advantage of that allowance and show compliance with RFP requirements as well as contingency requirements.

Baseline emissions, as shown in Tables VI-B-1 and VI-B-2, incorporate emission reductions generated from control measures that are already adopted. The year 2017 was chosen as the base year for the RFP demonstration to coincide with U.S. EPA’s triennial National Emissions Inventory year and the RFP milestone years included for the 2008 8-hour ozone plan.<sup>2</sup> For example, baseline emissions in 2023 are derived from the projected emissions from 2017 which includes all adopted control measures that will be implemented (partially or fully) by December 31, 2023. Therefore, the difference between baseline emissions of 2017 and 2023 is driven by control measures that are either partially implemented in 2017 or control measures with implementation date after 2017. More details about the adoption and implementation of the 2022 AQMP control measures can be found in Chapter 4 – Control Strategy and Implementation. The implementation schedule for CARB’s proposed mobile source control measures can be found in Tables 4-4 and 4-5 from Chapter 4 and in Appendix IV-B.

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<sup>2</sup> CARB, 2018 Updates to the California State Implementation Plan, available at [https://www.arb.ca.gov/planning/sip/2018sipupdate/2018update.pdf?\\_ga=2.235755329.1996493440.1653087661-816060816.1597333165](https://www.arb.ca.gov/planning/sip/2018sipupdate/2018update.pdf?_ga=2.235755329.1996493440.1653087661-816060816.1597333165).

TABLE VI-B-1

## SUMMARY OF REASONABLE FURTHER PROGRESS CALCULATIONS – VOC

Row	Calculation Step <sup>a</sup>	2017 <sup>b</sup>	2023	2026	2029	2032	2035	2037
1	RFP Baseline VOC Emissions <sup>c</sup> (tons/day)	412.59	377.59	364.61	351.94	344.05	339.32	337.87
2	Required Percent Change Since Previous Milestone Year (%)	-	18	27	36	45	54	60
3	Target VOC Level (tons/day)	-	338.33	301.19	264.06	226.93	189.79	165.04
4	Cumulative Milestone Year Shortfall (tons/day)	-	39.26	63.42	87.88	117.12	149.53	172.83
5	Cumulative Shortfall in VOC (%)	-	9.5	15.4	21.3	28.4	36.2	41.9
6	Incremental Milestone Year Shortfall (%)	-	9.5	5.9	5.9	7.1	7.8	5.7

<sup>a</sup> Units are in tons per day (tons/day), based on the summer planning inventory unless otherwise noted

<sup>b</sup> Base Year (2017)

<sup>c</sup> RFP Baseline VOC Emissions reflect emission reduction benefits from CARB's Heavy-Duty Inspection and Maintenance Plan (HD I&M) and Small Off-Road Engines (SORE) regulations adopted in December 2021; used in RFP demonstration

Row Description:

**ROW 1:** RFP baseline emissions used for RFP demonstration; Baseline and Future Emission Inventory taking into account existing rules and projected growth, and CARBS's HD I&M and SORE regulations.

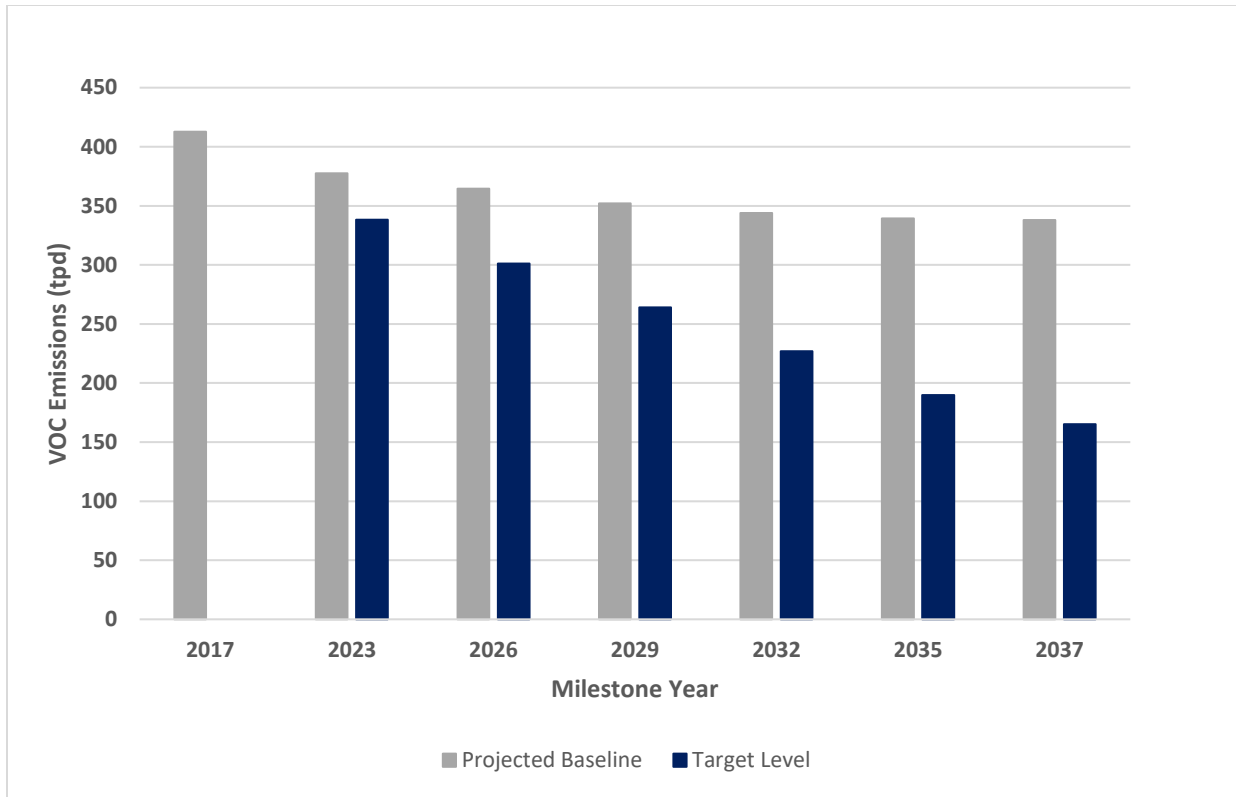
**ROW 2:** Required 18% reduction 6 years after Base Year; future milestone years are every 3 years until attainment year; and required reductions are 3% per year for each milestone year (e.g., for every 3 years, required 9% reduction)

**ROW 3:**  $[(2017 \text{ Base Year Row } 1) \times (1 - \text{Row } 2)]$ ; e.g., for 2029,  $412.59 \text{ tpd} \times (1 - 0.36) = 264.06 \text{ tpd}$

**ROW 4:**  $[(\text{Row } 1) - (\text{Row } 3)]$  or (Baseline – Target); negative number meets target level and positive number is shortfall of target level; e.g., for 2029,  $351.94 \text{ tpd} - 264.06 \text{ tpd} = 87.88 \text{ tpd}$

**ROW 5:**  $[(\text{Row } 4) / (\text{Row } 1 \text{ Base Year}) \times 100]$ ; e.g., for 2029, cumulative shortfall is  $87.88 \text{ tpd} / 412.59 \text{ tpd} = 21.3\%$

**ROW 6:** Negative (Row 5) is zero shortfall; positive number is a shortfall. Incremental milestone year shortfall is determined by subtracting the previous year's cumulative shortfall from the current cumulative shortfall; e.g., for 2029, cumulative shortfall of  $21.3\% - \text{previous } 2026 \text{ shortfall of } 15.4\% = 5.9\%$



**FIGURE VI-B-1**

**REASONABLE FURTHER PROGRESS – VOC**

*[RFP BASELINE EMISSIONS REFLECT EMISSION REDUCTION BENEFITS FROM CARB'S HEAVY-DUTY INSPECTION AND MAINTENANCE PLAN (HD I&M) AND SMALL OFF-ROAD ENGINES (SORE) REGULATIONS ADOPTED IN DECEMBER 2021]*

**TABLE VI-B-2**  
**SUMMARY OF REASONABLE FURTHER PROGRESS CALCULATIONS – NOx**

Row	Calculation Step <sup>a</sup>	2017 <sup>b</sup>	2023	2026	2029	2032	2035	2037
1	RFP Baseline NOx Emissions (tons/day) <sup>c</sup>	348.16	224.60	194.99	181.47	173.22	165.91	161.04
2	Reductions in NOx Emissions since Base Year (tons/day)	-	123.56	153.17	166.69	174.94	181.25	187.12
3	Percent Reductions in NOx Emissions since Base Year (%)	-	35.5	44.0	47.9	50.2	52.3	53.7
4	Cumulative Shortfall in VOC (%)	-	9.5	15.4	21.3	28.4	36.2	41.9
5	Percent Surplus Reduction (%)	-	26.0	28.6	26.6	21.9	16.1	11.9
6	RFP Compliance	-	Yes	Yes	Yes	Yes	Yes	Yes

<sup>a</sup> Units are in tons per day (tpd), based on the summer planning inventory unless otherwise noted

<sup>b</sup> Base Year (2017)

<sup>c</sup> Baseline Emissions reflect emission reduction benefits from CARB's Heavy-Duty Inspection and Maintenance Plan (HD I&M) and Small Off-Road Engines (SORE) regulations adopted in December 2021; used in RFP demonstration

Row Description:

**ROW 1:** RFP baseline emissions used for RFP demonstration; Baseline and Future Emission Inventory taking into account existing rules and projected growth, and CARBS's HD I&M and SORE regulations

**ROW 2:** Reductions achieved in Baseline: [(Row 1 Base Year) – (Row 1 Milestone Year)]; e.g., for 2029: 348.16 tpd – 181.47 tpd = 166.69 tpd

**ROW 3:** % Reductions achieved since Base Year: [(Row 2) / (Row 1 Base Year)] x 100; e.g., for 2029: (166.69/348.16) x 100 = 47.9%

**ROW 4:** Cumulative VOC shortfall from Table VI-B-1 Row 5

**ROW 5:** Surplus reductions achieved [(Row 3) – (Row 4)]; e.g., for 2029: 47.9 % – 21.3 %

**ROW 6:** Positive number in Row 5 is percent surplus for each milestone year, thus meeting RFP target levels

Tables VI-B-1 and VI-B-2 summarize the RFP calculations. The emissions inventory used in the RFP demonstration incorporate the benefits of two regulations adopted by CARB in December 2021: (1) Heavy-Duty Inspection and Maintenance Plan (HD I&M)<sup>3</sup> and (2) Small Off-Road Engines (SORE)<sup>4</sup> regulation. The RFP demonstration was extended to 2037, which is the attainment date for Extreme nonattainment areas. Figure VI-B-1 depicts the target level and projected baseline RFP demonstration for VOCs. For each of the milestone years, the required progress is met on the basis of reductions from the existing control program using a combination of VOC and NOx reductions within the South Coast Air Basin (Basin). No additional reductions from the proposed control measures in this AQMP are needed for progress purposes. Projected VOC baseline emissions are not sufficient to meet the CAA requirements as the baseline VOC emission levels are above the target levels of each milestone year. Therefore, projected NOx baseline emission reductions are used to substitute the shortfall and to comply with the targeted RFP levels. The CAA Section 182(c)(2)(C) provides for NOx reductions to substitute for RFP reductions not achieved for VOC emissions. The demonstration in Tables VI-B-1 and VI-B-2 show compliance with RFP requirements. The contingency measure requirement for the RFP demonstration is summarized in Chapter 4 of the 2022 AQMP. While the Basin is expected to meet the RFP requirements for ozone precursor emissions, attainment of the 2015 ozone standard relies heavily on significant NOx reductions. Accordingly, the proposed control strategy consists of two components: 1) an aggressive control strategy for all NOx emission sources in the Basin; and 2) control of locally generated emissions via proposed state-wide or nationally applied control measures implemented by state and federal actions.

Table VI-B-3 provides a list of the South Coast AQMD adopted rules and regulations for stationary sources that is scheduled to be implemented from 2017, accounting for the emission reductions in the baseline emissions of the future milestone/attainment years. The corresponding information for CARB's mobile source control measures can be found in Attachment VI-B-1 of this appendix.

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<sup>3</sup> <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/hdim2021/isor.pdf>.

<sup>4</sup> <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/sore21/isor.pdf>.

**TABLE VI-B-3  
IMPLEMENTATION SCHEDULE OF SOUTH COAST AQMD ADOPTED RULES AND REGULATIONS FOR  
REASONABLE FURTHER PROGRESS PER MILESTONE/ATTAINMENT YEAR**

	2017	2018	2020	2023	2026	2029	2032	2035	2037
NOx				R1109.1	R1109.1	R1109.1	R1109.1	R1109.1	
			R1110.2	R1110.2	R1110.2	R1110.2			
	R1111	R1111	R1111	R1111	R1111	R1111	R1111	R1111	R1111 <sup>f</sup>
		R1117							
				R1118.1	R1118.1 <sup>a</sup>				
					R1134	R1134 <sup>b</sup>			
			R1135	R1135	R1135 <sup>c</sup>				
			R1146	R1146	R1146	R1146	R1146	R1146 <sup>d</sup>	
			R1146.1	R1146.1	R1146.1	R1146.1	R1146.1	R1146.1 <sup>d</sup>	
	R1146.2	R1146.2	R1146.2						
			R1179.1						
R1147	R1147	R1147	R1147						
VOCs		R1113	R1113	R1113 <sup>e</sup>					
	R1114	R1114							
				R1118.1	R1118.1 <sup>a</sup>				
	R1168	R1168	R1168	R1168					

<sup>a</sup> Partial implementation from 2022 with full implementation achieved in 2025

<sup>b</sup> Partial implementation from 2024 with full implementation achieved in 2027

<sup>c</sup> Partial implementation from 2020 with full implementation achieved in 2025

<sup>d</sup> Partial implementation from 2019 with full implementation achieved in 2033

<sup>e</sup> Partial implementation from 2018 with full implementation achieved in 2021

<sup>f</sup> Reductions achieved annually with full implementation in 2046



**DRAFT 2022 AQMP**  
**APPENDIX VI-B**  
**ATTACHMENT VI-B-1**

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**CARB'S MOBILE SOURCE CONTROL MEASURES**

## I. Key Mobile Source Regulations and Programs Providing Emission Reductions

Given the severity of California's air quality challenges and the need for ongoing emission reductions, the California Air Resources Board (CARB or Board) has implemented the most comprehensive mobile source emissions control program in the nation. CARB's comprehensive program relies on four fundamental approaches:

- Stringent emissions standards that minimize emissions from new vehicles and equipment;
- In-use programs that target the existing fleet and require the use of the cleanest vehicles and emissions control technologies;
- Cleaner fuels that minimize emissions during combustion; and,
- Incentive programs that remove older, dirtier vehicles and equipment and replace those vehicles with the cleanest technologies.

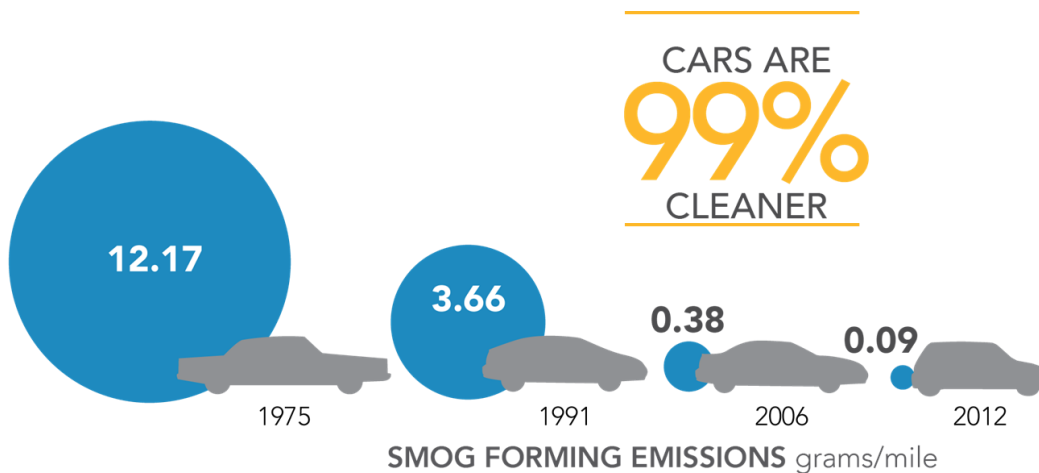
This multi-faceted approach has spurred the development of increasingly cleaner technologies and fuels and achieved significant emission reductions across all mobile source sectors that go far beyond national programs or programs in other states. These efforts extend back to the first mobile source regulations adopted in the 1960s, and pre-date the federal Clean Air Act Amendments (Act) of 1970, which established the basic national framework for controlling air pollution. In recognition of the pioneering nature of CARB's efforts, the Act provides California unique authority to regulate mobile sources more stringently than the federal government by providing a waiver of preemption for its new vehicle emission standards under Section 209(b). This waiver provision preserves a pivotal role for California in the control of emissions from new motor vehicles, recognizing that California serves as a laboratory for setting motor vehicle emission standards. Since then, CARB has consistently sought and obtained waivers and authorizations for its new motor vehicle regulations. CARB's history of progressively strengthening standards as technology advances, coupled with the waiver process requirements, ensures that California's regulations remain the most stringent in the nation.

In 1998, CARB identified diesel particulate matter as a toxic air contaminant. Since then, CARB adopted numerous regulations aimed at reducing exposure to diesel particulate matter while concurrently providing reductions in oxides of nitrogen (NOx) from freight transport sources like heavy-duty diesel trucks, transportation sources like passenger cars and buses, and off-road sources like large construction equipment. Phased implementation of these regulations will continue to produce emission reduction benefits through 2037 and beyond, as the regulated fleets are retrofitted, and as older and dirtier portions of the fleets are replaced with newer and cleaner models at an accelerated pace.

Further, CARB and South Coast AQMD staff work closely on identifying and distributing incentive funds to accelerate cleanup of vehicles and engines. Key incentive programs include: Low Carbon Transportation, Air Quality Improvement Program, VW Mitigation Trust, Community Air Protection, Carl Moyer Program, Goods Movement Program, Clean Off-Road Equipment (CORE) and Funding Agricultural Replacement Measures for Emission Reductions (FARMER). These incentive-based programs work in tandem with regulations to accelerate deployment of cleaner technology.

## A. Light-Duty Vehicles

Figure VI-B-1 illustrates the trend in CARB smog forming emission standards for light-duty vehicles. Cars are 99 percent cleaner than they were in 1975 due to CARB’s longstanding light-duty mobile source program. Since setting the nation’s first motor vehicle exhaust emission standards in 1966 that led to the first pollution controls, California has dramatically tightened emission standards for light-duty vehicles. In 1970, CARB required auto manufacturers to meet the first standards to control NOx emissions along with hydrocarbon emissions. The simultaneous control of emissions from motor vehicles and fuels led to the use of cleanerburning reformulated gasoline (RFG) that has removed the emissions equivalent of 3.5 million vehicles from California’s roads. Since CARB first adopted it in 1990, the Low Emission Vehicle Program (LEV and LEV II) and Zero-emission Vehicle (ZEV) Program have resulted in the production and sales of hundreds of thousands of zero-emission vehicles (ZEVs) in California.



**FIGURE VI-B-A1**  
**Light-Duty Emission Standards**

As a result of these efforts, light-duty vehicle emissions in the South Coast have been reduced significantly since 1990 and will continue to go down through 2037. From today, light-duty vehicle NOx emissions are projected to decrease by over 68 percent in 2037. Key light-duty programs include Advanced Clean Cars (ACC), On-Board Diagnostics, Reformulated Gasoline, Incentive Programs, and the Enhanced Smog Check Program.

### 1. Advanced Clean Cars

CARB’s groundbreaking ACC program is now providing the next generation of emission reductions in California, and ushering in a new zero-emission passenger transportation system. The success of this program is evident: California is the world’s largest market for Zero-emission Vehicles (ZEVs), with over 87 models available today, including battery-electric, plug-in hybrid electric, and fuel cell electric vehicles. A wide variety are now available at lower price points, attracting new consumers. As of February 2022, Californians, who drive only 10 percent of the nation’s cars, now account for over 40 percent of all zero-emission cars in the country. The U.S. makes up about half of the world market. This movement

towards commercialization of advanced clean cars has occurred due to CARB's ZEV requirements, part of ACC, which affects passenger cars and light-duty trucks.

CARB's ACC Program, approved in January 2012, is a pioneering approach of a 'package' of regulations that – although separate in construction – are related in terms of the synergy developed to address both ambient air quality needs and climate change. The ACC program combines the control of smog, soot causing pollutants and greenhouse gas (GHG) emissions into a single coordinated package of requirements for model years 2015 through 2025. The program assures the development of environmentally superior cars that will continue to deliver the performance, utility, and safety vehicle owners have come to expect

The ACC Program also included amendments affecting the current ZEV requirements through the 2017 model year in order to enable manufacturers to successfully meet 2018 and subsequent model year requirements. These ZEV amendments are intended to achieve commercialization through simplifying the regulation and pushing technology to higher volume production in order to achieve cost reductions. The ACC Program will continue to achieve benefits into the future as new cleaner cars enter the fleet and displace older and dirtier vehicles.

Going beyond these regulations, California will be transitioning to zero emissions. In support of California's transition to zero-emission vehicles, in 2020, Governor Newsom signed Executive Order N-79-20<sup>1</sup> which established a goal that 100 percent of California sales of new passenger cars and trucks be zero-emission by 2035. Advanced Clean Cars 2 (ACC 2), a measure in the 2016 State SIP Strategy, is a significant effort critical to meeting air quality standards, and is still being developed. ACC 2 is consistent with the Governor Newsom's Executive Order and has the goal of cutting emissions from new combustion vehicles while taking all new vehicle sales to 100 percent zero-emission no later than 2035.

With this order and many other recent actions, Governor Newsom has recognized that air pollution remains a challenge for California that requires bold action. Zero-emission vehicle commercialization in the light-duty sector is well underway. Longer-range battery electric vehicles are coming to market that are cost-competitive with gasoline fueled vehicles and hydrogen fuel cell vehicles are now also seeing significant sales. Autonomous and connected vehicle technologies are being installed on an increasing number of new car models. A growing network of retail hydrogen stations is now available, along with a rapidly growing battery charger network.

## 2. On Board Diagnostics (OBD)

OBD systems serve an important role in helping to ensure that engines and vehicles maintain low emissions throughout their full life. OBD systems are designed to identify when a vehicle's emission control systems or other emission-related computer controlled components are malfunctioning, causing emissions to be elevated above the vehicle manufacturer's specifications. Many states currently use the

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<sup>1</sup> Executive Order N-79-20 <https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf>.

OBD system as the basis for passing and failing vehicles in their inspection and maintenance programs, as is exemplified by California's Smog Check program.

California's first OBD regulation required manufacturers to monitor some of the emission control components on vehicles starting with the 1988 model year. In 1989, CARB adopted OBD II, which required 1996 and subsequent model year passenger cars, light duty trucks, and medium duty vehicles and engines to be equipped with second generation OBD systems. The Board has modified the OBD II regulation in regular updates since initial adoption to address manufacturers' implementation concerns and, where needed, to strengthen specific monitoring requirements. Most recently, the Board amended the regulation in 2021 to require manufacturers to implement Unified Diagnostic Services (UDS) for OBD communications, which will provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance. UDS implementation would be required for all 2027 and subsequent model year light- and medium-duty vehicles and engines, as well as some heavy-duty vehicles and engines.

### 3. California Enhanced Smog Check Program

The Bureau of Automotive Repair (BAR) is the State agency charged with administration and implementation of the Smog Check Program. The Smog Check Program is designed to reduce air pollution from California registered vehicles by requiring periodic inspections for emission-control system problems, and by requiring repairs for any problems found. In 1998, the Enhanced Smog Check program began in which Smog Check stations relied on the BAR-97 Emissions Inspection System (EIS) to test tailpipe emissions with either a Two-Speed Idle (TSI) or Acceleration Simulation Mode (ASM) test depending on where the vehicle was registered. For instance, vehicles registered in urbanized areas received an ASM test, while vehicles in rural areas received a TSI test.

In 2009, the following requirements were added in to improve and enhance the Smog Check Program, making it more inclusive of motor vehicles and effective on smog reductions:

- Low pressure evaporative test;
- More stringent pass/fail cutpoints;
- Visible smoke test; and
- Inspection of light- and medium-duty diesel vehicles.

The next major change in the Program was due to AB 2289, adopted in October 2010, a new law restructuring California's Smog Check Program, streamlining and strengthening inspections, increasing penalties for misconduct, and reducing costs to motorists. This new law, supported by CARB and BAR, promised faster and less expensive Smog Check inspections by taking advantage of the second generation of OBD software installed on all vehicles. The new law also directs vehicles without this equipment to high-performing stations, helping to ensure that these cars comply with current emission standards. This program will reduce consumer costs by having stations take advantage of diagnostic software that monitors pollution-reduction components and tailpipe emissions. Beginning mid-2013, testing of passenger vehicles using OBD was required on all vehicles model years 2000 or newer.

## 4. Reformulated Gasoline (CaRFG)

Since 1992, CARB has been regulating the formulation of gasoline through the California Reformulated Gasoline program (CaRFG). The CaRFG program has been implemented in three phases and has resulted in California gasoline being the cleanest in the world. California's cleaner-burning gasoline regulation is one of the cornerstones of the State's efforts to reduce air pollution and cancer risk. Reformulated gasoline is fuel that meets specifications and requirements established by CARB, which reduced motor vehicle toxics by about 40 percent and reactive organic gases by about 15 percent. The results from cleaning up fuel can have an immediate impact as soon as it is sold in the State. Vehicle manufacturers design low-emission vehicles to take full advantage of cleaner-burning gasoline properties.

## 5. Incentive Programs

There are many different incentive programs focusing on light-duty vehicles that produce extra emission reductions beyond traditional regulations. Incentive programs encourage both the early retirement of dirty, older cars and the purchase of newer, lower-emitting vehicle engines and technologies. Several State and local incentive funding pools have been used historically – and remain available – to fund the accelerated turnover of on-road heavy duty vehicles.

The State, in partnership with the local air districts, has a well-established history of using incentive programs to advance technology development and deployment, and to achieve early emission reductions. Since 1998, CARB and California's local air districts have been administering incentive funding to accelerate the deployment and turnover to cleaner vehicles, starting with the Moyer Program. In recognition of the key role that incentives play in complementing State and local air quality regulations to reduce emissions, the scope and scale of California's air quality incentive programs has since greatly expanded. Each of CARB's incentive programs has its own statutory requirements, goals, and categories of eligible projects that collectively provide for a diverse and complex incentives portfolio. CARB uses this portfolio approach to incentives to accelerate development and early commercial deployment of the cleanest mobile source technologies and to improve access to clean transportation.

The Fiscal Year (FY) 2021-22 State Budget included an unprecedented level of investment in ZEVs, with \$2.3 billion allocated for CARB over the next three years, specifically dedicated to incentive-based turnover of mobile source vehicles and equipment, as part of a \$3.9 billion comprehensive, multi-agency package to accelerate progress toward the State's zero-emission vehicle goals established under Executive Order N-79-20. With the Proposed 2022-23 State Budget, Governor Newsom is further reinforcing California's commitment to transitioning away from combustion vehicles with a proposed additional \$6.1 billion in ZEV investments over the next 5 years.

### a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

California's Low Carbon Transportation Investments and the Air Quality Improvement Program form CARB's major incentive funding program, which works in concert with the State's larger portfolio of clean transportation investments. Together, the Low Carbon Transportation Investments and Air Quality Improvement Program are known as the Clean Transportation Incentives program; they provide mobile source incentives to reduce greenhouse gas, criteria pollutant, and toxic air contaminant emissions

through the deployment of advanced technology and clean transportation in the light-duty and heavy-duty sectors.

The Clean Transportation Incentives Program is part of California Climate Investments, and is designed to accelerate the transition to advanced technology low carbon freight and passenger transportation, with a priority on providing health and economic benefits to California's most disadvantaged communities, and with a focus on increasing deployment of zero-emission vehicles and equipment wherever possible. Low Carbon Transportation Investments are supported by California's Cap-and-Trade auction proceeds. The Air Quality Improvement Program (AQIP) is a mobile source incentive program that focuses on reducing criteria pollutant and diesel particulate emissions with concurrent GHG reductions. AQIP is appropriated from the Air Quality Improvement Fund.

Each year, the legislature appropriates funding to CARB for the Low Carbon Transportation Investments and Air Quality Improvement Programs, and allocations are used to fund multiple programs in the passenger vehicle, on-road heavy-duty, and off-road vehicle sectors, including: the Clean Vehicle Rebate Project (CVRP); Enhanced Fleet Modernization Program and Plus-Up Pilot Project (Clean Cars 4 All); and the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP).

i. Clean Vehicle Rebate Program (CVRP)

As one of the programs funded through the Clean Transportation Incentives program, CVRP is a vehicle purchasing incentives program that provides consumer rebates to reduce the price for new ZEV purchases, and is designed to offer vehicle rebates on a first-come, first-serve basis for light-duty ZEVs, plug-in hybrid electric vehicles, and zero-emission motorcycles. In FY 2021-22, CVRP was allocated \$525 million.

ii. Clean Cars 4 All (CC4A)

Clean Cars 4 All (formerly known as the Enhanced Fleet Modernization Program PlusUp Pilot Project) is another Clean Transportation Incentives program for passenger vehicles. Clean Cars 4 All provides incentives for lower-income consumers living in and near disadvantaged communities who scrap their old vehicles and purchase new or used hybrid, plug-in hybrid, or zero-emission vehicle replacement vehicles. The budget for FY 2021-22 included \$75 million for the statewide expansion of CC4A.

iii. Other Clean Transportation Equity Investments

CARB also funds a suite of transportation equity pilot projects aimed at increasing access to clean transportation and mobility options for priority populations in disadvantaged and low-income communities, and for lower-income households. This includes clean vehicle ownership projects, clean mobility options, streamlining access to funding and financing opportunities, and increasing community outreach, education and exposure to clean technologies. Clean Transportation Equity pilot projects exemplify the importance of understanding the unique needs across communities and provide lessons for how we most directly address barriers to collectively achieve our equity, air quality, and climate goals. Major Clean Transportation Equity Investment programs include: Clean Mobility Options, Clean Mobility in Schools, Financing Assistance; and Sustainable Transportation Equity Project (STEP). Clean Transportation Equity Investment projects were allocated \$150 million in the FY 2021-22 budget, which includes the \$75 million for CC4A mentioned above.

Financing Assistance provides eligible consumers buy-down and financing opportunities to purchase or lease a new or used clean vehicle, such as a conventional hybrid electric vehicle (HEV), plug-in hybrid (PHEV), or battery electric vehicle (BEV). Clean Mobility in Schools Projects are located within disadvantaged communities, and are intended to encourage and accelerate the deployment of new zero-emission school buses, school fleet vehicles, passenger cars, lawn and garden equipment, and can incorporate alternative modes of transportation like transit vouchers, active transportation elements, and bicycle share programs. In the light-duty sector, some of the Clean Mobility Options programs that CARB funds include the Clean Mobility Options Voucher Pilot Program (CMO). CMO provides voucher-based funding for low-income, tribal, and disadvantaged communities to fund zero-emission shared and on-demand services such as carsharing, ridesharing, bike sharing, and innovative transit services. STEP is a new transportation equity pilot program that funds zero-emission carsharing, bike sharing, public transit and shared mobility subsidies, among other projects.

#### b) Moyer Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Moyer Program), funded by dedicated revenue from the DMV's smog abatement fee and a fee on the purchase of new tires, provides approximately \$60 million in grant funding annually through local air districts for cleaner than-required engines and equipment. Since 1998, approximately \$1 billion has been allocated to date. In the light-duty sector, the Moyer Program encourages voluntarily retirement of older, more polluting passenger vehicles through a Voluntary Accelerated Vehicle Retirement Program (VAVR), which is a car scrappage or old vehicle buy-back program that encourages the accelerated removal of higher-polluting vehicles that have passed their biennial Smog Check Test inspection, to be replaced with newer, cleaner vehicles or alternative transportation options.

#### c) Consumer Assistance Program

California's voluntary vehicle retirement program, the Consumer Assistance Program (CAP), is administered by BAR and provides low income consumers repair assistance including up to \$1,200 in emissions-related repairs if their vehicle fails its biennial Smog Check Test inspection, and/or up to \$1,500 per vehicle for retiring operational vehicles at BAR-contracted dismantler sites.

## B. Medium- and Heavy-Duty On-Road Trucks

Due to the benefits of CARB's longstanding heavy-duty mobile source program, heavy-duty on-road vehicle emissions in the South Coast Air Basin have been reduced significantly since 1990 and will continue to decrease through 2037. From today, medium- and heavy-duty NO<sub>x</sub> emissions are projected to decrease by over 79 percent in 2037. Key programs contributing to those reductions include new heavy-duty engine standards, cleaner diesel fuel requirements, California's Truck and Bus Regulation and incentive programs.

### 1. Heavy-Duty Engine Standards

Since 1990, heavy-duty engine NO<sub>x</sub> emission standards have become dramatically more stringent, dropping from 6 grams per brake horsepower-hour (g/bhp-hr) in 1990 down to the current 0.2 g/bhp-hr standard, which took effect in 2010. In addition to mandatory NO<sub>x</sub> standards, there have been several



generations of optional lower NOx standards put in place over the past 15 years. Most recently in 2015, engine manufacturers were allowed to certify to three optional NOx emission standards of 0.1g/bhp-hr, 0.05 g/bhp-hr, and 0.02 g/bhp-hr (i.e., 50 percent, 75 percent, and 90 percent lower than the current mandatory standard of 0.2 g/bhp-hr). The optional standards allow local air districts and CARB to preferentially provide incentive funding to buyers of cleaner trucks, and to encourage the development of cleaner engines.

## 2. Optional Low-NOx Standards for Heavy-Duty Diesel Engines

In 2013, California established optional low-NOx standards for heavy-duty diesel engines (Optional Reduced Emissions Standards for Heavy-Duty Engines regulation), with the most aggressive standard being 0.02 g/bhp-hr, 90 percent below the federally required standard. The optional low-NOx standards were developed to pave the way for more stringent mandatory standards by encouraging manufacturers to develop and certify low-NOx engines, and incentivizing potential customers to purchase these low-NOx engines. By 2019, a total of fifteen engine families, some using natural gas and others using liquefied petroleum gas, had been certified to the optional low-NOx standards.

## 3. Heavy-Duty Engine and Vehicle Omnibus Regulation

In 2021, CARB comprehensively overhauled how NOx emissions from new heavy-duty engines are regulated in California through the adoption of the Heavy-Duty Engine and Vehicle Omnibus Regulation which reduces NOx emissions from the engines in medium- and heavy-duty vehicle classes. The Omnibus Regulation includes NOx certification emission standards and in-use standards that significantly reduce tailpipe NOx emissions during most vehicle operating modes such as high-speed steady-state, transient, low load urban driving, and idling modes of operation. Additionally, revisions to the emissions warranty, useful life, emissions warranty and reporting information and corrective action procedures, and durability demonstration procedures provide additional emission benefits by encouraging more timely repairs to emission-related malfunctions and encouraging manufacturers to produce more durable emission control components, thereby reducing the rate at which engine emission controls fail and emissions increase.

## 4. Cleaner In-Use Heavy-Duty Trucks (Truck and Bus Regulation)

California's Truck and Bus Regulation or In-Use Heavy-Duty Truck Rule was first adopted in December 2008. This rule represents a multi-year effort to turn over the legacy fleet of heavy-duty on-road engines and replace them with the cleanest technology available. In December 2010, CARB revised specific provisions of the In-Use Heavy-duty Truck Rule, in recognition of the deep economic effects of the recession on businesses and the corresponding decline in emissions.

Starting in 2012, the Truck and Bus Regulation phases in requirements applicable to an increasingly larger percentage of California's truck and bus fleet over time, so that by 2023 nearly all older vehicles will be upgraded to have exhaust emissions meeting 2010 model year engine emissions levels. The regulation applies to nearly all diesel fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds that are privately or federally owned, including on-road and off-road agricultural yard goat trucks, and privately and publicly owned school buses. Moreover, the regulation applies to any person, business, school district, or federal government agency that owns, operates, leases or rents

affected vehicles. The regulation also establishes requirements for any in-State or out-of-state motor carrier, California-based broker, or any California resident who directs or dispatches vehicles subject to the regulation. Finally, California sellers of a vehicle subject to the regulation would have to disclose the regulation's potential applicability to buyers of the vehicles. Approximately 170,000 businesses in nearly all industry sectors in California, and almost a million vehicles that operate on California roads each year are affected. Some common industry sectors that operate vehicles subject to the regulation include: for-hire transportation, construction, manufacturing, retail and wholesale trade, vehicle leasing and rental, bus lines, and agriculture.

In 2017, California passed legislation ensuring compliance with the Truck and Bus Regulation through the California Department of Motor Vehicles (DMV) vehicle registration program. Starting January 1, 2020, DMV verifies compliance to ensure that vehicles subject to the Truck and Bus Regulation meet the requirements prior to obtaining DMV vehicle registration. The law requires the DMV to deny registration for any vehicle that is non-compliant or has not reported to CARB as compliant or exempt from the Truck and Bus Regulation.

CARB compliance assistance and outreach activities that are key in support of the Truck and Bus Regulation include:

- The Truck Regulations Upload and Compliance Reporting System (TRUCRS), an online reporting tool developed and maintained by CARB staff;
- The Truck and Bus regulation's fleet calculator, a tool designed to assist fleet owners in evaluating various compliance strategies;
- Targeted training sessions all over the State; and
- Out-of-state training sessions conducted by a contractor.

CARB staff also develops regulatory assistance tools, conducts and coordinates compliance assistance and outreach activities, administers incentive programs, and actively enforces the entire suite of regulations. Accordingly, CARB's approach to ensuring compliance is based on a comprehensive outreach and education effort.

## 5. Heavy-Duty Inspection and Maintenance Regulation

To ensure heavy-duty trucks remain clean in-use, CARB adopted in 2021 the HeavyDuty Inspection and Maintenance Regulation, which requires periodic demonstrations that vehicles' emissions control systems are properly functioning in order to legally operate within the State. This regulation is designed to achieve criteria emissions reductions by ensuring that malfunctioning emissions control systems are repaired in a timely fashion.

## 6. Heavy-Duty On-Board Diagnostics (HD OBD)

OBD systems serve an important role in helping to ensure that engines and vehicles maintain low emissions throughout their full life. OBD systems monitor virtually all emission controls on gasoline and diesel engines, including catalysis, particulate matter (PM) filters, exhaust gas recirculation systems, oxygen sensors, evaporative systems, fuel systems, and electronic powertrain components as well as other components and systems that can affect emissions when malfunctioning. The systems also provide

specific diagnostic information in a standardized format through a standardized serial data link on-board the vehicles. The use and operation of OBD systems ensure reductions of in-use motor vehicle and motor vehicle engine emissions through improvements in emission system durability and performance.

The Board originally adopted comprehensive Heavy-Duty OBD regulations in 2005 for model year 2010 and subsequent heavy-duty engines and vehicles, referred to as HD OBD. In 2009, the Board CARB updated the HD OBD regulation, adopted specific enforcement requirements, and aligned the HD OBD with OBD requirements for medium-duty vehicles. In 2021, the Board CARB again amended the HD OBD regulation; the 2021 amendments require manufacturers to implement Unified Diagnostic Services for OBD communications, which will provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance.

## 7. Clean Diesel Fuel

Since 1993, CARB has required that diesel fuel have a limit on the aromatic hydrocarbon content and sulfur content of the fuel. Diesel powered vehicles account for a disproportionate amount of diesel particulate matter, which is considered a toxic air contaminant in California. In 2006, CARB required a low-sulfur diesel fuel to be used not only by on-road diesel vehicles but also for off-road engines. The diesel fuel regulation allows alternative diesel formulations as long as emission reductions are equivalent to the CARB formulation.

## 8. Advanced Clean Truck Regulation (ACT)

In June 2020, CARB adopted the Advanced Clean Trucks regulation, a first of its kind regulation requiring medium- and heavy-duty manufacturers to produce ZEVs as an increasing portion of their sales beginning in 2024. The Advanced Clean Trucks regulation is a manufacturers ZEV sales requirement and a one-time reporting requirement for large entities and fleets. This regulation is expected to result in roughly 100,000 heavy-duty ZEVs operating on California's roads by 2030 and nearly 300,000 heavy-duty ZEVs by 2035. With the adoption of the Advanced Clean Trucks regulation, CARB Resolution 20-19 directs staff to return to the Board with a zero- emission fleet rule and sets the following targets for transitioning California's heavy-duty vehicle sectors to ZEVs:

- 100 percent zero-emission drayage, last mile delivery, and government fleets by 2035;
- 100 percent zero-emission refuse trucks and local buses by 2040;
- 100 percent zero-emission-capable vehicles in utility fleets by 2040; and
- 100 percent zero-emission everywhere else, where feasible, by 2045.

As mentioned earlier, the Governor signed Executive Order N-79-20 in September 2020, which directs CARB to adopt regulations to transition the State's transportation fleet to ZEVs. This includes transitioning the State's drayage fleet to ZEVs by 2035 and transitioning the State's truck and bus fleet to ZEVs by 2045 where feasible.

## 9. Innovative Clean Transit (ICT) and Zero-Emission Airport Shuttle Regulation

To achieve the needed emission reductions from heavy-duty applications, CARB is driving the use of zero-emission heavy-duty vehicles in strategic applications, including urban transit buses and airport ground

transportation. The Innovative Clean Transit regulation was the first of these programs. It was adopted in December 2018 and requires all public transit agencies to gradually transition to a 100 percent zero-emission bus fleet and encourages them to provide innovative first- and last-mile connectivity and improved mobility for transit riders. Beginning in 2029, 100 percent of new purchases by transit agencies must be Zero-emission Buses, with a goal for full transition by 2040. It applies to all transit agencies that own, operate, or lease buses in California with a GVWR greater than 14,000 lbs. It includes standard, articulated, over-the-road, double-decker, and cutaway buses.

The Zero-emission Airport Shuttle Regulation, adopted in June 2019, requires airport shuttle operators in California to transition to 100 percent ZEV technologies. Airport shuttle operators must begin adding zero-emission shuttles to their fleets in 2027, and complete the transition to ZEVs by the end of 2035. The regulation applies to airport shuttle operators who own, operate, or lease vehicles at any of the 13 California airports regulated under this rule.

## 10. Incentive Programs

There are many different incentive programs focusing on heavy-duty vehicles that accelerate turnover to cleaner technologies, and thereby produce extra emission reductions beyond traditional regulations. Several State and local incentive funding pools have been used historically – and remain available – to fund the accelerated turnover of on-road heavy-duty vehicles.

### a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

In addition to funding passenger vehicle incentive programs, the Low Carbon Transportation Investments and the Air Quality Improvement Program (Clean Transportation Incentives) also provides incentive funding for heavy-duty vehicles. This program funds projects to accelerate fleet and engine turnover to cleaner existing technologies through the Hybrid and Zero-emission Truck and Bus Voucher Incentive Project (HVIP) and Truck Loan Assistance program, as well as funding demonstration and pilot projects.

Beyond the vehicle purchasing incentives programs (CVRP and Clean Cars 4 All) and Clean Transportation Equity Investments, an additional \$873 million was allocated in the FY 2020-2021 budget for on-road heavy-duty trucks and off-road equipment. CARB provides these incentive funds following the principles of the portfolio approach, meaning that funding is provided across multiple sectors and applications – as well as across multiple technologies to support both the technologies that are providing emission reductions today, as well as those that are needed to meet future goals as the technology matures. This includes funding for demonstration and pilot projects, vouchers for advanced clean technologies, and financing and support for small fleets transitioning to cleaner technologies. Additionally, this year funding was set aside specifically for drayage trucks, transit buses, and school buses, all of which are primed to rapidly transition to zero-emission.

#### i. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

CARB's Hybrid and Zero-emission Truck and Bus Voucher Incentive Project (HVIP) serves as the cornerstone program in CARB's advanced technology heavy-duty incentive portfolio. HVIP has provided funding since 2010 to support the long-term transition to cleaner combustion and zero-emission vehicles in the heavy-duty market. The program helps offset the higher costs of clean vehicles, and additional

incentives are available for providing disadvantaged community benefits. HVIP responds to a key market challenge by making clean vehicles more affordable for fleets through point-of-purchase price reductions. With an HVIP voucher, technology-leading vehicles can be as affordable as their traditional fossil-fueled counterparts, enabling fleets of all sizes to deploy advanced technologies that are cleaner and quieter. HVIP is the earliest model in the United States to demonstrate the function, flexibility, and effectiveness of first-come first-served incentives that reduce the incremental cost of commercial vehicles. HVIP is fleet-focused, providing a streamlined and user-friendly option to encourage purchases and leases of advanced clean trucks and buses throughout California. Approved dealers are a key part of HVIP success and are trained to facilitate the application process. Vocations include freight and drayage trucks, delivery vans, utility vehicles, transit, school, and shuttle buses, refuse trucks, and more. In FY 2021-22, the Legislature allocated \$569.5 million for HVIP.

ii. Truck Loan Assistance Program

CARB's Truck Loan Assistance Program was created through a one-time appropriation of approximately \$35 million in the 2008 State Budget to implement a heavy-duty loan program that assists on-road fleets affected by the Truck and Bus Regulation and the Heavy-Duty Tractor-Trailer Greenhouse Gas Regulation. CARB has continued to operate this program with subsequently appropriated AQIP funds of around \$28 million annually to provide financing opportunities to small business - truckers who don't meet conventional lending criteria and are unable to qualify for traditional financing for cleaner trucks. As of February 2022, about \$187 million in Truck Loan Assistance Program funding has been provided to small business truckers for the purchase of approximately 36,000 cleaner trucks, exhaust retrofits, and trailers. In FY 2021-22, \$28.6 million was allocated for the Truck Loan Assistance Program.

iii. Demonstration and Pilot projects

In addition to funding HVIP and the Truck Loan Assistance Program, the Clean Transportation Incentives program is the only program in CARB's portfolio, and one of the only programs in the State, that funds demonstration and pilot projects to support early market deployment of nascent zero-emission technologies. The purpose of the Advanced Technology Demonstration and Pilot Projects is to help accelerate the next generation of advanced technology vehicles, equipment, or emission controls, which are not yet commercialized. As such, it provides a testing ground for innovative projects focused on improving access to clean transportation for priority communities. In FY 2021-22, \$80 million was allocated for heavy-duty advanced technology demonstration and pilot projects, which are intended to help bring to market-readiness zero-emission (ZE) heavy-duty technologies that are poised to deploy commercially in the near future in both on- and off-road applications. This includes zero-emission long-haul trucks, strategic truck range extenders, and ZE applications along freight facilities/corridors.

In heavy-duty applications, the goods movement sector is a focus for incentive funding, with CARB funding multiple demonstration and pilot programs to drive zero-emission technologies in last mile delivery trucks, drayage trucks, and heavy-duty trucks and tractors. The *USPS Zero-Emission Delivery Truck Pilot Commercial Deployment Project* is deploying battery electric last-mile delivery trucks in the USPS fleet, together with the associated charging infrastructure. The project will demonstrate the practicality and economic viability of the widespread adoption of a variety of ZE medium- and heavy-duty vehicle technologies in delivery applications. The *Battery Electric Drayage Truck Demonstration* project

is a \$40 million Statewide demonstration of forty-four zero-emission battery electric and plug-in hybrid drayage trucks that, since 2018, have been in operation serving major California ports in five air districts (South Coast, Bay Area, San Joaquin Valley, Sacramento, and San Diego). Battery electric drayage trucks are used to transport cargo to or from California's ports and intermodal rail yards. Installation of charging infrastructure that enables safe charging of the trucks for statewide demonstration is also included as part of this project. To accelerate the deployment of zero-emission technologies in heavier freight applications, the \$44.8 million *Volvo Low Impact Green Heavy Transportation Solutions* project is funding Class 8 heavy-duty battery electric trucks equipped with battery electric tractors to facilitate creation of a zero-emission goods movement system from the Ports of Long Beach and Los Angeles to four freight handling facilities in disadvantaged communities.

Clean transportation incentives have also funded demonstration and pilot projects for ZE urban transit buses. The \$22.3 million *Fuel Cell Electric Bus Commercialization Consortium* in the Bay Area and Southern California is funding battery and fuel cell urban transit buses, which will better serve communities' transit needs, substantially reduce greenhouse gas emissions, eliminate criteria pollutants, and provide economic benefits.

#### iv. Clean Transportation Equity Investments

As mentioned earlier, Clean Mobility in Schools Projects are also encouraging and accelerating the deployment of new zero-emission heavy-duty engines and vehicles, including battery electric school buses and clean school fleet vehicles.

##### b) Moyer Program

In addition to funding passenger vehicle incentive programs, the Moyer Program provides monetary grants to private companies and public agencies to clean up their heavy-duty engines beyond that required by law through retrofitting, repowering or replacing their engines with newer and cleaner ones. These grants are issued locally by air districts. Projects that reduce emissions from heavy-duty on-road engines qualify, including heavy-duty trucks, drayage trucks, emergency vehicles, public agency and utility vehicles, school buses, solid waste collection vehicles, and transit fleet vehicles.

As the regulatory, technological and incentives landscape has changed significantly since the creation of the Moyer Program and to address evolving needs, the Legislature has periodically modified the program to better serve California. Most recently, Senate Bill (SB) 513 (Beall, 2015) has provided new opportunities for the Moyer Program to contribute significant emission reductions alongside implemented regulations, advance zero and near-zero technologies, and combine program funds with those of other incentive programs.

In the FY 2021-22 budget, the Legislature appropriated an additional \$45 million in Moyer Program funding to support the replacement of diesel trucks with ultra-low NOx trucks certified to meet the 0.02 g/bhp-hr NOx standard or lower. Currently, only the South Coast Air Quality Management District and the San Joaquin Valley Air Pollution Control District would be eligible for these funds. In November 2021, the Board approved increases to the Moyer Program cost-effectiveness limits and funding caps for optional advanced technology and zero-emission replacement projects for on-road heavy-duty trucks. Increasing the cost-effectiveness thresholds is designed to increase funding opportunities, and ensures that the Moyer Program continues to focus on developing the most advanced zero-emission and low



emission technologies, consistent with encouraging further emissions reductions. These changes included increasing the threshold for on-road zero-emission vehicles, which includes zero-emission school buses, from \$100,000 to \$500,000 per unit.

The Moyer Program also funds CARB's On-Road Heavy-Duty Voucher Incentive Program (VIP), which provides funding opportunities for small fleet owners with 10 or fewer vehicles to quickly replace their older heavy-duty diesel or alternative fuel vehicles. Under this program, fleet owners may be eligible for funding of up to \$410,000 for replacing their existing vehicle(s) to be scrapped and replaced by new trucks (zero-emission or certified to the optional 0.02 g/bhp-hr NOx standard), or up to \$50,000 for replacing their existing fleet with used vehicles with 2013 model year or later engines. Air districts have the discretion to set certain local eligibility requirements based upon local priorities.

#### c) Goods Movement Emission Reduction Program (Prop 1B)

The Prop 1B Program was created to reduce exposure for populations living near freight corridors and facilities that were being adversely impacted by emissions from goods movement. This program provided incentives to owners of equipment used in freight movement to upgrade to cleaner technologies sooner than required by law or regulation. Voters approved \$1 billion in total funding for the air quality element of the Prop 1B Program to complement \$2 billion in freight infrastructure funding under the same ballot initiative.

Beginning in 2008, the Goods Movement Emission Reduction Program funded by Prop 1B has funded cleaner trucks for the region's transportation corridors; the final increment of funds implemented projects through 2020. The \$1 billion program was a partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. While all Prop 1B Program funds have been awarded to the local air districts for implementation, the program framework exists to serve as a mechanism to award clean truck funds through newer funding programs.

#### d) Volkswagen (VW) Mitigation Trust

In 2015, after a CARB-led investigation, in concert with the United States Environmental Protection Agency (U.S. EPA), VW admitted to deliberately installing emission defeat devices on nearly 600,000 VW, Audi, and Porsche diesel vehicles sold in the United States, approximately 85,000 of which were sold in California. The VW California settlement agreement includes both a Mitigation Trust to mitigate the excess NOx emissions caused by the company's use of illegal defeat devices in their vehicles, as well as a ZEV Investment Commitment to help grow the State's expanding ZEV program. The Mitigation Trust includes approximately \$423 million for California to be used as specified in the settlement agreement. Per the Beneficiary Mitigation Plan approved by CARB in 2018, this funding will be used to replace older heavy-duty trucks, buses, and freight vehicles and equipment with cleaner models, with a focus on zero-emission technologies where available and cleaner combustion everywhere else, as well as to fund light-duty ZEV infrastructure. In addition, there have been mitigation funds established as the result of other settlements from which funding is used to support clean technologies.

#### e) Community Air Protection Incentives (AB 617 | Community Air Protection Program)

Since the 2016 State SIP Strategy elucidated the need for additional legislative assistance in funding turnover programs to accelerate the deployment and adoption of cleaner technologies, the Legislature has since 2017 established a number of new incentive programs that are implemented through CARB through various budget bills. The State Legislature has provided substantial funding to achieve early emissions reductions in the communities most impacted by air pollution. In its 2018 funding allocation, the Legislature expanded the possible uses of AB 617 funds to include Moyer and Proposition 1B eligible projects with a priority on zero-emission projects, zero-emission charging infrastructure, stationary source projects, and additional projects consistent with the CERPs.

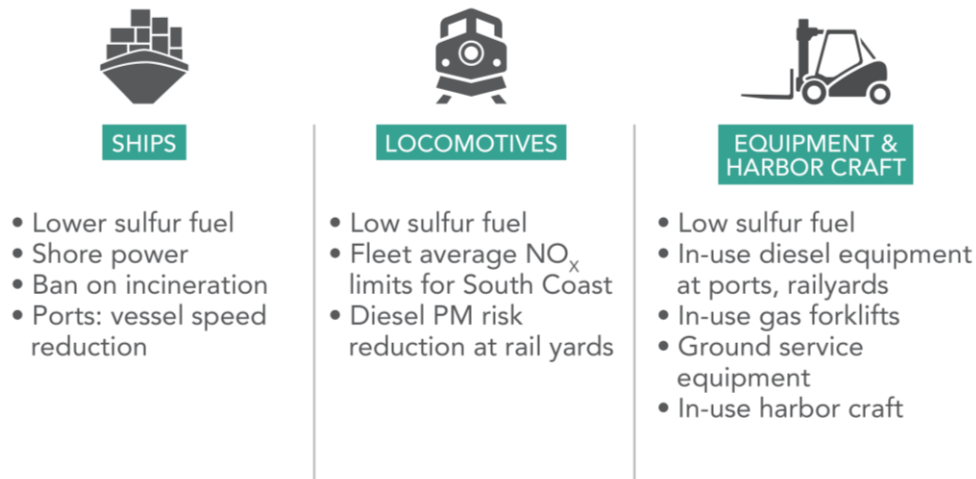
CARB and air districts partner to run the programs, with CARB developing guidelines and the districts administering funds for their regions. In most cases throughout the State, selected communities have identified mobile source emissions as a target for reductions. It is likely that a significant portion of the AB 617-allocated funding will incentivize the accelerated turnover to cleaner vehicles and equipment in and around low-income and disadvantaged communities.

### C. Off-Road Sources

Off-road sources encompass equipment powered by an engine that does not operate on the road. Sources vary from ships to lawn and garden equipment and for example, include sources like locomotives, aircraft, tractors, harbor craft, off-road recreational vehicles, construction equipment, forklifts, and cargo handling equipment.

Figure VI-B-A2 illustrates the comprehensive suite of emission control measures applicable to the broad variety of engines and vehicle that fall under the Off-Road category. As a result of these emission control efforts, off-road emissions in the South Coast Air Basin have been reduced significantly since 1990 and will continue to decrease through 2037. From today, off-road NO<sub>x</sub> emissions are reduced by over 25 percent by 2037. Key programs in this sector include the Off-Road Engine Standards, Locomotive Engine Standards, Clean Diesel Fuel, Cleaner In-Use Off-Road Regulation and In-Use Large Spark Ignition (LSI) Fleet Regulation.





**FIGURE VI-B-A2  
OFF-ROAD VEHICLE AND EQUIPMENT CONTROL PROGRAMS**

## 1. Off-Road Engine Standards

The Clean Air Act preempts states, including California, from adopting requirements for new off-road engines less than 175 HP used in farm or construction equipment. California may adopt emission standards for in-use off-road engines pursuant to Section 209(e)(2), but must receive authorization from U.S. EPA before it may enforce the adopted standards.

CARB first approved regulations to control exhaust emissions from small off-road engines (SORE) such as lawn and garden equipment in December 1990 with amendments in 1998, 2003, 2010, 2011, 2016, and 2021. The 1990 – 2016 regulations were implemented through three tiers of progressively more stringent exhaust emission standards that were phased in between 1995 and 2008. The most recent suite of amendments (December 2021) requires most newly manufactured SORE engines be zero emission starting in 2024.

Manufacturers of forklift engines are subject to new engine standards for both diesel and Large Spark Ignition (LSI) engines. Off-road diesel engines were first subject to engine standards and durability requirements in 1996 while the most recent Tier 4 Final emission standards were phased in starting in 2013. Tier 4 emission standards are based on the use of advanced after-treatment technologies such as diesel particulate filters and selective catalytic reduction. LSI engines have been subject to new engine standards that include both criteria pollutant and durability requirements since 2001 with the cleanest requirements phased-in starting in 2010.

To control emissions from Transport Refrigeration Units (TRUs), CARB adopted in 2004 the Airborne Toxic Control Measure (ATCM) for In-Use Diesel-Fueled TRUs, TRU Generator Sets, and Facilities where TRUs Operate, which set increasingly stringent engine standards to reduce diesel particulate matter emissions from TRUs and TRU generator sets. The ATCM for TRUs was subsequently amended in 2010 and 2011, and most recently in February 2022, as the first phase of CARB’s current push to develop new

requirements to transition diesel-powered TRUs to zero-emission technology in two phases. The February 2022 adoption, Part 1 amendments to the existing TRU Airborne Toxic Control Measure (ATCM), requires the transition of diesel-powered truck TRUs to zero-emission. CARB plans to develop a subsequent Part 2 regulation to require zero-emission trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets, for future Board consideration.

## 2. Cleaner In-Use Off-Road Equipment (Off-Road Regulation)

The Off-Road Regulation was first approved in 2007 and subsequently amended in 2010 in light of the impacts of the economic recession. Equipment affected by this regulation are used in construction, manufacturing, the rental industry, road maintenance, airport ground support and landscaping. In December 2011, the Off-Road Regulation was modified to include on-road trucks with two diesel engines.

The Off-Road Regulation will significantly reduce emissions of diesel PM and NOx from the over 150,000 in-use off-road diesel vehicles that operate in California. The Regulation affects dozens of vehicle types used in thousands of fleets by requiring owners to modernize their fleets by replacing older engines or vehicles with newer, cleaner models, retiring older vehicles or using them less often, or by applying retrofit exhaust controls.

The Off-Road Regulation imposes idling limits on off-road diesel vehicles, requires a written idling policy, and requires a disclosure when selling vehicles. The Regulation also requires that all vehicles be reported to CARB and labeled, restricts the addition of older vehicles into fleets, and requires fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing verified exhaust retrofits. The requirements and compliance dates of the Off-Road Regulation vary by fleet size.

Fleets are subject to increasingly stringent restrictions on adding older vehicles. The regulation also sets performance requirements. While the regulation has many specific provisions, in general by each compliance deadline, a fleet must demonstrate that it has either met the fleet average target for that year, or has completed the Best Available Control Technology requirements. The performance requirements of the Off-Road Regulation were phased in from January 1, 2014 through January 1, 2019.

Compliance assistance and outreach activities in support of the Off-Road Regulation include:

- The Diesel Off-road On-line Reporting System, an online reporting tool developed and maintained by CARB staff;
- The Diesel Hotline (866-6DIESEL), which provides the regulated public with questions about the regulations and access to CARB staff. Staff is able to respond to questions in English, Spanish and Punjabi; and
- The Off-road Listserv, providing equipment owners and dealerships with timely announcement of regulatory changes, regulatory assistance documents, and reminders for deadlines.

## 3. Clean Diesel Fuel

Since 1993, CARB has required that diesel fuel have a limit on the aromatic hydrocarbon content and sulfur content of the fuel. Diesel powered vehicles account for a disproportionate amount of the diesel particulate matter which is considered a toxic air contaminant by the State of California. In 2006, CARB

required a low-sulfur diesel fuel to be used not only by on-road diesel vehicles but also for off-road engines. The diesel fuel regulation allows alternative diesel formulations as long as emission reductions are equivalent to the CARB formulation.

#### 4. Locomotive Engine Standards

The Clean Air Act and the U.S. EPA national locomotive regulations expressly preempt states and local governments from adopting or enforcing “any standard or other requirement relating to the control of emissions from new locomotives and new engines used in locomotives” (U.S. EPA interpreted new engines in locomotives to mean remanufactured engines, as well). U.S. EPA has approved two sets of national locomotive emission regulations (1998 and 2008). In 1998, U.S. EPA approved the initial set of national locomotive emission regulations. These regulations primarily emphasized NO<sub>x</sub> reductions through Tier 0, 1, and 2 emission standards. Tier 2 NO<sub>x</sub> emission standards reduced older uncontrolled locomotive NO<sub>x</sub> emissions by up to 60 percent, from 13.2 to 5.5 g/bhphr.

In 2008, U.S. EPA approved a second set of national locomotive regulations. Older locomotives upon remanufacture are required to meet more stringent particulate matter (PM) emission standards which are about 50 percent cleaner than Tier 0-2 PM emission standards. U.S. EPA refers to the PM locomotive remanufacture emission standards as Tier 0+, Tier 1+, and Tier 2+. The new Tier 3 PM emission standard (0.1 g/bhp-hr), for model years 2012-2014, is the same as the Tier 2+ remanufacture PM emission standard. The 2008 regulations also included new Tier 4 (2015 and later model years) locomotive NO<sub>x</sub> and PM emission standards. The U.S. EPA Tier 4 NO<sub>x</sub> and PM emission standards further reduced emissions by approximately 95 percent from uncontrolled levels.

In April 2017, CARB petitioned U.S. EPA for rulemaking, seeking the amendment of emission standards for newly built locomotives and locomotive engines and lower emission standards for remanufactured locomotives and locomotive engines. The petition asks U.S. EPA to update its standards to take effect for remanufactured locomotives in 2023 and for newly built locomotives in 2025. The new emission standards would provide critical criteria pollutant reductions, particularly in the disadvantaged communities that surround railyards. U.S. EPA has not yet responded to this petition.

#### 5. Marine Sources and Ocean-Going Vessels (OGVs)

To reduce emissions from Ocean Going Vessels (OGV), CARB has adopted the Ocean-Going Vessel Fuel Regulation, “Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline” (2008) and the Ocean-Going Vessels At-Berth Regulation (2007).

The At-Berth- Regulation requires container ships, passenger ships, and refrigerated-cargo ships at six California ports to meet compliance requirements for auxiliary engines while they are docked, including emission or power reduction requirements. Reduced vessel speeds also provide emission reduction benefits, and programs are operated by local air districts along the California coast to incentivize lower speeds. CARB staff received comments during the public process about including a statewide vessel speed reduction program. In the 2022 State SIP Strategy, the CARB measure for ‘Future Emissions Reductions from Ocean-Going Vessels’ considers options available under CARB authority to achieve further emissions reductions, including developing a statewide vessel speed reduction program.

In 2007, CARB adopted the Commercial Harbor Craft Regulation (CHC Regulation), which reduces toxic and criteria emissions. Commercial harbor craft include any private, commercial, government, or military marine vessels including, but not limited to ferries, excursion vessels, tugboats (including ocean-going tugboats), barges, and commercial and commercial passenger fishing boats. This regulation was subsequently amended in 2010, and again in March 2022, to establish expanded and more stringent in-use requirements to cover more vessel categories and mandate accelerated deployment of zero-emission and advanced technologies in vessel categories where technology feasibility has been demonstrated.

To control emissions from personal watercraft, CARB staff is also exploring development of Spark-Ignition Marine Engine Standards, as described in the 2022 State SIP Strategy. For this measure, CARB would develop and propose catalyst based standards for outboard and personal watercraft engines greater than or equal to 40 kW in power that will gradually reduce emission standards to approximately 70 percent below current levels, and consider actions that would require a percentage of outboard and personal watercraft vessels to be propelled by zero-emission technologies for certain applications.

## 6. Large Spark-Ignition (LSI) Engines and Forklifts

Forklift fleets are subject to in-use fleet requirements either under the LSI fleet regulation, if fueled by gasoline or propane, or under the off-road diesel fleet regulation, if fueled by diesel. Both regulations require fleets to retire, repower, or replace higher-emitting equipment in order to maintain fleet average standards.

Large spark-ignition engines, which are defined as spark-ignition (i.e., Otto-cycle) engines greater than 25 horsepower, are used in a variety of equipment, including, but not limited to, forklifts, airport ground support equipment (GSE), sweeper/scrubbers, industrial tow tractors, generator sets, and irrigation pumps. LSI equipment is found in approximately 2,000 fleets throughout the state operating at warehouses and distribution centers, seaports, airports, railyards, manufacturing plants, and many other commercial and industrial facilities.

CARB first adopted emission standards for off-road LSI engines in 1998. The original LSI regulation required engine manufacturers to certify new LSI engines to a 3.0 gram per brake horsepower-hour (g/bhp-hr) standard that, by 2004, represented a 75 percent reduction in emissions compared with uncontrolled LSI. Building on this success, in 2002, U.S. EPA subsequently harmonized the national standard with California's standard, starting with the 2004 model year and adopted a more stringent 2.0 g/bhp-hr standard for 2007 and subsequent model year engines. The federal program demonstrated that additional reductions from new engines were technically feasible and cost-effective. In the 2003 State Implementation Plan for Ozone (2003 SIP), California committed to two additional LSI measures—one for the development of more stringent new engine standards and another for the development of in-use fleet requirements.

CARB adopted these two LSI measures in a 2006 rulemaking, which harmonized California's standard with U.S. EPA's 2.0 g/bhp-hr standard starting with the 2007 model year, set forth a more stringent 0.6 g/bhp-hr California standard starting with the 2010 model year, and established in-use LSI fleet requirements. The 0.6 g/bhp-hr standard represents a 95 percent emission reduction versus uncontrolled LSI engines and is still in effect today.

The in-use element of the 2006 rulemaking, adopted as the Large Spark-Ignition Engine Fleet Requirements Regulation (LSI Fleet Regulation), which was eventually amended in 2010 and 2016, requires fleet operators with four or more LSI forklifts to meet fleet average emission standards. The 2006 LSI rulemaking and 2010 amendments required specific hydrocarbon + NOx fleet average emission level standards that became increasingly more stringent over time. The focus of the 2016 amendments was to collect data from fleet operators in order to inform the development of requirements that would support the broad-scale deployment of Zero-Emission equipment in LSI applications. The 2016 amendments also required fleet operators to report key compliance information to CARB, and extended to 2023 requirements from the prior LSI Fleet Regulations that were otherwise due to sunset in 2016.

## 7. Cargo Handling Equipment (CHE)

Cargo handling equipment (CHE) include yard trucks (hostlers), rubber-tired gantry cranes, container handlers, forklifts, dozers, and other types. The Cargo Handling Equipment (CHE) Regulation established requirements for in-use and newly purchased diesel-powered equipment at ports and intermodal rail yards. CARB adopted the CHE in 2005, which established best available control technology (BACT) for new and in-use mobile CHE that operate at California's ports and intermodal rail yards through accelerated turnover of older equipment through retrofits and/or replacement to cleaner on- or off-road engines. Since 2006, the CHE Regulation has resulted in reductions of diesel PM and NOx at ports and intermodal rail yards throughout California.

## 8. Incentive Programs

There are many different incentive programs focusing on off-road mobile sources that increase the penetration of cleaner technologies into the market. The incentive programs encourage the purchase of cleaner off-road combustion engines and equipment, and zero-emission technologies. CARB is expanding incentives for zero-emission off-road equipment through targeted demonstration and pilot project categories in the off-road sector, and increased funding.

### a) Low Carbon Transportation Investments and Air Quality Improvement Program (Clean Transportation Incentives)

As mentioned earlier, \$873 million was allocated in the FY 2020-2021 budget for off-road equipment and on-road heavy-duty trucks under the Clean Transportation Incentives programs. In the off-road sector, major programs include the Clean Off-Road Equipment Voucher Incentive Project (CORE), and Demonstration and Pilot Programs. Off-road equipment categories that are prioritized for funding include agricultural and construction equipment, small off-road engines (SORE) such as lawn and garden equipment, heavier cargo handling equipment (CHE), and ZE applications at railyards, marine ports, freight facilities, and along freight corridors.

#### v. Clean Off-Road Equipment Voucher Incentive Project

The Clean Off-Road Equipment Voucher Incentive Project (CORE) is a voucher project similar to HVIP, but for advanced technology off-road equipment. CORE is intended to accelerate deployment of advanced technology in the off-road sector by providing a streamlined way for fleets to access funding that helps offset the incremental cost of such technology. CORE targets commercial-ready products that have not

yet achieved a significant market foothold. By promoting the purchase of clean technology over internal combustion options, the project is expected to reduce emissions, particularly in areas that are most impacted, help build confidence in zero-emission technology in support of CARB strategies and subsequent regulatory efforts where possible, and provide other sector-wide benefits, such as technology transferability, reductions in advanced-technology component costs, and larger infrastructure investments. CORE provides vouchers to California purchasers and lessees of zero-emission off-road equipment on a first-come, first-served basis, with increased incentives for equipment located in disadvantaged communities.

CARB launched CORE at the end of 2019 through a one-time \$40 million allocation in the fiscal year 2017-18 Funding Plan to support zero-emission freight equipment through CORE. Since that time, CORE has been allocated significant additional funds, including \$194.95 million from the FY 2021-22 budget. This allocation includes \$30 million of dedicated funds appropriated by the Legislature in SB 170 to provide incentives for professional landscaping services in California operated by small businesses or sole proprietors to purchase zero-emission small off-road equipment.

vi. Demonstration and Pilot Projects

As mentioned earlier, in FY 2021-22, \$80 million was allocated for off-road and onroad heavy-duty advanced technology demonstration and pilot projects. CARB is focusing funding on off-road demonstration and pilot projects that include heavier cargo handling equipment (CHE), clean equipment in rail, marine, and ports applications, and zero-emission equipment along freight facilities/corridors.

For the *Port of LA Multi-Source Facility Demonstration Project*, the Los Angeles Harbor Department (Port of LA) was awarded \$14.5 million to operate multiple near zero- or zero-emission technologies to move goods from ships through the Green Omni Terminal. This project is demonstrating the viability of electrified CHE, forklifts, and a ships at-berth vessel emissions control system. The *Zero-Emission Freight "Shore to Store"* Project will use \$41.1 million to fund electric yard tractors, hydrogen fuel cell Class 8 on-road trucks, and a large capacity hydrogen fueling station in Ontario, CA. Additional zero- and near zero-emission freight facility projects include a \$5.8 million *Zero-Emission for California Ports* project at the Port of LA, which will fund hybrid fuel cell and electric yard trucks, as well as hydrogen fueling stations. Further, the San Joaquin Valley's *Net-Zero Farming and Freight Facility Demonstration Project* is funding battery electric trucks equipped with all-electric transport refrigeration units (eTRUs) to facilitate clean freight transport, and transportation of agricultural produce between packing and warehouse facilities.

**b) Funding Agricultural Replacement Measures for Emission Reductions (FARMER)**

California's agricultural industry consists of approximately 77,500 farms and ranches, providing over 400 different commodities, making agriculture one of the State's most diverse industries. In recognition of the strong need and this industry's dedication to reducing their emissions, the Legislature has allocated over \$323 million towards the Funding Agricultural Replacement Measures for Emission Reductions (FARMER) Program since 2017. The program provides funding through local air districts for incentivizing the introduction of lower-emissions agricultural harvesting equipment, heavy-duty trucks, agricultural pump engines, tractors, and other equipment used in agricultural operations. Since October 2019, the FARMER Program also includes a project category for demonstration projects and modifications to the zero-emission agricultural utility terrain vehicle (UTV), heavy-duty agricultural truck, and off-road mobile

agricultural equipment trade-up pilot project categories. As of September 30, 2021, the FARMER Program has spent \$289.7 million on over 6,600 pieces of agricultural equipment and will reduce 1,120 tons of PM<sub>2.5</sub> and 18,700 tons of NO<sub>x</sub> over the lifetime of the projects, Statewide.

#### c) Moyer Program

In addition to funding on-road incentives, the Moyer Program provides monetary grants to reduce emissions from off-road equipment such as construction and agricultural equipment, marine vessels and locomotives, forklifts, TRUs, and airport ground support equipment.

#### d) Goods Movement Emission Reduction Program (Prop 1B)

As discussed earlier, Proposition 1B was a \$1 billion partnership between CARB and local agencies, air districts, and seaports to quickly reduce air pollution emissions and health risk from freight movement along California's trade corridors. Over the course of six years, the program has upgraded ships at-berth, cargo handling equipment, locomotives, TRUs, and harbor craft.

## II. Conclusion

In conclusion, CARB has implemented the most comprehensive mobile source emissions control program in the nation. CARB's mobile source control program is robust and targets all sources of emissions through a four-pronged approach. First, increasingly stringent emissions standards drive the use of the cleanest available engines and equipment, and minimize emissions from new vehicles and equipment. Second, to speed the turnover of older, dirtier engines and equipment to cleaner new equipment, in-use programs target emissions from the existing fleet by requiring vehicle and fleet owners to transition legacy fleets and vehicles to the cleanest vehicles and emissions control technologies. Third, incentive programs help fleet owners to replace older, dirtier vehicles and equipment with the cleanest technologies, while also facilitating the development of the next generation of clean technologies that are needed to meet future air quality targets. Finally, cleaner fuels minimize emissions from all combustion engines being used across the State.

This multi-faceted approach has not only spurred the development and use of increasingly cleaner technologies and fuels, it has also provided significant emission reductions across all mobile source sectors that go far beyond national programs or programs in other states.