

Chapter 5

Attainment Demonstration



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Chapter 5: Attainment Demonstration

Under the federal Clean Air Act (CAA) and consistent with the U.S. Environmental Protection Agency's (EPA) 2018 Implementation Rule for the 2015 8-hour ozone National Ambient Air Quality Standards (NAAQS), attainment plans must address a number of requirements related to demonstrating attainment of the standard as expeditiously as practicable, but no later than the required 2037 attainment deadline.^{1,2} For each nonattainment area for which an attainment demonstration is required, which includes the San Joaquin Valley (Valley), that area must provide for implementation of all reasonably available control measures needed for attainment as expeditiously as practicable. Through comprehensive existing stationary source control strategy, in addition to new regulatory commitments from the California Air Resources Board (CARB), the Valley will experience reduced nitrogen oxide (NOx) emissions by over 70% between 2018 and 2037. Valley residents will benefit from dramatically decreased ambient ozone concentrations over time.

This chapter demonstrates that all reasonably available control measures (RACM), to meet reasonable further progress (RFP) and demonstrate attainment as expeditiously as practicable, are implemented in the Valley.

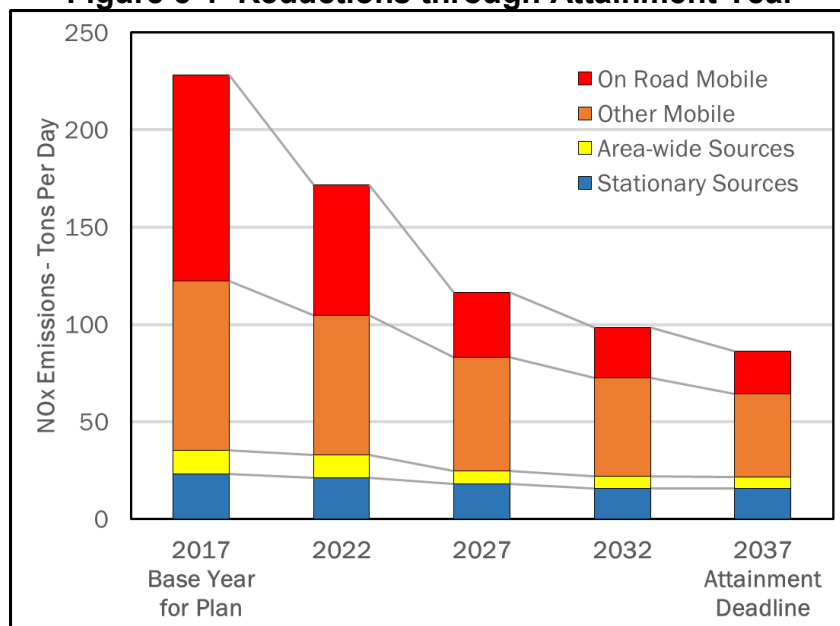
5.1 MODELING ATTAINMENT DEMONSTRATION

Under the federal CAA³ and consistent with EPA's 2018 Implementation Rule¹, the San Joaquin Valley Air Pollution Control District (District) must demonstrate attainment as expeditiously as practicable, no later than the attainment deadline of 2037, using air monitoring data for the period of 2035, 2036, and 2037. Modeling shows that the aggressive regulations currently adopted and committed to in the *2022 Ozone Plan* will bring the Valley into attainment of the 2015 8-hour ozone standard, with a 72% reduction in NOx emissions between 2018 and 2037, without the use of a black box, pursuant to CAA §182(e)(5).

¹ EPA. *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements; Final Rule*. 83 Fed. Reg. 234. P. 63003. (2018, December 6), (to be codified at 40 CFR Part 51.) <https://www.govinfo.gov/content/pkg/FR-2018-12-06/pdf/2018-25424.pdf>

² EPA. *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements; Final Rule*. 83 Fed. Reg. 234. Pp. 63007-63008. (2018, December 6), (to be codified at 40 CFR Part 51.) <https://www.govinfo.gov/content/pkg/FR-2018-12-06/pdf/2018-25424.pdf>

³ CAA §182(c)(2)(A)

Figure 5-1 Reductions through Attainment Year

As presented in Appendix F, CARB used a modeled attainment test consistent with EPA guidelines to predict future 8-hour ozone concentrations at each monitoring site in the Valley and to demonstrate attainment. A photochemical model simulates the observed ozone levels using precursor emissions and meteorology in the region. The model also simulates future ozone levels based on projected changes in emissions while keeping the meteorology constant. This modeling identifies the relative benefits of controlling different ozone precursor pollutants and the most expeditious attainment date. Appendix F contains the modeling protocol for this Plan, in addition to a summary of the modeling process and results.

As detailed in Appendix F and summarized below in Section 5.2, modeling conducted by CARB shows that the Valley will attain the 8-hour ozone standard by 2037 based on implementation of the existing control strategy, coupled with regulatory commitments from CARB. As the Valley approaches attainment, the monitoring site with the highest predicted ozone concentration will be the Clovis monitor in Central Valley, with a future design value of 68 ppb in 2037 (Table 5-2).

5.2 MODELING

[This section provided by California Air Resources Board]

Photochemical modeling plays a crucial role in the SIP process to demonstrate attainment of air quality standards based on estimated future emissions and for the development of emissions targets necessary for attainment. Currently, the San Joaquin Valley nonattainment area (SVJ or the Valley) is designated as an extreme ozone nonattainment area for the 2015 0.070 ppm (or 70 ppb) 8-hour ozone standard and must demonstrate attainment of the standard by 2037. Consistent with U.S. EPA

guidelines for model attainment demonstrations (U.S. EPA, 2018), photochemical modeling was used to estimate the future year 2037 ozone (O₃) design values (DVs) at each monitoring site in the Valley in order to show attainment of the standard by 2037.

The findings of the Valley's model attainment demonstration are summarized below. Additional information and a detailed description of the procedures employed in this modeling are available in the Modeling Protocol and Attainment Demonstration Appendix of this document.

U.S. EPA modeling guidance (U.S. EPA, 2018) outlines the approach for utilizing regional chemical transport models (CTMs) to predict future attainment of the 2015 (70 ppb) 8-hour ozone standard. The model attainment demonstration (Appendix F) requires that CTMs be used in a relative sense, where the relative change in ozone to a given set of emission reductions (i.e., predicted change in future anthropogenic emissions) is modeled, and then used to predict how current/present-day ozone levels would change under the future emissions scenario.

The starting point for the attainment demonstration is the observational based DV, which is used to determine the compliance with the ozone standards. The DV for a specific monitor and year represents the three-year average of the annual 4th highest 8-hour ozone mixing ratio observed at the monitor. The U.S. EPA recommends using an average of three DVs to better account for the year-to-year variability in ozone levels due to meteorology. This average DV is called a weighted DV (in the context of this SIP document, the weighted DV will also be referred to as the reference year DV or DVR). Since 2018 represents the reference year for projecting DVs to the future, site-specific DVs should be calculated for the three-year periods ending in 2018, 2019, and 2020, and then these three DVs are averaged. However, 2020 was an atypical year with large societal changes in response to the COVID19 pandemic and is not suitable for use in the DVR calculation. To remove the impact from 2020 observations, we utilize an alternative methodology for calculating the average DVs by excluding year 2020. In this method, the 8-hour O₃ DV for 2020 was replaced by the two-year average of the 4th highest 8-hour O₃ concentrations from 2018 and 2019.

These reference DVs serve as the anchor point for estimating future year projected design values. The year 2037 was the future year modeled in this attainment demonstration since that is the year for which attainment must be demonstrated.

Projecting the reference DVs to the future requires three photochemical model simulations, described below:

1. Base Year Simulation

The base year simulation for 2018 is used to assess model performance (i.e., to ensure that the model is reasonably able to reproduce the observed ozone mixing ratios). Since this simulation will be used to assess model performance, it is essential to include as much day-specific detail as possible in the emissions inventory, including, but not limited to hourly adjustments to the motor vehicle

and biogenic inventories based on local meteorological conditions, known wildfire and agricultural burning events, and any exceptional events such as refinery fires.

2. Reference Year Simulation

The reference year simulation was identical to the base year simulation, except that certain emissions events which are either random and/or cannot be projected to the future are removed from the emissions inventory. For 2018, the only difference between the base and reference year simulations was that wildfires were excluded from the reference year simulation.

3. Future Year Simulation

The future year simulation (2037) was identical to the reference year simulation, except that the projected future year anthropogenic emission levels were used rather than the reference year emission levels. All other model inputs (e.g., meteorology, chemical boundary conditions, biogenic emissions, and calendar for day-of-week specifications in the inventory) are the same as those used in the reference year simulation.

Table 5-1 summarizes the 2018 and 2037 SJV anthropogenic emissions used in the attainment demonstration modeling. The anthropogenic emissions inventory used in this modeling was based on the California Emissions Projection Analysis Model (CEPAM) v1.03 augmented with updates consistent with CEPAM v1.04 for select source categories. Overall, anthropogenic NO_x emissions in CEPAMv1.04 were projected to decrease by ~61% between 2018 and 2037 from 221.8 tpd to 87.3 tpd with bulk of the reductions coming from on-road mobile sources. In contrast, anthropogenic ROG was projected to decrease by ~10% from 323.9 tpd to 290.9 tpd with the bulk of those reductions coming from all mobile sources including on-road and other mobile sources. For a detailed description of the anthropogenic emissions inventory, updates to the inventory, and how it was processed from the planning totals to a gridded inventory for modeling, see the Modeling Emissions Inventory Appendix.

Table 5-1 SJV Summer Planning Emissions for 2018 and 2037 (tons/day)

Source Category	CEPAM v1.04				With CARB Commitments	
	2018 NO _x (tpd)	2018 ROG (tpd)	2037 NO _x (tpd)	2037 ROG (tpd)	2037 NO _x (tpd)	2037 ROG (tpd)
Stationary	24.1	84.0	16.2	92.9	16.2	92.9
Area	7.7	157.1	3.6	159.2	3.6	159.2
On-road Mobile	93.4	31.2	20.9	13.4	13.2	11.2
Other Mobile	96.6	51.6	46.6	25.5	29.0	23.5
Total	221.8	323.9	87.3	291.0	62.0	286.8

* The baseline 2018 and 2037 emissions do not include Emission Reduction Credit and emission reductions from federal measures (see details in the Modeling Protocol and Attainment Demonstration Appendix of this document)

As part of the model attainment demonstration, the fractional changes in ozone mixing ratios between the model reference year and model future year were calculated at each of the monitors following U.S. EPA modeling guidance and procedures outlined in the Modeling Protocol Appendix. These ratios, called “relative response factors” or RRFs, are calculated based on the ratio of modeled future year ozone to the corresponding modeled reference year ozone.

$$RRF = \frac{\frac{1}{N} \sum_{d=1}^N (MDA8 O_3)_{future}^d}{\frac{1}{N} \sum_{d=1}^N (MDA8 O_3)_{reference}^d}$$

Future year DVs at each monitor are then calculated by multiplying the corresponding reference year DV by the site-specific RRF. The results in Table 5-2 show that all monitoring sites in the Valley have a future DV less than 70 ppb based on the 2037 emissions inventory, with the Clovis monitor in Central SJV having the highest predicted future design value of 68 ppb in 2037. Therefore, the attainment demonstration modeling predicts that the entire Valley will attain the 70 ppb 8-hour O₃ standard by 2037 with the commitments outlined in the SIP. For the details about the final DV calculation, please see the Modeling Protocol and Attainment Demonstration Appendix.

Table 5-2 Summary of 2018 weighted average and future year 2037 ozone design value (DV) at SJV monitoring sites, where the 2037 DVs include the effects of CARB commitments but exclude federal clean truck and Tier 5 off-road commitments

Sub-region	Site	2018 Average DV (ppb)	2037 Truncated DV (ppb)
Northern SJV	Turlock-S Minaret St.	82.3	65
Northern SJV	Modesto-14th St.	79.3	66
Northern SJV	Merced-S Coffee Av.	76.7	60
Northern SJV	Tracy-Airport	73.7	64
Northern SJV	Stockton-Hazelton St.	66.0	58
Central SJV	Fresno-Garland	85.7	68
Central SJV	Clovis	85.3	68
Central SJV	Parlier	84.3	64
Central SJV	Fresno-Drummond St.	82.0	65
Central SJV	Fresno- Sierra Skypark #2	80.0	63
Central SJV	Hanford-S. Irwin St.	80.0	65
Central SJV	Madera-28261 Avenue 14	77.7	60
Central SJV	Madera-Pump Yard	75.7	61
Central SJV	Tranquility	72.7	61
Southern SJV	Edison	89.0	62
Southern SJV	Arvin-Di Giorgio	88.0	61
Southern SJV	Bakersfield-5558 California Avenue	87.3	66
Southern SJV	Sequoia and Kings Canyon Natl Park	86.7	61
Southern SJV	Bakersfield-Municipal Airport	85.3	61

Sub-region	Site	2018 Average DV (ppb)	2037 Truncated DV (ppb)
Southern SJV	Visalia-N Church Street	84.0	64
Southern SJV	Maricopa-Stanislaus Street	83.7	66
Southern SJV	Sequoia Natl Park-Lower Kaweah	83.3	59
Southern SJV	Oildale-3311 Manor Street	83.0	63
Southern SJV	Shafter-Walker Street	79.7	62
Southern SJV	Porterville-1839 Newcomb Street	78.0	58

5.3 REASONABLY AVAILABLE CONTROL MEASURES (RACM) DEMONSTRATION

CAA Section 172(c)(1) and EPA's 2018 Implementation Rule⁴ require that attainment plans include a demonstration that the area has adopted all reasonably available measures to meet RFP requirements and demonstrate attainment as expeditiously as practicable. Nonattainment areas should consider all available measures, including those implemented in other areas, and adopt measures determined to be economically and technologically feasible and that will advance the attainment date or are necessary for RFP. Conversely, the demonstration must also indicate that there are no additional reasonably available measures that will advance the attainment date by at least one year or contribute to RFP for the area. Modeling for this and previous ozone plans has shown that the Valley is NO_x limited. NO_x emission reductions are most effective in reducing Valley ozone concentrations, whereas Valley ozone is not as responsive to volatile organic compound (VOC) emission reductions and therefore, VOC emission reductions have minimal impact on advancing attainment. Advancing attainment by one year would then depend on expediting NO_x emission reductions. The District is currently implementing all reasonably available control measures for NO_x.

5.3.1 District RACM Demonstration

As presented in Appendix C, the District is currently implementing all reasonably available control measures under the District's jurisdiction; therefore, there are no additional reasonably available measures to implement that would provide further emissions reductions.

5.3.2 CARB RACM Demonstration

[This section provided by California Air Resources Board]

The Clean Air Act (Act) 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 ppb 8-hour ozone standard, California's mobile source and consumer products measures along with the

⁴ EPA. *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements; Final Rule*. 83 Fed. Reg. 234. Pp. 63007-63008. (2018, December 6), (to be codified at 40 CFR Part 51.) <https://www.govinfo.gov/content/pkg/FR-2018-12-06/pdf/2018-25424.pdf>

Department of Pesticides (DPR) measures meet the RACM requirement in the San Joaquin Valley.

5.3.2.1 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 Act requires 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 the State continues 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.

5.3.2.2 RACM for Mobile Sources

5.3.2.2.1 Waiver and Authorizations

While section 209 of the Act 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 Act 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 engines⁵ – 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 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-

⁵ Locomotives and engines less than 175 horsepower (hp) used in farm and construction equipment are exempt from California's waiver authority.

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 Act 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 Act, 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.

5.3.2.2.2 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)⁶ 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, as well as supporting attainment for 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 measures included in the 2022 State SIP Strategy

⁶ 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>

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.

5.3.2.2.3 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 NOx 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 ACC program, which includes the LEV III and 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. 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. There are no additional

measures that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.2.2.4 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_x and PM_{2.5} 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 Heavy-Duty Truck Idling Requirements.

In 2013, California recognized the heavy-duty engines could be cleaner and established optional low-NO_x 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 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 NO_x emissions from new heavy-duty engines are regulated in California. The Omnibus Regulation also includes in-use standards that significantly reduce tailpipe NO_x 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 ACT 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. 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 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 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 incentivize 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. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.2.2.5 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 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 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 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 + NO_x 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 units (TRUs) to zero-emission technology in two phases. CARB adopted the Part 1 amendments to the existing TRU 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 Tier 5 Off-Road New Compression-Ignition Engine Standards measure to reduce NO_x 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 NO_x.

CARB is also developing a measure, as described in the 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. There are no additional measures, that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.2.2.6 Marine Sources

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 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 2022 State SIP Strategy, the 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 technological 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 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.

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. There are no additional measures, that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.2.2.7 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. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.2.2.8 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 through the waiver process, and in their approvals of CARB's regulations and District plans.

In its 2019 approval of the Valley's 2016 Ozone Plan for the 75 ppb 8-hour ozone standard, which included the State's current control program and new measure commitments from the 2016 State SIP Strategy, U.S. EPA found that,

"There are no additional reasonably available control measures that would advance attainment of the 2008 ozone standards in the San Joaquin Valley...

therefore, the 2016 Ozone Plan provides for the implementation of all RACM as required by [the] CAA.”⁷

In addition to declarations that the mobile source control program meets RACM requirements, U.S. EPA has also provided past determinations that CARB’s mobile source control programs meet the more rigorous Best Available Control Measure (BACM) requirements. As BACM requirements are considered a more stringent threshold to meet than RACM, U.S. EPA has stated that a determination that the control program has meet BACM requirements also constitutes a conclusion that it meets RACM requirements.⁸ U.S. EPA has acknowledged CARB’s mobile source control program as meeting BACM in and in their 2019 approval of the South Coast’s PM2.5 Serious Area Plan.⁹ In their 2018 proposal for that approval, U.S. EPA noted that,

“With respect to mobile sources, we recognize that CARB's current program addresses the full range of mobile sources in the South Coast through regulatory programs for both new and in-use vehicles... Overall, we believe that the program developed and administered by CARB and SCAG provide for the implementation of BACM for PM2.5 and PM2.5 precursors in the South Coast nonattainment area.”¹⁰

In their 2020 approval of the San Joaquin Valley’s PM2.5 Serious Area 2018 Plan,¹¹ U.S. EPA further found that CARB’s mobile source control program met the more stringent level of Most Stringent Measures (MSM). In their 2020 proposal for that plan, U.S. EPA found that,

“CARB’s programs constitute the most stringent emission control programs currently available for the mobile source and fuels categories, taking into account economic and technological feasibility.”¹²

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 CARB’s control measures includes an extensive public process and is consistent with U.S. EPA RACM guidance. Through this process, CARB found that with the current

⁷ 84 FR 3302 <https://www.federalregister.gov/documents/2019/02/12/2019-01686/clean-air-plans-2008-8-hour-ozone-nonattainment-area-requirements-san-joaquin-valley-california>

⁸ “We interpret the BACM requirement as generally subsuming the RACM requirement (i.e., if we determine that the measures are indeed the “best available,” we have necessarily concluded that they are “reasonably available”). Consequently, our proposed approval of the... provisions relating to the implementation of BACM also constitutes a proposed finding that the Plan provides for the implementation of RACM.”

⁹ 69 FR 5411 <https://www.federalregister.gov/documents/2004/02/04/04-2264/approval-and-promulgation-of-implementation-plans-for-california-san-joaquin-valley-pm-10>

¹⁰ 83 FR 49872 <https://www.federalregister.gov/documents/2018/10/03/2018-21560/approval-and-promulgation-of-implementation-plans-california-south-coast-serious-area-plan-for-the>

¹¹ 85 FR 44192 <https://www.federalregister.gov/documents/2020/07/22/2020-14471/clean-air-plans-2006-fine-particulate-matter-nonattainment-area-requirements-san-joaquin-valley>

¹² 85 FR 17382 <https://www.federalregister.gov/documents/2020/03/27/2020-05914/clean-air-plans-2006-fine-particulate-matter-nonattainment-area-requirements-san-joaquin-valley>

mobile source control program and new measures, there are no additional reasonable available control measures that would advance attainment of the 70 ppb 8-hour ozone standard in the San Joaquin Valley 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.

5.3.2.3 RACM for Consumer Products

Consumer products are defined as chemically formulated products used by household and institutional consumers. For thirty 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. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.2.4 RACM for Pesticides

DPR is the State agency responsible for regulating the application of pesticides, which are a source of VOCs in the San Joaquin Valley. California began including in the SIP controls to reduce VOC emissions from pesticide applications in the 1994 Ozone SIP. The 1994 Ozone SIP included a Pesticide Element, which committed the State to reducing VOC emissions from agricultural and commercial structural pesticides in the San Joaquin Valley by 12 percent of the 1990 base year emissions by 1999.¹³

¹³ 62 FR 1150 (U.S. EPA, 1997) Final Approval of the 1994 Pesticide SIP <https://www.govinfo.gov/content/pkg/FR-1997-01-08/pdf/97-144.pdf>

In 2009, California revised the Pesticide SIP Commitment for the Valley, which U.S. EPA approved in 2012. The Revised SIP Commitment for the San Joaquin Valley set an 18.1 tons per day VOC emissions cap to ensure that emissions from agricultural and commercial structural pesticide use do not exceed the equivalent of the Valley's 12 percent reduction commitment from the 1994 Pesticide Element.¹⁴ Also approved by U.S. EPA in 2012 were a suite of updated pesticide regulations that control emissions from fumigant and nonfumigant pesticides, and require the use of low-emitting fumigation methods during the May-October season, submitted by California into the SIP in 2009. DPR is also required to annually prepare and make available to the public a pesticide emission inventory to track VOCs and determine compliance.¹⁵

As nonfumigant emissions account for the majority of the pesticide VOC emissions in the San Joaquin Valley, DPR adopted in 2013 a suite of regulations to control emissions from nonfumigant pesticides; U.S. EPA approved these regulations into the SIP in 2016.¹⁶ The nonfumigant regulations establish limits on the sale and use of high-VOC formulations of nonfumigant pesticide products that contain any of four specified primary active ingredients for use on seven specified crops grown in the San Joaquin Valley. These restrictions are triggered when forecasted VOC emissions meet or exceed 95 percent of the 18.1 tpd VOC emissions cap. Once triggered, these prohibitions remain in effect until VOC emissions from non-fumigants fall below 95 percent of the Valley's 18.1 tpd VOC emissions cap for at least two consecutive years. This suite of regulations went into effect in 2015 and has significantly reduced VOC emissions from the nonfumigant source category; pesticide applications subject to these restrictions accounted for 30 percent of total nonfumigant emissions prior to the restrictions (2014), but only 10 percent in 2019.¹⁷

As part of the regulation submittal process, DPR conducted an Analysis of Alternatives for Nonfumigant Pesticide Products. U.S. EPA found nonfumigant pesticides are subject to RACM but not to RACT requirements, because there are no major sources of nonfumigant VOCs in the Valley and no relevant U.S. EPA Control Techniques Guidelines.¹⁸ However, U.S. EPA pointed out that DPR has demonstrated these fumigant regulations are stringent enough to implement RACT-level controls on the application of pesticides. U.S. EPA also indicated these rules are consistent with the Act requirements and existing guidance on enforceability, stringency, and SIP revisions.¹⁹

¹⁴ 77 FR 65294 <https://www.federalregister.gov/documents/2012/10/26/2012-26311/approval-and-promulgation-of-implementation-plans-california-revisions-to-the-california-state>

¹⁵ 77 FR 65294 <https://www.federalregister.gov/documents/2012/10/26/2012-26311/approval-and-promulgation-of-implementation-plans-california-revisions-to-the-california-state>

¹⁶ 81 FR 64350 <https://www.federalregister.gov/documents/2016/09/20/2016-22499/approval-of-california-air-plan-revisions-department-of-pesticide-regulations>

¹⁷ California DPR October 2021 "Annual Report on Volatile Organic Compound Emissions from Pesticides for 1990 – 2019" https://www.cdpr.ca.gov/docs/emon/vocs/vocproj/2019_voc_annual_report.pdf

¹⁸ 81 FR 6481 <https://www.gpo.gov/fdsys/pkg/FR-2016-02-08/pdf/2016-02314.pdf>

¹⁹ 77 FR 65294 <https://www.govinfo.gov/content/pkg/FR-2012-10-26/pdf/2012-26311.pdf>

DPR compiles and publishes annual reports on VOC emissions from pesticides. In its latest report, DPR identified that VOC emissions in 2019 in the San Joaquin Valley nonattainment area were 20 percent lower than the 1990 base year, and remain in compliance with the SIP goal benchmark of 12 percent below 1990 levels. Calculated future emissions from this source category, however, have triggered the 2013 nonfumigant regulations to go into effect for the SJV nonattainment area. DPR requires that these prohibitions will remain in effect through the October 31, 2022 period.²⁰ Beyond ensuring that the control measures in the San Joaquin Valley are maintaining that VOC emissions from pesticides do not exceed the prescribed limits, DPR assessment indicates that no other state, aside from California, is required to adopt into their SIP measures to reduce VOC emissions from pesticides. This requirement suggests that the California pesticide control program exceeds the RACT threshold of ‘reasonably available’ control technologies, and meet at least the more stringent threshold of “Best available” control technologies (BACT). Even so, in the 2022 State SIP Strategy, a new measure is included for DPR to develop and implement a statewide regulation, which may also reduce VOC emissions.

Finally, the pesticide control program currently being implemented in the San Joaquin Valley has been found by U.S. EPA to meet RACT/RACM requirements. In 2012, as part of their final approval of California’s 2009 Field Fumigant Regulations and the Revised SIP Commitment for the SJV, U.S. EPA evaluated California’s field fumigant regulations for the South Coast, Ventura County, Southeast Desert, San Joaquin Valley, and Sacramento Metropolitan nonattainment areas, and concluded that the controls met RACT requirements:

“[U.S.] EPA believes, based on the information provided in the CDPR’s alternatives analysis, and the research cited to support it, that CDPR has demonstrated that the proposed regulations are stringent enough to implement RACT-level controls on the application of pesticides.”²¹

U.S. EPA has also approved the RACM demonstration in the 80 ppb 8-hour ozone SIPs for the San Joaquin Valley and South Coast, including the VOC control measures.²² Finally, U.S. EPA has also determined that California’s pesticide control program meets the more stringent control level requirements of BACM, as was affirmed in the Technical Support Document for U.S. EPA’s action to approve California’s 2009 Field Fumigant Regulations and the Revised SIP Commitment,²³ wherein they reference their prior approval of the PM10 SIPs for South Coast and Southeast Desert²⁴ and other SIPs:

²⁰ California DPR October 2021 “Annual Report on Volatile Organic Compound Emissions from Pesticides for 1990 – 2019” https://www.cdpr.ca.gov/docs/emon/vocs/vocproj/2019_voc_annual_report.pdf

²¹ U.S. EPA *Technical Support Document for Final Rule* (August 14, 2012) <https://www.regulations.gov/document/EPA-R09-OAR-2012-0194-0023>

²² See 77 FR 12652 (March 1, 2012) (SJV 2007 8-hour Ozone SIP), and 77 FR 12674 (March 1, 2012) (South Coast 8-hour Ozone Plan)

²³ U.S. EPA *Technical Support Document for Final Rule* (August 14, 2012) <https://www.regulations.gov/document/EPA-R09-OAR-2012-0194-0023>

²⁴ 70 FR 69081 (November 14, 2005)

“The approval of the fumigant regulations is consistent with these approved RACM/BACM demonstrations and therefore will not interfere with these SIPs’ compliance with the RACM/BACM requirements.”

In summary, DPR’s pesticide regulations represent all measures that are technologically and reasonably available in the context of the San Joaquin Valley’s 70 ppb 8-hour ozone attainment plan. There are no additional measures that, when considered in aggregate, would advance the attainment date by at least one year.

5.3.3 Metropolitan Planning Organizations (MPOs) RACM Demonstration

[This section provided by the Valley Metropolitan Planning Organizations]

As discussed in Appendix D of this Plan, the Transportation Control Measure (TCM) RACM Analysis conducted by the SJV MPOs and Trinity Consultants in Spring of 2022 as part of 2022 SJV Ozone Plan development resulted in a number of new TCMs for the region. The focus of new TCMs is on complete streets and educational campaign projects that promote non-vehicular travel modes and eco-driving techniques. The TCMs selected would result in emission reductions that were either too small or impossible to quantify. Therefore, the reductions achieved from these measures would not advance the attainment date for the purposes of this RACM demonstration. See Appendix D for more details on the RACM methodology and final TCM listing for each MPO.

5.3.4 RACM Demonstration Conclusion

Currently, the Valley is implementing all reasonably available control measures and there are no reasonably available control measures from any agencies’ jurisdiction that would advance the attainment date by at least one year or contribute to RFP for the area.

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