SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

PROPOSED SAN JOAQUIN VALLEY CONTINGENCY MEASURE STATE IMPLEMENTATION PLAN REVISION

April 18, 2023

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San Joaquin Valley UNIFIED AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

1. INTRODUCTION

Under the federal Clean Air Act (CAA) and consistent with U.S. Environmental Protection Agency (EPA) guidance, attainment plans must include contingency measures that provide for additional emission reductions if the area fails to attain the air quality standard by the applicable deadline, meet a quantitative milestone, or show reasonable further progress (RFP) toward attainment of the standard. These measures are designed to achieve additional emission reductions that provide greater public health benefits to the area.

On November 26, 2021, in response to recent adverse court rulings on prior EPA actions, EPA took final action in the Federal Register to disapprove contingency measures in the *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards* (*2018 PM2.5 Plan*). These actions, detailed in Table 1, became effective on December 27, 2021.

Table 1 EPA Contingency Measure Disapprovals for PM2.5 National Ambient Air Quality Standards (NAAQS)

NAAQS	District Plan	Federal Register Disapproval Citation
1997 Annual	*2018 PM2.5 Plan* (revised in 2021)	86 FR 67329
2006 24-hour	*2018 PM2.5 Plan*	86 FR 67343
2012 Annual	*2016 PM2.5 Plan* (revised in the *2018 PM2.5 Plan*)	86 FR 67343

EPA disapproval or inaction causes regulatory uncertainty, leading to inefficiencies and confusion, and can also result in devastating consequences to public health and the economy. As a result of these EPA disapprovals, the Valley is currently under sanctions and Federal Implementation Plan (FIP) clocks for disapproved contingency measures. Under these clocks, permit offset sanctions would be imposed 18 months from the effective date of the final disapproval. Highway sanctions would be imposed six months after the permit offset sanctions. In addition, EPA would be required to finalize a FIP 24 months from the effective date of the final disapproval. The sanctions and FIP are not imposed if EPA approves a subsequent State Implementation Plan (SIP) submittal that corrects the identified deficiencies before the applicable deadline.

In response to EPA's contingency actions described above, the District and CARB are providing this SIP revision to revise the District's contingency measure commitment for the 1997, 2006, and 2012 PM2.5 standards. This strategy, developed in coordination with EPA, will be transmitted through CARB to EPA for approval and incorporation into the California SIP. This proposed contingency SIP revision would replace relevant portions of Appendices H of the *2018 PM2.5 Plan* and the *2021 Attainment Plan Revision for the 1997 Annual PM2.5 Standard* related to contingency measures.

2. WHAT IS A CONTINGENCY MEASURE?

Through an attainment plan, a region puts forth strategies to achieve air quality improvements by federal CAA mandated deadlines. Agencies strive to be thorough and scientific in air quality planning to ensure an area meets attainment of federal standards by the attainment date. However, given the large number of variables inherent in planning and air quality more generally, there is a possibility that the air quality benefits will not occur as quickly as expected. In air quality planning, a contingency measure is something that would reduce direct PM2.5 emissions or PM2.5 precursors in the event the region does not reach attainment by the applicable attainment date, fails to make RFP, fails to submit a quantitative milestone report, or fails to meet a quantitative milestone. The purpose of contingency measures is to achieve additional air quality benefits while the region and state formally revise the attainment plan pursuant to CAA requirements for plan revisions and attainment date extensions.[1]

Contingency measures "must be fully adopted rules or measures that can take effect without further action by the state or the EPA upon failure to meet milestones or attain by the attainment deadline."[2] Legal interpretations of what qualifies as approvable contingency measures under the CAA have changed over the years.

Prior to 2016, agencies could use "surplus" emissions reductions from fully adopted rules to satisfy the contingency requirement. These rules achieved continuing and new emissions reductions past the attainment deadline through phased-in implementation and ongoing technology deployment. However, in *Bahr v. EPA*, 836 F.3d 1218 (9th Cir. 2016)("*Bahr*"), the court rejected EPA's interpretation allowing for early implementation of contingency measures that provided additional emission reductions, and held instead that contingency measures may only consist of new measures that do not take effect until triggered by an applicable CAA failure.

For many years, air basins outside the Ninth Circuit were able to continue relying on emissions reductions from already-implemented measures to fulfill the contingency measure requirement. (*Louisiana Environmental Action Network v. EPA*, 283 F.3d 575 (5th Cir. 2004) ("*LEAN*"). However, in *Sierra Club v. EPA*, 21 F.4th 185 (D.C. Cir. 2021) the court cited and agreed with the *Bahr* case, superseding *LEAN* and now prohibiting all regions in the nation from relying on surplus emissions reductions from early implemented measures to satisfy contingency measure requirements. This 2021 *Sierra Club* decision (published after EPA's implementation rule for the 2012 PM2.5 NAAQS in 2016), coupled with increased nonattainment areas under increasingly stringent NAAQS, elevates the contingency measure problem to one of nation-wide significance.

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[1] EPA. *Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements; Final Rule*. 81 Fed. Reg. 164, pp. 58010-58162. (August 24, 2016). https://www.govinfo.gov/content/pkg/FR-2016-08-24/pdf/2016-18768.pdf

[2] EPA. *Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements; Final Rule*. 81 Fed. Reg. 164, pp. 58010-58162. (August 24, 2016). https://www.govinfo.gov/content/pkg/FR-2016-08-24/pdf/2016-18768.pdf

In response to *Bahr* and as part of the 75 ppb 8-hour ozone SIP due in 2016, CARB developed the statewide Enhanced Enforcement Contingency Measure (Enforcement Contingency Measure) as a part of the *2018 Updates to the California State Implementation Plan* to address the need for a triggered action as a part of the contingency measure requirement. Additionally, the District developed a new contingency measure achieving additional reductions from architectural coatings if required by an applicable CAA failure. CARB and the District worked closely with EPA regional staff in developing the contingency measure package that included the Enforcement Contingency Measure, the District architectural coatings measure and emission reductions from implementation of CARB's mobile source emissions program. As part of the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard* SIP action, EPA approved CARB's enforcement as a "SIP strengthening" measure. In this action, EPA also approved the District's architectural coatings measure and the implementation of the mobile source reductions along with a CARB emission reduction commitment as meeting the contingency measure requirement for this SIP.

Subsequently, the Association of Irritated Residents filed a lawsuit against EPA for its approval of various elements within the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard*, including the contingency measure. The Ninth Circuit Court of Appeals issued its decision in *Association of Irritated Residents v. EPA*[3] (*AIR*) that EPA's approval of the contingency element was arbitrary and capricious because EPA departed from its long-standing policy of requiring a SIP's contingency measure element to provide for emissions reductions equating to at least one year's reasonable further progress (RFP) without providing a reasoned explanation for its change in policy. The Ninth Circuit Court of Appeals held that, in line with EPA's longstanding interpretation of what is required of a contingency measure and the purpose it serves, together with *Bahr*, all reductions needed to satisfy the CAA's contingency measure requirements must come from the contingency measure itself, and that the amount of reductions needed for contingency cannot be reduced based upon surplus emission reductions from ongoing programs. In light of the holding, the current contingency framework creates several regulatory absurdities:

- Early implementation of measures improves public health and contributes to progress towards attainment of more stringent NAAQS. Withholding emissions reductions for contingencies slows public health improvements in nonattainment and environmental justice areas.
- Withholding a measure from the District's attainment strategy that achieves further emission reductions and advances attainment is unreasonable given the District's nonattainment challenges.
- Regions that are nonattainment for multiple standards must meet different RFP milestones and attainment deadlines under each NAAQS. If a region must withhold emissions reductions (e.g. NOx reductions) to satisfy a contingency measure need for one NAAQS, then that region will hinder its ability to meet milestones and attainment deadlines under other NAAQS as well.

[3] *Association of Irritated Residents v. U.S. Environmental Protection Agency*, 10 F.4th 937 (9th Cir. 2021).

- There are multiple contingency years in each SIP, and areas like the Valley must identify contingencies for multiple SIPs and NAAQS. The scarcity of available contingency measures is compounded if an area needs to identify replacement contingency measures in the future.

2.1 EPA Draft Guidance for Contingency Measures

In light of the difficulty nonattainment areas face in addressing CAA contingency requirements, the District, CARB, and other agencies have urged EPA to provide updated federal guidance. In response, EPA developed the *Draft Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter* (Draft Guidance) on March 16, 2023.[4] The District, CARB, and other local/state air quality management agencies engaged with EPA in the development of this Draft Guidance to provide technical input and recommendations through workgroup meetings and ongoing staff discussions. The purpose of the Draft Guidance is to identify solutions and flexibility related to key issues that regions face in developing approvable contingency measures, including the scarcity of available measures, implementation timelines following a contingency trigger, and the amount of reductions needed, among other issues. The Draft Guidance contains three main concepts: (1) revising the quantity of emissions reductions that contingency measures should provide to account for declining emissions inventories over time; (2) allowing for an infeasibility justification if an area is unable to identify feasible contingency measures in sufficient quantities due to a scarcity of available, qualifying measures and/or (3) revising the time period within which emissions reductions from contingency measures should occur.

3. CONTINGENCY MEASURE EMISSION REDUCTION TARGETS

In its new Draft Guidance, EPA has recognized that the longstanding policy of requiring emission reductions of one year's worth of RFP for contingency measures is extremely challenging and infeasible for areas such as the Valley. EPA's Draft Guidance therefore puts forth a new approach to calculate the recommended quantity of emission reductions, which EPA has named One Year's Worth of Progress (OYW_P). Based on this Draft Guidance, the following table summarizes the NOx and PM2.5 emission reductions needed to demonstrate that OYW_P is being achieved through the contingency measure. In EPA's draft guidance, the OYW_P value is calculated as the average emission reductions expected per year over the planning time line, expressed as a percentage of the base year emission inventory, and then applying this percentage

[4] EPA. *Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter*. March 16, 2023. Retrieved from: https://www.epa.gov/system/files/documents/2023-03/CMTF%202022%20guidance%203-16-23.pdf

to the attainment year inventory to result in an emission reduction target for contingency. In mathematical form, this would be expressed as:

$$OYW_P = \frac{\frac{(base\ year\ EI - attainment\ year\ EI)}{(attainment\ year - base\ year)}}{base\ year\ EI} * (attainment\ year\ EI)$$

The steps for the calculations for the 1997, 2006, and 2012 PM2.5 standards are detailed below, consistent with EPA's Draft Guidance.

Step 1: Calculate the annual average reductions needed to attain for each relevant precursor.

	1997 Standard	2006 Standard	2012 Standard
PM2.5 Step 1a	$62.5\ tpd - 58.06\ tpd = 4.4\ tpd$	$62.5\ tpd - 56.1\ tpd = 6.4\ tpd$	$62.5\ tpd - 58.4\ tpd = 4.1\ tpd$
PM2.5 Step 1b	$4.4\ tpd\ \div 10\ years = 0.44\ tpd$	$6.4\ tpd\ \div 11\ years = 0.58\ tpd$	$4.1\ tpd\ \div 9\ years = 0.46\ tpd$
NOx Step 1a	$317.2\ tpd - 150.6\ tpd = 166.6\ tpd$	$317.2\ tpd - 115.0\ tpd = 202.2\ tpd$	$317.2\ tpd - 179.8\ tpd = 137.4\ tpd$
NOx Step 1b	$166.6\ tpd\ \div 10\ years = 16.7\ tpd$	$115.0\ tpd\ \div 11\ years = 18.4\ tpd$	$137.4\ tpd\ \div 9\ years = 15.3\ tpd$

Step 2: Calculate the annual percentage reduction needed to attain.

	1997 Standard	2006 Standard	2012 Standard
PM2.5	$0.44\ tpd\ \div 62.5 = 0.0071\ (or\ 0.71\%)$	$0.58\ tpd\ \div 62.5 = 0.0093\ (or\ 0.93\%)$	$0.46\ tpd\ \div 62.5 = 0.0073\ (or\ 0.73\%)$
NOx	$16.7\ tpd\ \div 317.2 = 0.0525\ (or\ 5.25\%)$	$18.4\ tpd\ \div 317.2 = 0.0579\ (or\ 5.79\%)$	$15.3\ tpd\ \div 317.2 = 0.0481\ (or\ 4.81\%)$

Step 3: Calculate the amount of reductions needed for OYW of progress.

	1997 Standard	2006 Standard	2012 Standard
PM2.5	$58.06\ tpd \times 0.71\% = \mathbf{0.41\ tpd}$	$56.1\ tpd \times 0.93\% = \mathbf{0.52\ tpd}$	$58.4\ tpd \times 0.93\% = \mathbf{0.43\ tpd}$
NOx	$150.6\ tpd \times 5.25\% = \mathbf{7.91\ tpd}$	$115.0\ tpd \times 5.79\% = \mathbf{6.66\ tpd}$	$179.8\ tpd \times 4.81\% = \mathbf{8.65\ tpd}$

The following table summarizes the amount of emissions reductions needed to achieve the target, for the respective PM2.5 NAAQS, based on the OYW_P approach outlined in the Draft Guidance.[5] EPA's Draft Guidance also notes "a state may use the ratio to substitute CM reductions of one precursor for a shortfall in CM reductions of another precursor." Note that the attainment plan approved by EPA for the 2012 PM2.5 standard was a Moderate impracticability plan, where the District and CARB demonstrated that attainment by the 2021 Moderate deadline was not possible, and that the Valley should be classified as Serous nonattainment. As such, the following

[5] EPA. *Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter*. March 16, 2023. Retrieved from: https://www.epa.gov/system/files/documents/2023-03/CMTF%202022%20guidance%203-16-23.pdf

contingency calculation tables below for the 2012 PM2.5 standard are based on the RFP year of 2022, as there is no established attainment year.

Table 2 Contingency Measure Reductions Needed under OYW$_P$ Approach

Standard	Base Year	Attainment Year	RFP Years	Quantitative Milestone Years	Contingency Annual Average Emission Reduction Targets (tons/day)	
					NOx	PM2.5
1997 Annual	2013	2023	2017, 2020	2017, 2020, 2023, 2026	7.91	0.41
2006 24-hour	2013	2024	2017, 2020, 2023	2017, 2020, 2023, 2026	6.66	0.52
2012 Annual	2013	--	2019, 2022	2019, 2022, 2025, 2028	8.65	0.43

Under the prior EPA contingency policy, the contingency reductions would need to be achieved in the year after which the contingency provision was triggered.[6] However, EPA's Draft Guidance on contingency measures allows emission reductions to be achieved within two years of the contingency triggering event.[7]

Additionally, EPA's Draft Guidance explains that, where areas are unable to identify and adopt feasible contingency measures that would reduce emissions by an amount sufficient to meet the OYW of progress, then it would be appropriate to submit contingency measures that result in less than that amount, using a reasoned justification approach demonstrating the lack of sufficient feasible measures to meet the recommended quantity of contingency measures.

4. OPPORTUNITIES FOR DISTRICT CONTINGENCY MEASURES

As discussed above, there are several regulatory absurdities to the current implementation of EPA's baseline contingency measure policy. The District can no longer rely on surplus emission reductions of already implemented measures to meet contingency measure requirements and must identify a new contingency measure that is only implemented upon the occurrence of a triggering event. In its *Bahr* opinion, the Ninth Circuit acknowledged that "[a]gencies are free to change their existing policies as long as they provide a reasoned explanation for the change."[8] However, the few recent contingency measures approved by EPA involved unique situations that often do not apply to the District. Another limiting factor is the District's narrow jurisdictional authority primarily over stationary and some area sources of emissions in the Valley,

[6] "Guidance on Issues Related to 15 Percent Rate-of-Progress Plans," Memorandum from Michael H. Shapiro to Regional Air Directors (August 23, 1993), available at: https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19930823_shapiro_15pct_rop_guidance.pdf

[7] EPA. *Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter*. March 16, 2023. Retrieved from: https://www.epa.gov/system/files/documents/2023-03/CMTF%202022%20guidance%203-16-23.pdf

[8] *Bahr v. EPA*, 836 F.3d 1218, 1229

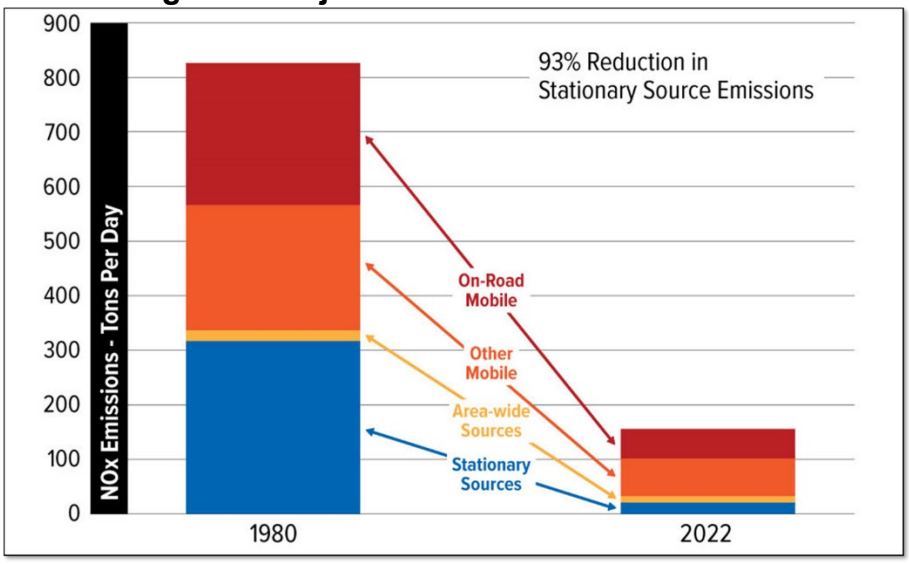
representing a comparatively small portion of total emissions within the Valley. The District has already implemented rules for these sources that meet or go beyond state and federal regulations, as detailed below, which leaves very few local District measures to explore as a contingency measure.

4.1 Stringency of District's Regulatory Program

The San Joaquin Valley's challenges in meeting national ambient air quality standards are unmatched anywhere in the nation due to the region's unique combination of topography and meteorology. Since 1992, the District has adopted over 650 rules to implement an aggressive on-going control strategy to reduce emissions in the Valley in order to reach attainment of the federal mandates, resulting in air quality benefits throughout the Valley.

Through these ongoing efforts by the District, and significant efforts by CARB to reduce emissions from mobile sources, NOx emissions across the Valley have been reduced by over 75%, while stationary source emissions, which are under the District's jurisdiction, have been reduced by over 93% since 1980. Although significant progress has been made in reducing emissions, substantial additional emissions reductions are still needed to meet all of the federal PM2.5 and ozone standards. These additional reductions will be needed across the Valley as the population across the region continues to grow, bringing additional vehicle emissions, goods movement emissions, and other emissions.

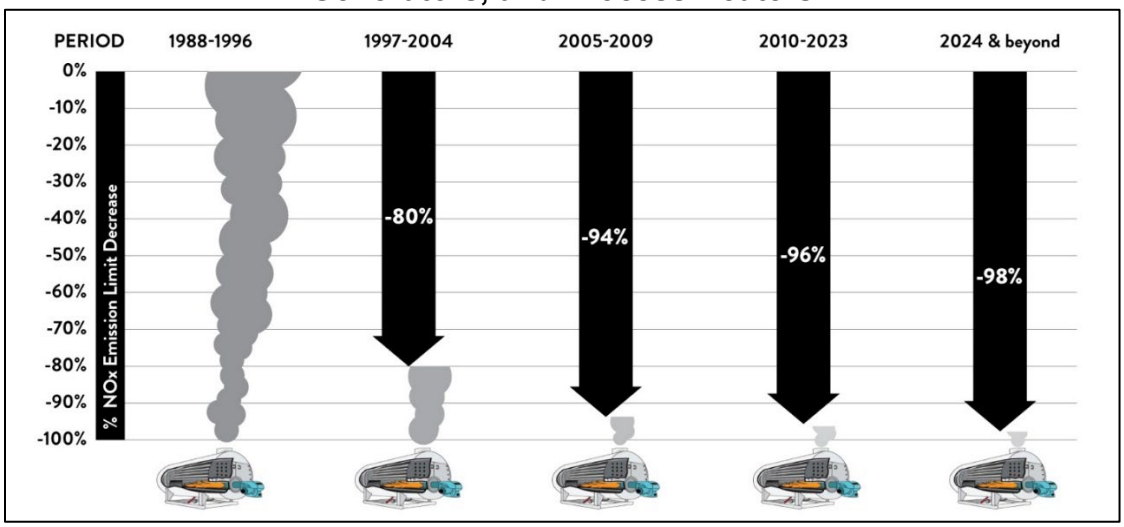
Figure 1 Major Reductions in Air Pollution



Through the history of the District's regulatory program, emissions from a variety of industries and area sources have been aggressively reduced compared to uncontrolled levels, with emissions reduced by well over 90% for various industrial stationary sources. For example, with respect to boilers, steam generators, and process heaters,

the following illustration summarizes the significant emissions reductions achieved relative to baseline emissions levels.

Figure 2 Significant Emissions Reductions from Industrial Boilers, Steam Generators, and Process Heaters



The stringency of the District's stationary source regulatory program has been affirmed through state and federal approvals of District plans and regulations, including establishing the District as implementing all feasible measures, best available control measures, most stringent measures, best available retrofit control technology, and other applicable requirements. As an example, within the District's *2018 PM2.5 Plan*, a thorough evaluation of District PM2.5 rules was performed, in order to satisfy Most Stringent Measure requirements for a region to be granted at attainment deadline extension. EPA agreed with this analysis in its February 2020 evaluation of Best Available Control Measures (BACM) and Most Stringent Measures (MSM) for the 2006 PM2.5 NAAQS. As a result, EPA determined that District rules for stationary and area sources meet or exceeded requirements necessary to implement BACM and MSM in the Valley.[9] EPA finalized its approval of this analysis in July 2020[10], certifying that the District's PM2.5 rules were the most stringent in the nation.

Furthermore, in response to a lawsuit filed by several organizations challenging EPA's approval of the *2018 PM2.5 Plan*, on April 13, 2022, the Ninth Circuit Court of Appeals upheld EPA's conclusion that the District is implementing Best Available Control Measures (BACM) and Most Stringent Measures (MSM), concluding that "*EPA undertook a rigorous analysis of compliance with BACM and MSM requirements.*"

[9] EPA. Technical Support Document, Evaluation of BACM/MSM, San Joaquin Valley PM2.5 Plan for the PM2.5 Plan for the 2006 PM2.5 NAAQS. (February 2020). Retrieved from: https://www.regulations.gov/document/EPA-R09-OAR-2019-0318-0005

[10] EPA. *Clean Air Plans; 2006 Fine Particulate Matter Nonattainment Area Requirements; San Joaquin Valley, California.* (July 22, 2020). Retrieved from: https://www.govinfo.gov/content/pkg/FR-2020-07-22/pdf/2020-14471.pdf

Additionally, on March 15, 2023, EPA issued requirements under a Federal Implementation Plan to address interstate transport requirements that establishes new national emissions limitations for a variety of industrial sources of pollution (power generating plants, internal combustion engines, glass manufacturing plants, etc.). In reviewing the emissions limits for industrial sources, the District's rules and regulations are already significantly more stringent than the limits included by EPA, highlighting the Valley's accomplishments at achieving emissions reductions and improving air quality across the region. The following table provides a comparison between the District's current emission limits and EPA's emission limits for the source categories identified in the Interstate Transport FIP.

Table 3 Sample Comparison of Current District and EPA Recommended Emission Limits in Interstate Transport FIP

Source Category	District Emission Limit	EPA Proposed National Emission Limit
Glass Melting Furnaces	Container Glass: 0.75 lb/ton Fiberglass: 1.3 to 3.0 lb/ton Flat Glass: 1.5 to 1.7 lb/ton	Container Glass: 4.0 lb/ton Pressed/Brown Glass or Fiberglass: 4.0 lb/ton Flat Glass: 7.0 lb/ton
Internal Combustion Engines in Pipeline Transportation of Natural Gas	Rich Burn: 0.15 g/bhp-hr Lean Burn: 0.6 g/bhp-hr	Four Stroke Rich Burn: 1.0 g/hp-hr Four Stroke Lean Burn: 1.5 g/hp-hr Two Stroke Lean Burn: 3.0 g/hp-hr
Boilers in Iron and Steel and Ferroalloy Manufacturing, Metal Ore Mining, Basic Chemical Manufacturing, Petroleum and Coal Products Manufacturing, and Pulp, Paper, and Paperboard Mills	Natural gas fired boilers 0.0061 lb/mmBtu	Coal: 0.20 lb/mmBtu Residual oil: 0.20 lb/mmBtu Distillate oil: 0.12 lb/mmBtu Natural Gas: 0.08 lb/mmBtu

Ongoing Stationary Source Regulatory Efforts

The District Governing Board adopted the 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards (*2018 PM2.5 Plan* or Plan) on November 15, 2018. The *2018 PM2.5 Plan* utilized extensive science and research, state of the art air quality modeling, and the best available information in developing a strategy for bringing the Valley into attainment with the 1997, 2006, and 2012 NAAQS for PM2.5 as expeditiously as practicable.

To achieve the significant emission reductions necessary for expeditious attainment, the *2018 PM2.5 Plan* includes stringent stationary and mobile source control measures, as well as incentive-based control measures to accelerate the deployment of new clean vehicles, equipment, and technologies across a variety of sectors. The vast majority of the District's emission reduction commitments are achieved through new regulatory measures.

The District has adopted numerous new industrial source regulations since adoption of the *2018 PM2.5 Plan* and is now close to meeting all of the Plan's control measure commitments, and is already exceeding the District's total aggregate emission reduction commitments for direct PM2.5 and NOx (Table 4). Additional regulatory development is underway. The significant direct PM2.5 emissions reductions from these measures will contribute greatly towards the Valley attaining the current federal PM2.5 and ozone air quality standards.

Table 4 New District Stationary Source Regulations since Adoption of *2018 PM2.5 Plan*

Measure	Status
Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)	Adopted by Board June 2019
Rule 4311 (Flares)	Adopted by Board December 2020
Rules 4306/4320 (Boilers, Steam Generators, Process Heaters)	Adopted by Board December 2020
Rule 4692 (Commercial Underfired Charbroiling)	Enhanced Strategy adopted by Board December 2020
Rule 4103 (Phase-out of Agricultural Open Burning)	Adopted by Board June 2021
Rule 4702 (Internal Combustion Engines)	Adopted by Board August 2021
Residential Woodstove Replacement Federally Enforceable Measure	Adopted by Board November 2021
Rule 4354 (Glass Melting Furnaces)	Adopted by Board December 2021
Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, Process Heaters)	Adopted by Board December 2021

In addition, the District recently adopted the *2022 Ozone Plan* in December of 2022, which contained a thorough control measure evaluation for 60 rules applicable to ozone formation. Each control measure evaluation for the District's NOx and volatile organic compound (VOC) rules included a contingency measure evaluation, concluding that all 60 control measures do not contain opportunities for a contingency measure, because the rules are already implementing the most stringent measure feasible and/or a contingency trigger was incompatible with the control technology required.

4.2 District Feasibility Analysis

As part of this evaluation, the District analyzed contingency measure opportunities for each source category. This evaluation included analysis of technological and economic feasibility of potential measures. Additionally, potential contingency measures identified through this process would need to be adopted and approved by EPA prior to adoption of its contingency measure FIP, and reductions would need to be achieved within one to two years of the contingency triggering event. Accordingly, the District evaluated whether each rule could be amended and approved by EPA in the timeframe needed. The District places great value on innovation and full public participation in the development and adoption of regulations. The District's rule development process involves extensive interaction with affected sources to find the most effective means of achieving emissions reductions and a rigorous public engagement and commenting process. For each rule, the District undergoes a robust process, which includes an evaluation of potential emission reduction opportunities, and a number of intricate analyses required by the California Health and Safety Code[11] related to cost effectiveness, emission reductions, environmental impacts, and socioeconomic impacts. Through this process, the District hosts numerous public workshops to solicit feedback from the public and affected stakeholders, and continues to invite public participation and comment for the entirety of the project.

The District's evaluation is provided in the table below.

[11] CH&SC §40920.6

Table 5 District Contingency Measure Evaluation by Rule

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
NOx Rules				
Rule 4103 (Open Burning)	None; The District has already committed to phase out ag burning by January 1, 2025.[12]	-	-	-
Rule 4106 (Prescribed Burns)	Require mechanical removal, air curtain burners, and forest-specific biomass projects.	No; As stated in Appendix C of the *2022 Ozone Plan*, alternative control methods are not feasible. The District reanalyzed various alternative control methods such as mechanical removal, air curtain burners, and forest-specific biomass projects, which are infeasible due to the vast number of acres that require management and lack of access to remote areas in the forest. Due to recent increase in wildfires, the District continues to support reductions of forest fire fuel through prescribed burns. Therefore, this source category is not suitable for a contingency measure.	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Agencies would need long lead time to design, plan, and deploy technologies. In addition, land agencies also need to ensure that they have appropriate budgets in place, which could take significant time. The lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.
Rule 4301 (Fuel Burning Equipment)	None; Other District rules with more stringent NOx requirements for specific types of fuel burning equipment supersede this rule. See the evaluations for Rules 4306, 4307, 4308, 4309, 4320, and 4352.	-	-	-
Rule 4306 and 4320 (Advanced Emission	Refer to the District's analysis below in	-	-	-

[12] SJVAPCD. *Final Supplemental Report and Recommendations on Agricultural Burning.* (June 17, 2021). Retrieved from: https://ww2.valleyair.org/media/aldmsd0b/final-supplemental-report-and-recommendations-on-agricultural-burning.pdf

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
Reduction Options for Boilers, Steam Generators, and Process Heaters >5 MMBtu/hr)	Section 4.2 for Emissions from Oil and Gas Production Combustion Equipment.			
Rule 4307 (Boilers, Steam Generators and Process Heaters 2 – 5 MMBtu/hr)	Require use of technologies such as SCRs, ultra-low NOx burners, and EMx.	No; As stated in Appendix C of the *2022 Ozone Plan*, the potential emission reduction opportunities are not cost effective. Various control technologies that were further evaluated for their potential to reduce emissions as a contingency measure include SCRs, ultra-low NOx burner, and EMx. • Retrofitting a range of SCR options has annualized costs ranging from $2,458,692 to $17,142,547. These options range from $126,420 to $815,897 per ton of emissions reduced • Retrofitting a range of ultra-low NOx burner options has an annualized costs as high as $4,942,190, which would have a cost effectiveness of $322,200 per ton of emissions reduced • Replacement of an older unit with a new boiler meeting the 9 ppmv NOx unit has an annualized costs up to $11,243,043, with a cost effectiveness of $732,976 per ton of emissions reduced • The District researched post-combustion controls such as EMx, the second generation of the SCONOx technology that reduces NOx, SOx, CO, and VOC emissions. Per EmeraChem, manufacturer/vendor of the technology, this technology has not been achieved in practice (AIP) for natural gas fired boilers. SCONOx and EMx systems have only been used by power plants for the control of turbine emissions. The cost of an EMx system would be anywhere from $3 to $5 million, or even up to $8 million in some cases for large power plant installations. Moreover, an EMx system is ideal for a new installation, but becomes extremely challenging and sometimes nearly impossible to	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
		retrofit to an existing unit. In fact, cost-effectiveness analyses conducted by the District for the installation of SCONOx/EMx units on large power plant turbine installations within the Valley have shown that this technology is not cost-effective. Given the high cost-effectiveness demonstrated for turbines and lack of demonstrated practice with boilers, this technology is not feasible or cost-effective for reducing emissions from this category. While cost-effectiveness was further reviewed, there are a number of additional feasibility considerations and complexities that potentially render the utilization of the above technologies as infeasible, including physical constraints, control effectiveness for the wide variety of potential applications, and other considerations.		
Rule 4308 (Boilers, Steam Generators and Process Heaters 0.075 to less than 2.0 MMBtu/hr)	Require use of technologies such as SCRs, ultra-low NOx burners, and EMx.	No; As stated in Appendix C of the *2022 Ozone Plan*, the technologies involved with reducing emissions from this source category are not cost effective and this source category is not suitable for a contingency measure. These potential controls are also not cost effective as implementation of: • Selective Catalytic Reduction (SCR) systems reduce NOx emissions by 15 ppmv @ 3% O_2 at a cost effectiveness of at least $216,858/ton of emissions reduced • Ultra-low NOx burner system reduces NOx emissions from 20 ppmv @ 3% O2 to 9 ppmv @ 3% O2 at a cost effectiveness of $91,746/ton of emissions reduced • EMx systems, as explained under Rule 4307, are not cost effective and most likely not technologically feasible for these small units While cost-effectiveness was further reviewed, there are a number of additional feasibility considerations and	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
		complexities that potentially render the utilization of the above technologies as infeasible, including physical constraints, control effectiveness for the wide variety of potential applications, and other considerations.		
Rule 4309 (Dryers, Dehydrators, and Ovens)	Require use of technologies such as low NOx burners.	No; As stated in Appendix C of the *2022 Ozone Plan*, alternative control technology such as low NOx burners would reduce NOx emissions, however, requiring the use of these burners has proven to have a negative impact on product quality such as drying onions and changing onion color due to higher carbon monoxide emissions. The District does not see implementing low NOx burners as feasible due to affecting the facilities ability to carry out normal business until the technologies are further improved.	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.
Rule 4311 (Flares)	None; no technologies currently available to achieve lower limits.	No; The District recently adopted amendments to Rule 4311 in December 2020 after going through a robust public process of over 3 years. As stated in the Appendix B of the 2020 Rule 4311 staff report, the control level implemented in the recent rule amendment (December 2020) required substantial costs and the emission levels selected are the most stringent levels.[13] The District did not identify any new level of control more stringent than what is currently required under Rule 4311. The 2020 amendments require operators to install the cleanest ultra-low NOx flaring technology available. Further reductions from this source category would require control technologies with greater complexity and	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

[13] SJVAPCD. *Adopt Proposed Amendments to Rule 4311 (Flares).* (December 17, 2020). Retrieved from: https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/12.pdf

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
		costs, which have yet to be identified and would be less cost effective than the previous rule amendment. Notably, the most recent amendments to these rules required over 3 years of analysis and public engagement. Additionally, operations are still in the process of complying with the recent rule amendments, and imposing more stringent requirements on these facilities at this time would be infeasible.	reductions within one to two years.	
Rule 4313 (Lime Kilns)	There are currently no lime kilns operating in the Valley, and there are no opportunities for emission reductions from Rule 4313. Therefore, this source category is not suitable for a contingency measure.	-	-	-
Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters)	Require use of additional or alternative control technologies beyond existing stringent controls.	No; The District recently adopted amendments to Rule 4352 in December 2021 after going through a robust public process of a year and a half. Appendix C of the 2021 Rule 4352 Staff Report evaluated alternative control technologies applicable to sources subject to Rule 4352.[14] District analysis found that all alternative control technology that could reduce emissions further require technology that has prohibitively high capital costs and is not cost effective. In addition, many of these technologies have not been implemented at facilities subject to Rule 4352; therefore, these control technologies are not commercially tested and proven.	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years. Additionally, operations are currently investing in control	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

[14] SJVAPCD. *Adopt Proposed Amendments to Rule 4352 (Solid Fuel Fired Boilers, Steam Generators, and Process Heaters)*. (December 16, 2021). Retrieved from: https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2021/December/final/12.pdf

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
			technologies to meet recently amended rule limits.	
Rule 4354 (Glass Melting Furnaces)	Require use of additional or alternative control technologies beyond existing stringent controls.	No; As stated in Appendix C of the 2021 Rule 4354 Staff Report, the District reviewed alternative control technologies, including, but not limited to, oxy-fuel fired furnaces and natural gas furnaces equipped with a SCR, and found no additional feasible control technologies for this source category.[15] Alternative control technologies, require substantial capital, operation, and maintenance costs associated with implementation. In addition, significant amount of space is also required for certain types of controls, making implementation of these technologies infeasible. Capital costs are estimated to range from $2,123,053 to $28,307,370 while annual operation and maintenance costs range from $595,088 to $3,676,829. Additionally, as a comparison, EPA recently finalized their interstate transport FIP which included new national emissions limits that are significantly higher (less stringent) than the District's rule limits.	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years. Additionally, operations are currently investing in control technologies to meet recently amended rule limits.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.
Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations)	There are no identified NOx and PM2.5 emission reduction opportunities associated with Rule 4641. Therefore, this source category is not suitable for a contingency measure.	-	-	-
Rule 4692 (Commercial Charbroiling)	Refer to the District's analysis below in Section 4.2 for Commercial Charbroiling.	-	-	-

[15] SJVAPCD. *Adopt Proposed Amendments to Rule 4354 (Glass Melting Furnaces)*. (December 16, 2021). Retrieved from: https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2021/December/final/11.pdf

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
Rule 4702 (Internal Combustion Engines)	Require use of additional or alternative control technologies beyond existing stringent controls.	No; The District recently adopted amendments to Rule 4702 per commitments in the *2018 PM2.5 Plan* in August 2021 after going through a robust public process. The 2021 Rule 4702 staff report included evaluations of additional control technology including SCRs, electrification and solar power, and other control technologies.[16] • SCR systems require significant capital, up to $300,000 to purchase a single unit and up to $60,000 of annual operation and maintenance costs • Introducing an electric engine/solar system has a cost effectiveness ranging from $150,000 to $260,000 per ton of emissions reduced In addition to cost effectiveness, there are a number of additional feasibility considerations and complexities that potentially render the utilization of the above technologies as infeasible, including physical constraints, control effectiveness variation for the wide range of potential applications, and other considerations.	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years. Additionally, operations are currently investing in control technologies to meet recently amended rule limits.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.
Rule 4703 (Stationary Gas Turbines)	Require use of additional or alternative control technologies beyond existing stringent controls.	No; As stated in Appendix C of the *2022 Ozone Plan,* the District has found that further control from sources subject to Rule 4703 is not currently feasible or cost effective. • Retrofitting a SCR system on units producing less than 3 megawatts (to comply with 2 ppmvd NOx @ 15% O_2) incurs an estimated $439,278 of annual costs, which costs $348,633 per ton of emissions reduced. • Retrofitting a SCR system on units producing between 3 to 10 megawatts (to comply with 2 ppmvd NOx @ 15% O_2) incurs an estimated	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

[16] SJVAPCD. *Proposed Amendments to Rule 4702 (Internal Combustion Engine)*. (July 20, 2021). Retrieved from: http://www.valleyair.org/workshops/postings/2021/08-19-21-r4702/DraftStaffReport.pdf

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
		$716,998 of annual costs, which costs $770,965 per ton of emissions reduced. • Retrofitting a SCR system on units producing greater than 10 megawatts (simple cycle unit to comply with 2.5 ppmvd NOx @ 15% O_2) incurs an estimated $1,737,092 of annual costs, which costs $232,231 per ton of emissions reduced. • Retrofitting SCRs on units producing greater than 10 megawatts (combined cycle to comply with 2 ppmvd NOx @ 15% O_2) incurs an estimated $2,785,635 of annual costs, which costs $141,116 per ton of emissions reduced. While cost-effectiveness was further reviewed, there are a number of additional feasibility considerations and complexities that potentially render the utilization of the above technologies as infeasible, including physical constraints, control effectiveness for the wide variety of potential applications, and other considerations.	within 60 days and achieve reductions within one to two years.	
Rule 4902 (Residential Water Heaters)	Adopt electrification requirements earlier than CARB measure.	No; CARB currently has an existing commitment that will require electrification and achieve emission reductions statewide starting in 2030. The District evaluated opportunities to advance the implementation timeframe of electrification requirements in the Valley. Manufacturers need time to ramp up production of zero-emission technologies to meet the expected demand. Further, any such standard would have to be developed in collaboration with energy and building code regulators and the District would need to ensure it was consistent with all State and local efforts. The District would need to work carefully with communities to consider any housing cost or affordability impacts. The District would need to engage with community-based organizations and other key stakeholders to incorporate equity considerations for low-income and environmental justice communities where feasible. Given the need for triggerable and potentially short-term reductions, the long lead time associated with this potential measure,	No; This measure would require a very robust public process that would take at least two years (or more). Manufacturers would require long lead time to design and produce the amount of units needed. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
		the attrition-based nature of implementation, and the existing CARB measure in place that would conflict with a local contingency measure, this measure is deemed infeasible. In an effort to identify potential emission reduction opportunities, the District's 2022 Ozone Plan includes a further study commitment to evaluate current and upcoming work from CARB and other agencies related to reducing emissions from residential and commercial combustion sources, and evaluate the feasibility of implementing zero emission or low-NOx requirements for these sources in the Valley. Through this effort, the District will also evaluate opportunities to advocate for funding under the Inflation Reduction Act, Bipartisan Infrastructure Law, and other funding sources, which are prioritizing funding opportunities for electrification of appliances to reduce greenhouse gas emissions.		

Rule 4905 (Natural Gas – Fired, Fan Type Residential Central Furnace)	Adopt electrification requirements earlier than CARB measure.	No; CARB currently has an existing commitment that will require electrification and achieve emission reductions statewide starting in 2030. The District evaluated opportunities to advance the implementation timeframe of electrification requirements in the Valley. Manufacturers need time to ramp up production of zero-emission technologies to meet the expected demand. Further, any such standard would have to be developed in collaboration with energy and building code regulators and the District would need to ensure it was consistent with all State and local efforts. The District would need to work carefully with communities to consider any housing cost or affordability impacts. The District would need to engage with community-based organizations and other key stakeholders to incorporate equity considerations for low-income and environmental justice communities where feasible. Given the need for triggerable and potentially short-term reductions, the long lead time associated with this potential measure, the attrition-based nature of implementation, and the existing CARB measure in place that would conflict with a local contingency measure, this measure is deemed infeasible. In an effort to identify potential emission reduction opportunities, the District's 2022 Ozone Plan includes a further study commitment to evaluate current and upcoming work from CARB and other agencies related to reducing emissions from residential and commercial combustion sources, and evaluate the feasibility of implementing zero emission or low-NOx requirements for these sources in the Valley. Through this effort, the District will also evaluate opportunities to advocate for funding under the Inflation Reduction Act, Bipartisan Infrastructure Law, and other funding sources, which are prioritizing funding opportunities for electrification of appliances to reduce greenhouse gas emissions.	No; This measure would require a very robust public process that would take at least two years (or more). Manufacturers would require long lead time to design and produce the amount of units needed. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
Direct PM2.5 Rules				
Rule 4204 (Cotton Gins)	Require use of additional or alternative control technologies beyond existing stringent controls.	No; As stated in Appendix C of the District's *2018 PM2.5 Plan*, the District has reviewed studies conducted by the United States Department of Agriculture-Agricultural Research Service and found only 16% of PM10 particles were in the PM2.5 size fraction. Furthermore, the District did not find additional feasible emission reduction opportunities from baghouse filters and 1D-3D cyclones with expansion chambers. Baghouse filters are unable to effectively control cotton fibers at the high air velocities and potentially high humidity needed at these facilities. 1D-3D cyclones with expansion chambers were found to be ineffective against the small particle sizes of PM2.5. Therefore, the most effective controls are currently in place. Additionally, there are a number of additional feasibility considerations and complexities that potentially render the utilization of the above technologies as infeasible, including physical constraints, control effectiveness for the wide variety of potential applications, and other considerations.	No; Any new regulation would need approximately two years (or more) of rule development to allow for a robust public process with all affected industries, stakeholders, and public. Operations would need long lead time to design, plan, and install control technology. Lead time required would not conform with the required trigger timeline. It also would be infeasible to implement new requirements within 60 days and achieve reductions within one to two years.	No; Due to the need for a robust public process, the District would not be able to adopt a contingency measure and receive EPA approval prior to adoption of the final contingency FIP.
Rule 4550 (Conservation Management Practices)	None; this measure is an "on-the-way" measure. The District committed to evaluate emission reduction opportunities for this source category in the *2018 PM2.5 Plan*, including opportunities to reduce emissions from fallowed land and promote the selection of conservation tillage as a CMP, in coordination with	-	-	-

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
	agricultural stakeholders and the District's AgTech committee. Rule development is ongoing and there is a significant amount of work needed to ensure that impacts of the Sustainable Groundwater Management Act (SGMA) are understood along with ensuring that measures are technologically feasible and cost-effective; therefore, this source category is not suitable for a contingency measure.			
Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)	Refer to the District's analysis below in Section 4.2 for Wood Burning Fireplaces and Wood Burning Heaters.	-	-	-

District Rule	Contingency Options	Technological and Economic Feasibility	Trigger Feasibility	FIP Timeline
Rule 8011 (General Requirements)	There are no emission reduction opportunities associated with Rule 8011.	-	-	-
Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities) Rule 8031 (Bulk Materials) Rule 8041 (Carryout and Trackout) Rule 8051 (Open Areas) Rule 8061 (Paved and Unpaved Roads) Rule 8071 (Unpaved Vehicle Traffic) Rule 8081 (Ag Sources)	The District identified one opportunity for Open Areas in Rule 8051, as discussed in Section 4.2 below.	The District has evaluated all potential requirements achieved in practice in other areas or included in other state implementation plans. As demonstrated in Appendix C of the 2018 PM2.5 Plan, Regulation VIII currently has in place the most stringent measures feasible to implement in the Valley and therefore meets or exceeds RACM, BACM, and MSM requirements for this source category. As discussed below in Section 4.2, the District will evaluate a potential contingency measure that further increases the stringency of Rule 8051 for rural areas.	As discussed below in Section 4.2, the District will evaluate a potential contingency measure that further increases the stringency of Rule 8051 for rural areas.	As discussed below in Section 4.2, the District will evaluate a potential contingency measure that further increases the stringency of Rule 8051 for rural areas.

Despite the scarcity of measures suitable as a contingency measure, the District has continued to engage with CARB, EPA, SCAQMD, and other agencies on issues related to contingency measures. As a part of the overall contingency measure evaluation, the District performed a thorough analysis of all potential contingency measure opportunities under the District's regulatory authority (summarized in Table 6). Through this evaluation, and in coordination with CARB and EPA in developing this contingency submission, the District has identified potential contingency opportunities for a limited number of sources, as discussed below.

Wood Burning Fireplaces and Wood Burning Heaters

The District's residential wood burning emission reduction strategy includes wood burning curtailments implemented through District Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters), in conjunction with the District's incentive grant program for fireplace and woodstove change-outs, and robust public education and outreach efforts. This approach is designed to improve public health by reducing toxic wood smoke emissions in Valley neighborhoods during the peak PM2.5 winter season (November through February), and has proven to be extremely effective in advancing the District's objectives to attain the PM2.5 federal standards and protect public health. Commitments in the District's *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards* (*2018 PM2.5 Plan*) included rulemaking for Rule 4901 to further lower wood burning curtailment levels, as well as enhancements to the District's incentive grant funding levels, public outreach and education, enforcement, and air quality forecasting programs.

Through the District's Residential Wood Smoke Reduction Program, which is based on Rule 4901, the District has declared and enforced episodic wood burning curtailments, also called "No burn" days, since 2003. The District's Residential Wood Smoke Reduction Program and District Rule 4901 reduce harmful species of PM2.5 when and where those reductions are most needed, in impacted urbanized areas when the local weather is forecast to hamper particulate matter dispersion.

Rule 4901 was first adopted in 1993, and has been subsequently amended four times. The 1993 adoption of Rule 4901 established a public education program on techniques to reduce wood burning emissions. It also enforced EPA Phase II requirements for new wood burning heaters, prohibited the sale of used wood burning heaters, established a list of prohibited fuel types, and required the District to request voluntary curtailment of wood burning on days when the ambient air quality was unhealthy.

In 2003, the rule was amended and added episodic wood burning curtailments when air quality was forecast to be at 150 or higher on the air quality index (AQI), which was equivalent to a PM2.5 concentration of 65 µg/m³ at the time; added restrictions on the installation of wood burning devices in new residential developments, based on housing density; and added requirement that during the transfer of a residential property, sellers provide a statement of compliance to the District and buyer for residential real properties with non-compliant wood burning devices.

In 2008, the rule was amended and lowered the mandatory curtailment level to a PM2.5 concentration of 30 µg/m^3, and added an attainment plan contingency measure that would lower the wood burning curtailment level to 20 µg/m^3 if EPA were to find that the Valley did not attain the 1997 PM2.5 NAAQS in 2014.

In 2014, Rule 4901 was amended again and lowered the No Burn threshold for high polluting wood burning heaters and fireplaces from 30 µg/m^3 to 20 µg/m^3 and established a separate No Burn threshold for cleaner certified wood burning devices. The amendment doubled the number of No Burn days for high polluting units that were the source of over 95% of the wintertime residential wood smoke emissions.

In 2019, the District amended Rule 4901 to lower the curtailment threshold from 20 to 12 µg/m^3 for older, higher-polluting wood burning heaters, open hearth fireplaces, and non-registered wood burning heaters in the Hot Spot counties of Madera, Fresno, and Kern. Within these same Hot Spot counties, the cleaner, registered wood burning heaters are allowed to burn when air quality is forecast to be between 12 and 35 µg/m^3. In these counties, no wood burning is allowed when air quality is forecast to be above 35 µg/m^3. In the remaining Valley counties, the previous curtailment thresholds remain in place. As part of this action, the District increased the incentive amounts offered through the *Fireplace and Woodstove Change-Out Program* to cover nearly the entire cost of replacing high polluting wood burning units with cleaner devices, such as natural gas inserts and electric heat pumps, offering up to $5,000 in incentives based on the device installed. Through the program, the District has funded the installation of natural gas devices at more than 21,000 Valley households. To complement the regulatory and incentives changes, the District has implemented an education and outreach campaign to increase public awareness of the program, along with focused rule enforcement efforts in Hot Spot counties and in areas of concern. The District also continues to investigate and employ the latest air quality modeling tools and techniques to support the air quality forecasting component of the program.

In addition, consistent with the District's *2018 PM2.5 Plan*, the District added a contingency provision to Rule 4901 for the 1997, 2006, and 2012 PM2.5 standards. This provision would require that, on and after sixty days following the effective date of EPA final rulemaking that the Valley has failed to attain the 1997, 2006, or 2012 NAAQS by the applicable attainment date specified in the EPA-approved *2018 PM2.5 Plan*, the PM2.5 curtailment levels for any county that has failed to attain the applicable standard shall be lowered to the curtailment levels in place for Hot Spot counties as follows:

- Lower the "No Burning Unless Registered" threshold (Level One) from the current level of 20 µg/m^3 to 12 µg/m^3, and
- Lower the "No Burning for All" threshold (Level Two) from the current level of 65 µg/m^3 to 35 µg/m^3.

Following these amendments, EPA recognized in their February 2020 evaluation of BACM and MSM for the 2006 PM2.5 NAAQS that Rule 4901 implements BACM and

MSM levels of control.[17] In July 2020, EPA took final action to approve the 2019 amendments to Rule 4901 and provide SIP credit for emissions reductions achieved through the strategy.[18]

In an effort to identify contingency measure opportunities for the District's wood burning curtailment strategy, the District reviewed curtailment levels required by other regions. As demonstrated in Table 6, the District requires the most stringent wood burning curtailment thresholds in the nation, as recognized by EPA in their February 2020 evaluation of BACM and MSM for the 2006 PM2.5 NAAQS.[19] The District also evaluated PM2.5 wood burning contingency strategies in analogous rules, and found that the District's existing contingency curtailment threshold is the most stringent. Notably, the District's regulatory thresholds are lower than the contingency thresholds established by other areas.

Table 6 Curtailment Levels and Contingency Measures from Analogous Rules

	San Joaquin Valley APCD	South Coast AQMD Rule 445	Imperial County APCD Rule 429	Sacramento Metropolitan AQMD Rule 421	Bay Area AQMD Reg 6 Rule 3
Current Curtailment Thresholds	**Level 1** 12 µg/m^3 or 20 µg/m^3 based on county **Level 2** 35 µg/m^3 or 65 µg/m^3 based on county	30 µg/m^3	35 µg/m^3	**Stage 1** 31 µg/m^3 **Stage 2** 35 µg/m^3 **Voluntary** 25 µg/m^3	35 µg/m^3
Contingency Measure Curtailment Thresholds	**Level 1** 12 µg/m^3 **Level 2** 35 µg/m^3	As low as 26 µg/m^3 once fully triggered	30 µg/m^3	None	None

District Contingency Commitment for District Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)

Despite significant reductions in population exposure to unhealthy pollution concentrations, emissions from residential wood burning remain a high contributor to PM2.5 levels in the San Joaquin Valley. The District has evaluated all District rules for opportunities to address contingency measure requirements under the Federal CAA,

[17] EPA. Technical Support Document, Evaluation of BACM/MSM, San Joaquin Valley PM2.5 Plan for the PM2.5 Plan for the 2006 PM2.5 NAAQS. (February 2020). Retrieved from: https://www.regulations.gov/document/EPA-R09-OAR-2019-0318-0005
[18] EPA. *Air Plan Approval; California; San Joaquin Valley Unified Air Pollution Control District*. 85 Fed. Reg. 141, pp. 44206-44209. (July 22, 2020). Retrieved from: https://www.govinfo.gov/content/pkg/FR-2020-07-22/pdf/2020-14298.pdf
[19] EPA. Technical Support Document, Evaluation of BACM/MSM, San Joaquin Valley PM2.5 Plan for the PM2.5 Plan for the 2006 PM2.5 NAAQS. (February 2020). Retrieved from: https://www.regulations.gov/document/EPA-R09-OAR-2019-0318-0005

and is proposing to amend Rule 4901 to include a revised contingency measure provision for the PM2.5 NAAQS.

The proposed contingency measure provision would establish a sequence of increasingly stringent contingency curtailment thresholds for all counties that would be triggered upon 60 days after the issuance of a final determination by EPA, pursuant to 40 CFR §51.1014(a), that the District has failed to meet any of the following elements for any of the PM2.5 NAAQS to:

1. Meet any RFP requirement;
2. Meet any quantitative milestone in an approved attainment plan;
3. Submit a quantitative milestone report; or
4. Attain the applicable PM2.5 NAAQS by the applicable attainment date.

The following table depicts the sequence of increasingly stringent contingency curtailment thresholds to be enforced following each contingency trigger.

Table 7 District Contingency Curtailment Thresholds

Contingency Concept	**Hot-Spot County (µg/m^3)**		**Non Hot-Spot County (µg/m^3)**	
	Level 1	**Level 2**	**Level 1**	**Level 2**
Current Requirements	12	35	20	65
Contingency Measure 1	12	35	12	35
Contingency Measure 2	11	35	11	35

Hot-spot counties: Madera, Fresno, Kern
Non Hot-spot counties: San Joaquin, Stanislaus, Merced, Kings, Tulare

The District proposes to amend Rule 4901 to incorporate the following contingency measure:

5.7.3 Contingency Provision

Conditioned upon EPA's final approval of contingency measure requirements under the federal Clean Air Act in the State Implementation Plan for the San Joaquin Valley for the applicable PM2.5 National Ambient Air Quality Standard (NAAQS), the effective date of this provision shall be 60 days after the issuance of a final determination by EPA, pursuant to 40 CFR § 51.1014(a), that the District has failed to meet one or more of the following Trigger Elements of the applicable PM2.5 NAAQS:

(1) Any Reasonable Further Progress requirement;
(2) Any quantitative milestone;
(3) Submission of a quantitative milestone report; or
(4) Attainment of the applicable PM2.5 NAAQS by the applicable attainment date.

This Contingency Provision, upon the effective date, shall be implemented, sequentially and in the order of stringency for the Level One and Level Two Episodic Wood Burning Curtailment as follows:

(A) Level One curtailment threshold of 12 µg/m³ and Level Two curtailment threshold of 35 µg/m³, upon failure to comply with any one of the Trigger Elements, will be in place for all Valley counties;

(B) Level One curtailment threshold of 11 µg/m³ and Level Two curtailment threshold of 35 µg/m³ will be in place for all Valley counties, upon failure to comply with any two of the Trigger Elements.

Estimated Contingency Emission Reductions

Rule 4901 already includes the most stringent residential wood combustion control strategy in the nation, and this proposed contingency measure further enhances the stringency of this rule. The District has performed an analysis of recent ambient air quality data and estimate these amendments would achieve the emission reductions found in the following table. The analysis and emissions reduction estimates are largely based on the methodology that was used in the 2019 amendments to Rule 4901[20], which was approved by EPA.[21] See Appendix C for additional details on the District's emission reduction analysis.

The following table estimates the expected increase in curtailment days that would occur if the contingency thresholds are triggered. The values represent the collective increase in Level One and Level Two curtailment days.

Table 8 Additional Curtailments by Contingency Trigger (Days)

County	First Trigger		Second Trigger	
	Level One (12 µg/m³)	Level Two (35 µg/m³)	Level One (11 µg/m³)	Level Two (35 µg/m³)
Fresno	0.00	0.00	3.66	-
Kern (SJV)	0.00	0.00	3.35	-
Kings	5.65	22.60	3.32	-
Madera	0.00	0.00	4.71	-
Merced	37.77	2.34	4.68	-
San Joaquin	29.91	5.65	2.66	-
Stanislaus	25.93	8.31	3.32	-
Tulare	22.52	14.79	5.38	-

*The expected additional curtailment is calculated using a 3-year average of District air quality data from 2019-2022

[20] SJVAPCD. *Appendix B Emission Reduction Analysis for Proposed Amendments Residential Wood Burning Emission Reduction Strategy, pp. B-1 – B-14*. (June 20, 2019). Retrieved from: https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2019/June/final/13.pdf

[21] EPA. *Air Plan Approval; California; San Joaquin Valley Unified Air Pollution Control District; Final Rule*. 85 Fed Reg. 141, pp. 44206-44209. (July 22, 2020). Retrieved from: https://www.federalregister.gov/documents/2020/07/22/2020-14298/air-plan-approval-california-san-joaquin-valley-unified-air-pollution-control-district

In total, the emission reductions achievable from these proposed amendments to Rule 4901 for purposes of qualifying contingency measures are 0.69 tpd of PM2.5 and 0.10 tpd NOx on an annual average basis. These amendments, once adopted by the District's Governing Board and approved by EPA into the SIP, would contribute towards satisfying the contingency measure requirements for NOx and PM2.5 for the PM2.5 NAAQS.

Dust from Open Areas

The District's Regulation VIII series (Fugitive PM10 Prohibitions) was adopted in November 2001, and subsequently amended in 2004. This rule series contains a comprehensive suite of rules designed to reduce fugitive PM10 emissions from a range of sources, including dust from open areas (Rule 8051).

Rule 8051 applies to any open area 0.5 acres or more within urban areas, or 3.0 acres or more within rural areas that contains at least 1,000 square feet of disturbed surface area. The rule has requirements for limiting visible dust emissions (VDE) to 20% opacity, to comply with the conditions of a stabilized surface, and to install barriers to prevent unauthorized vehicles from accessing the stabilized areas. In 2004, Rule 8051 was amended to add applicability thresholds for rural and urban areas.

In 2018, the Imperial County Air Pollution Control District (ICAPCD) amended Rule 804 (Open Areas) to incorporate a contingency measure for their 2018 SIP for the 2012 PM2.5 standard. The contingency measure is triggered if ICAPCD fails to meet RFP, submit a quantitative milestone report, or meet a quantitative milestone pursuant to the 2018 Plan, and would lower the rural area threshold to include all rural areas having 0.5 acres or more that contain at least 1000 square feet of disturbed surface area. Notably, ICAPCD did not include this measure as a contingency that would be triggered if the area failed to meet attainment. However, despite the absence of this contingency measure to address to address all necessary triggering events, EPA took action in August 2019 to approve the rule as meeting contingency measure requirements.[22]

Through ongoing engagement with EPA on the District's contingency submission, EPA has suggested that the District evaluate a potential contingency measure that further increases the stringency of Rule 8051 for rural areas, despite the negligible, if any, quantifiable emissions reductions associated with this concept. Based on EPA's review and if necessary to ensure approvability of the District's contingency submission, the District is considering amendments to Rule 8051 as a potential contingency measure. This potential measure could include lowering the rural acreage threshold to a lower acreage threshold (e.g. 2 acres) with at least 1,000 square feet of disturbed surface area, and, unlike ICAPCD's measure that is only triggered under a limited set of

[22] EPA. *Air Plan Approval; California; Imperial County Air Pollution Control District*. 84 Fed. Reg. 168, pp. 45418-45419. (August 29, 2019). Retrieved from: https://www.govinfo.gov/content/pkg/FR-2019-08-29/pdf/2019-18589.pdf

circumstances, would be triggered for any of the contingency triggering events for any of the PM2.5 NAAQS.

Any potential contingency measure associated with this source category would need to be developed through a public process and adopted by the District's Governing Board for submission to EPA. The District has already held two workshops to discuss this potential measure.

Commercial Charbroiling

Since 2002, the District has required the installation and operation of particulate matter control devices on chain-driven commercial charbroilers through District Rule 4692. Through current Rule 4692 requirements, affected chain-driven commercial charbroilers are required to have emissions control devices that achieve 83% control efficiency for particulate matter and 86% control efficiency for VOC. However, the unavailability of a feasible and cost-effective control technology has been the barrier to the District's attempt to impose similar requirements for underfired charbroiling operations. Other air districts in California have encountered similar difficulties in identifying and requiring compliant control technologies for underfired charbroilers.

The District has contributed substantial time and effort into researching the emissions produced by under fired charbroilers in order to form a sound approach to controlling the emissions. Since 2009, the District has partnered with the SCAQMD, Bay Area Air Quality Management District (BAAQMD), and EPA to further the research and evaluation of emission control technologies for underfired charbroilers. Through this effort, underfired charbroiler technology assessments have been conducted at UC-Riverside College of Engineering's Center for Environmental Research & Technology (CE-CERT). The District provided in-kind technical support and the research was funded with over $500,000 in contributions provided by SCAQMD, BAAQMD, and EPA. This effort led to the establishment of published testing methodology, SCAQMD Method 5.1, which has been used as a benchmark methodology to standardize the testing of control efficiencies of kitchen exhaust pollution control units.

To assist with better understanding of cooking operations from underfired charbroilers in the Valley, and as an early measure in support of the District's commitment in the 2018 PM2.5 Plan, Rule 4692 was amended on June 21, 2018, to add reporting and registration requirements for commercial underfired charbroiler units, including Permit-Exempt Equipment Registration (PEER) requirements for units with a meat throughput greater than 400 pounds/week, or greater than 10,800 pounds/year, not to exceed 875 pounds/week.

Upon adoption of the regulatory amendment, the District conducted outreach to affected restaurants, with the vast majority of restaurants subject to the reporting requirement now having submitted the required information. To date, the District has received over 4,100 one-time reports, of which 878 restaurants have reported operation of an underfired charbroiler. Of these 878 restaurants, 145 have reported a cooking

throughput of at least 400 lbs of meat per week and have subsequently obtained a required PEER.

Additionally, the District created the Restaurant Charbroiler Technology Partnership (RCTP) program with the goal of reducing PM2.5 emissions from underfired commercial charbroilers. The program was initially allocated with $750,000 of incentive funding to fully cover all emissions control device installation costs as well as two years of device maintenance. RCTP initially struggled to find restaurants interested in participating in the program despite the program's willingness to cover all associated costs. Despite the District's efforts in promoting available funding under the RCTP program, the District has faced difficulty in finding restaurants willing to partner with the District to demonstrate new technologies. To date, only one restaurant, the Habit Burger Grill, has successfully completed two years of demonstration of a Molitron wet scrubber in their Stockton restaurant. Initially, the project experienced hood fan sizing issues, resulting in the restaurant being smoked out and forced to close temporarily. The Habit Burger Grill has subsequently installed these control devices on additional new restaurants, with some of these installations in the Valley.

In 2019, the District made an even larger concerted effort to conduct outreach to restaurants in the San Joaquin Valley regarding incentives available through RCTP. Through this outreach effort, the District received only 15 RCTP interest cards out of the over 4,200 restaurants that were contacted to comply with the 2018 Rule 4692 reporting and registration requirements. After discussing RCTP with these restaurants in more detail, none of these restaurants considered moving forward after this additional outreach.

In addition, the District tailored its approach and made direct contact with five prominent Valley restaurants, which resulted in a great deal of interest to evaluate the feasibility of installing the underfired emission control technology on their existing operations, with the understanding that all costs of the technology and two year maintenance would be covered through the RCTP program. District staff conducted multiple site visits to these operations, working with the restaurant owner/operator, engineering consultants, and technology vendors. Initial control system designs, quotes from vendors, and installation quotes from contractors were obtained and the feasibility of the technologies were fully assessed for each of the restaurants. However, after conducting a lengthy detailed analysis, none of the restaurants moved forward with the demonstration due to feasibility issues related to the installation of the control devices and local permitting challenges, as further described below, and concerns about the cost of maintenance after the funded two-year demonstration period concluded under RCTP.

Although a variety of technologies for capturing emissions from underfired charbroilers have been tested over the years, ESPs and mechanical or media filtration are the most widely installed technologies for controlling particulate emissions from commercial underfired charbroilers. Below are general descriptions of each technology.

- **Electrostatic Precipitator (ESP):** This technology uses electrostatic processes to capture particles on electrically charged plates. ESPs are complex technology, but highly automated, and the operation costs include electricity and water usage. In addition, wastewater collection and discharge requirements must be met, which involves washing collection plates. ESPs are more expensive to install initially, but have lower maintenance costs than the mechanical filtration units (generally about half of the maintenance costs of the filter units) and have a more effective control of the small particulates emitted by charbroiling.

- **Filtration (Mechanical or Media):** This technology uses groups of mechanical filters to capture particles. It is mechanically simpler than other technologies and the operation costs include electricity and filter replacements. Mechanical filtration units have been widely installed as pollution control devices for kitchen emissions, but maintenance of these units may be cost-prohibitive for mid-to high-volume underfired charbroiling operations due to the ongoing expense of changing the filters, and the large footprint of the units can make installation potentially infeasible.

- **Regenerative Filters:** Regenerative filters capture particles often on a catalyst surface, which then safely removes the particles during the regeneration process, thus allowing the filter to continue capturing particles with little maintenance or filter replacements. Regenerative filters are an emerging technology that has yet to be commercially proven in this source category. The District has had discussions with PureFlame and KhanTec to evaluate the feasibility of their technology. Notably, both technologies lack UL 8782 certification, and do not have installations in the United States.

- **Wool Filters:** Wool filters are another form of media filtration that uses wool instead of traditional filter media. A significant portion of PM2.5 produced by underfired charbroilers measure less than one micron, however, wool filters lack the ability to filter submicron particles at a high control efficiency thus rendering wool filters less efficient at reducing PM2.5.

The evaluation of installing emissions control technology on existing Valley restaurants through RCTP provided many insights as to the cost and technological feasibility of available controls. In addition to supporting and evaluating Valley-based underfired charbroiler control technology demonstrations, District staff has conducted an extensive review and assessment of underfired charbroiler control technology installations. This review included reaching out to other regulatory agencies in California and across the nation, technology manufacturers, and restaurants both inside and outside of the Valley to better understand the control technologies available for underfired charbroilers and real-world costs and experiences related to these technologies. While the District's evaluation has been successful in identifying potential underfired charbroiling control technologies, many questions remain with respect to understanding the feasibility and

cost of these technologies, and whether restaurants can successfully operate and maintain these systems, as described in more detail below:

- **Installation cost of controls can be prohibitively expensive:** The cost of control units themselves are expensive, ranging from $42,500 up to $149,303 for the device itself. This does not take into account additional ducting, exhaust fan upgrades, or operation and maintenance costs. Recent discussions with control device manufacturers indicated that maintenance costs are significant and can quickly outweigh purchase costs within a few year. This fact is also supported by the previous District demonstration project, which required $23,956 of annual maintenance.

- **Retrofitting controls on existing restaurants can be prohibitively expensive and technologically infeasible:** Based on discussions with restaurant operators, technology vendors, and other regulatory agencies, it can be extremely difficult and cost-prohibitive to add controls on existing restaurants. The installation process may require structural, electrical, or water-line modifications that substantially increase total project costs compared to new restaurants. In addition to significant purchase and installation costs, the installation process may require the restaurant to temporarily shut down, resulting in loss of revenue. The District's control strategy seeks to not disrupt business from being carried out, therefore adding another layer of cost and complexity to manage for existing restaurants. Furthermore, the existing restaurant may not have the authority to make changes to the building if the space is leased and the landlord is unwilling to accommodate any changes.

- **Maintenance of controls can be prohibitively expensive:** Regular maintenance of control devices is critical to ensure control effectiveness is maintained. All commercial technologies applicable to control underfired charbroilers are designed to capture PM2.5 and require regular maintenance to remove particles, ensure proper airflow, and maintain control efficiency. ESPs require regular cleaning of the plates capturing particles, as ESPs lose control efficiency when these plates are covered in grease particles and filters clog over time. Discussions with manufacturers indicate that maintenance costs are dependent on the control technology implemented and the type and volume of food cooked, and that most facilities require maintenance on a weekly to monthly basis.

- **Maintenance requires specially trained staff that may not be accessible to all restaurants:** Control device cleaning can be a complex process, requiring specially trained staff. Many manufacturers recommend that their staff or a trusted professional company perform maintenance. Training restaurant staff to perform this task are often not be feasible, and service companies capable of performing the maintenance may not be readily available nearby. Travel costs are another factor that needs be taken into account when determining

maintenance costs. Any delays in required maintenance could cause significant economic impacts to restaurants.

- **Regenerative filters lack UL 8782 certification:** Regenerative filters appear to be a promising technology that seek to limit the amount of maintenance required to control PM2.5 since the device is self-cleaning by design. However, regenerative filters have not been commercially demonstrated to control underfired charbroiler emissions in the US. The lack of UL 8782 certification currently prevents two manufacturers, PureFlame and KhanTec, from currently entering the market. The District has had previous working relationship with KhanTec and struggled to install their device due to fire safety concerns since the device had not received UL 8782 certification. Discussions with PureFlame also present the same concerns, as well as lacking a fire suppression system. The District cannot recommend using a control device that may become a safety hazard.

Cost Analysis for New Restaurants

District Rule 4692 (Commercial Charbroiling) reduces emissions by requiring catalytic oxidizers for chain-driven charbroilers that meet rule applicability thresholds.[23] Charbroiler exhaust transfers through the catalytic oxidizer with little loss of temperature. As high-temperature exhaust goes through the heated catalyst, particulate matter (PM) and VOC are oxidized to carbon dioxide and water vapor. This chemical reaction releases energy that heats the catalyst and transfers it to a heat recovery system. Rule 4692 requires emission controls for chain-driven charbroilers that cook 400 pounds of meat or more per week.

A variety of technologies for capturing emissions from underfired charbroilers have been tested over the years, including electrostatic precipitators (ESP), mechanical or media filtration, and wet scrubbers. ESPs and mechanical or media filtration are the most widely installed technologies for controlling PM from commercial underfired charbroilers. However, District analysis found no cost-effective technologies have been demonstrated as achieved in practice to date. As such, the rule currently does not have control requirements specific to underfired charbroilers.

This analysis uses the meat throughput data from each facility subject to Permit-Exempt Equipment Registration (PEER), which cook the most meat on an underfired charbroiler. According to the District PEER data, 157 restaurants cooked at least 10,800 pounds of meat annually. Using the District's commercial cooking methodology[24], the median PM2.5 emissions from each of these restaurants was 808 pounds annually.

[23] SJVAPCD. *Rule 4692 (Commercial Charbroiling)*. Retrieved from: https://www.valleyair.org/rules/currntrules/r4692.pdf
[24] SJVAPCD. *2006 Area Source Emissions Inventory Methodology 690 – Commercial Cooking Operations.* Retrieved from:

The District conducted a cost analysis using the methods in EPA's *Cost Manual*.[25] The *Cost Manual* has relative estimates of all costs associated with ESPs including purchase price, installation, engineering, fabrication, contractors, and many more. The *Cost Manual* begins with the purchase price, then estimates all other costs based on a percentage of the purchase price.

The total capital investment required for ESPs was calculated using the formula in Table 3.16 of the *Cost Manual*. The formula from Table 3.16 was used to evaluate the lower and upper end of ESP purchase costs of $42,500 and $149,303 respectively. The *Cost Manual* estimates the total capital investment of $112,336 needed for ESPs with a purchase cost of $42,500. The total capital investment increases to $394,638 for devices with a $149,303 purchase cost. Notably, these capital costs do not include site preparation or building modifications, which would require even further investment from the facility.

When combined with operation and maintenance costs, even less expensive ESP devices are not cost effective solutions to reducing emissions from this source category. Based on previous District experience and discussions with manufacturers, the District estimates that $12,000 to $24,000 of annual operation and maintenance costs are required to keep pollution control devices performing properly. Maintenance typically includes but is not limited to media filter replacements, carbon filter replacements, duct or hood cleaning, or ESP plate cleaning. As one example, the District's demonstration of a wet scrubber with media filtration through the RCTP had reported $23,956 of annual maintenance costs. Notably, regular maintenance is required to keep ESPs control efficiency, which can drop to below 30% if not properly maintained. Although facilities are required to install a control device, it is only effective if maintenance is performed regularly. The District has recently had discussions with various vendors that have integrated automated cleaning functions; however, these units still require professional cleaning on a regular basis.

Table 9 Direct Costs

	EPA Cost Manual Formula	Low Estimate	High Estimate
ESP + auxiliary equipment	1.0 A	$42,500	$149,303
Instrumentation	0.1 A	$4,250	$14,930
Sales Tax	0.03 A	$1,275	$4,479
Freight	0.05 A	$2,125	$7,465
Direct Cost Total	**B = 1.18 A**	**$50,150**	**$176,178**

https://www.valleyair.org/Air_Quality_Plans/EmissionsMethods/MethodForms/Current/CommercialCooking2006.pdf

[25] EPA. *Section 6 Particulate Matter Controls Chapter 3 Electrostatic Precipitators*. (September 1999). Retrieved from: https://www.epa.gov/sites/default/files/2020-07/documents/cs6ch3.pdf

Table 10 Direct Installation Costs

	EPA Cost Manual Formula	Low Estimate	High Estimate
Foundations and Supports	0.04 B	$2,006	$7,047
Handling and Fabrication	0.50 B	$25,075	$88,089
Electrical	0.08 B	$4,012	$14,094
Piping	0.01 B	$502	$1,762
Insulation for Ductwork	0.02 B	$1,003	$3,524
Painting	0.02 B	$1,003	$3,524
Direct Installation Costs Total	**0.67 B**	**$33,601**	**$118,039**

Table 11 Indirect Costs

	EPA Cost Manual Formula	Low Estimate	High Estimate
Engineering	0.20 B	$10,030	$35,236
Construction	0.20 B	$10,030	$35,236
Contractor	0.10 B	$5,015	$17,618
Start-up	0.01 B	$502	$1,762
Performance Test	0.01 B	$502	$1,762
Model Study	0.02 B	$1,003	$3,524
Contingencies	0.03 B	$1,505	$5,285
Total Indirect Costs	**0.57 B**	**$28,586**	**$100,421**

Table 12 Other Costs

	EPA Cost Manual Formula	Low Estimate	High Estimate
Site Preparation	SP	As Required	As Required
Buildings	Bldg	As Required	As Required

Table 13 Total Capital Investment

	EPA Cost Manual Formula	Low Estimate	High Estimate
Total	2.24 x B	**$112,336** *+ SP and Bldg*	**$394,638** *+ SP and Bldg*

The cost effectiveness was calculated twice to give a low and high total capital investment estimate by summing annualized one-time costs (annualized over a 10-year period using a 4 percent discount rate) and annual operation and maintenance costs. The District estimates a cost effectiveness of $74,424 per ton of PM2.5 controlled for ESP devices costing $42,500. These costs inflate to $209,180 per ton of PM2.5 controlled for ESP devices costing $149,303. As expected, the elevated purchase costs leads to excessive costs that will not be feasible for restaurant owners to incur an annual cost ranging from $25,850 to $72,655 of annual costs to control emissions. The average Valley restaurant only expects to profit $44,000 annually, which would require

the owner to sacrifice approximately 2.80 to 9.87 year's worth of profits to cover the total capital investment.[26]

Table 14 Cost Effectiveness Analysis for Underfired Charbroiler Controls

	Purchase Costs	Total Capital Investment	O&M (annual)	Annualized Cost	Cost Effectiveness (PEER Median Emissions)
Lowest Cost Estimate	$42,500	$112,336	$12,000	$25,850	**$74,424**
Highest Cost Estimate	$149,303	$394,638	$24,000	$72,655	**$209,180**

Cost Analysis for Existing Restaurants

Based on discussions with restaurant operators, technology vendors, and other regulatory agencies, it can be extremely difficult and cost-prohibitive to add controls on existing restaurants. The installation may require structural, electrical, or water-line modifications that may not be feasible. This makes installation costs much higher for existing restaurants compared to new restaurants that can integrate emissions controls into the design. The existing structure may not have the necessary space or structural support for the control unit. Furthermore, the existing restaurant may not have the authority to make changes to the building if the space is leased and the property owner is unwilling to accommodate. EPA's Cost Manual estimates that the total capital investment for existing restaurants would be 1.3 to 1.5 times more expensive than the total capital investment for new restaurants, with an estimated total capital investment ranging from $146,036 to $591,957, which would be far less cost effective than the already high cost effectiveness values shown previously for new restaurants.

Regulations in Other Regions

District staff conducted a thorough search and review of regulations adopted by other agencies for underfired charbroiling emissions and contacted these agencies to better understand the requirements and how they have been implemented. Areas with underfired regulations include New York City Department of Environmental Protection (NYC DEP) and Bay Area Air Quality Management District (BAAQMD).

The NYC DEP regulation, adopted in May 2016, requires the installation of control devices certified to provide at least 75% emissions reductions for new restaurants with underfired charbroilers that cook 875 pounds or more of meat per week. Based on staff-level discussions, NYC DEP is currently not enforcing the rule requirements, and has not issued any notices to comply. Notably, conversations and discussions with vendors indicated control requirements in the New York City area are the result of nuisance complaints and building code requirements.

[26] SJVAPCD. *Adopt Proposed Commercial Underfired Charbroiling Emission Reduction Strategy*. December 17, 2020. Retrieved from: https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2020/December/final/11.pdf

BAAQMD Regulation 6, Rule 2 (Commercial Cooking Equipment) applies to new and existing restaurants with underfired charbroilers that purchase more than 1,000 pounds of beef per week, with an aggregate grill surface area of ten (10) square feet or more, to control emissions using a certified control device and registration of charbroilers and associated control devices. The rule exempts low-use charbroilers that grill less than 800 pounds of beef per week. No restaurants have been subjected to requirements under this regulation given wide ranging exemptions, enforceability challenges, and lack of certified control devices.

In addition to these under fired regulations, a select number of areas regulate chain-driven charbroilers but do not include underfired charbroiler requirements, similar to the District's control strategy. Chain-driven charbroiler emissions are far easier to control with catalytic oxidizers that are not applicable to under fired charbroilers and the District's strategy has successfully limited PM2.5 emissions from chain-driven devices.

District Commercial Underfired Charbroiling Emission Reduction Strategy

In recognition of the above mentioned challenges, the District Governing Board adopted a multipronged strategy to promote emission reductions from this category, while minimizing the impact on restaurants during the COVID-19 pandemic. This strategy, approved by the Governing Board in December 2020, will require significant effort by the District through creating enhancements to the RCTP program, developing and providing guidance to local agencies for the development of ordinances, providing education to local agencies on the health impact of commercial cooking emissions, working with CARB as they consider developing a statewide Suggested Control Measure, working with CARB/EPA in making improvements to the emissions inventory for commercial underfired charbroiling, and formalizing the restaurant workgroup to stay in touch with current industry conditions and to continue to develop and deploy underfired charbroiler technology. Benefiting from any information gained through these efforts, the District will continue evaluating potential amendments to Rule 4692 to achieve additional emissions reductions from existing restaurants with underfired charbroilers, as technologically and economically feasible. In addition to this effort, the District continues to coordinate with CARB and EPA on feasibility of technology, and advocates for EPA and CARB to establish a new state/federal underfired charbroiler technology certification and demonstration program. To help address community impacts associated with commercial underfired charbroiling operations, this program would establish uniform certification requirements for vendors of emissions control technologies, and support the real-life demonstration of these technologies. Currently, there is no uniform certification program in place, and no technologies have been certified under regional programs. Given the community-level importance of reducing emissions from large underfired charbroiling operations, establishing a uniform certification and demonstration program would significantly accelerate the development and deployment of these technologies.

Conclusion

Considering all of the analysis presented above, the District concludes that a contingency measure provision for new or existing restaurants is not feasible at this time for the following reasons:

- Installation cost of controls can be prohibitively expensive
- Retrofitting controls on existing restaurants can be prohibitively expensive and technologically infeasible
- Maintenance of controls can be prohibitively expensive
- Maintenance requires specially trained staff that may not be accessible to all restaurants
- Regenerative filters lack UL 8782 certification
- Limited areas that have regulations in place do not enforce their rules or include exemptions

However, the District will continue evaluating future potential amendments to Rule 4692 to achieve additional emissions reductions from restaurants with underfired charbroilers, as technologically and economically feasible.

Dust Emissions from Almond Harvesting

Since 2018, the District has been operating a program to replace conventional nut harvesting equipment with new, low-dust equipment, initially starting as a pilot program and converting to a full program in late 2020.[27] The Low-Dust Nut Harvester program built upon more than a decade of significant investment made in the San Joaquin Valley to develop low-dust nut harvesting technologies and to understand the potential benefits in reducing particulate matter (PM) emissions from the use of these new technologies. Studies, conducted in partnership with the District, USDA-NRCS, and agricultural stakeholders and overseen by the San Joaquin Valley wide Air Pollution Study Agency have demonstrated that low-dust harvesting technology can be effective at reducing localized PM emissions associated with harvesting activities. The most recent study, conducted in 2017, indicated that low-dust harvesting technology can reduce localized PM emissions by more than 40%, and in some cases up to nearly 80%. Additionally, working with agricultural stakeholders, a scientific survey was conducted that concluded that a significant portion of nut crop growers and custom harvesters were interested in demonstrating new lower-emitting harvest technologies if provided with meaningful financial incentives. The results from studies conducted in the Valley show that, when compared to traditional harvesting equipment, low-dust harvest technology is successful in reducing PM emissions in Valley nut harvesting operations, without affecting crop yield, while providing potential labor and energy savings. These results were used to develop the District's incentive program including calculating the efficacy, cost-effectiveness, and quantification of emission reductions.

[27] SJVAPCD. *Low Dust Nut Harvester Program*. Retrieved from: https://ww2.valleyair.org/grants/low-dust-nut-harvester-replacement-program/

While incentives have played a critical role in the success of the transition to low-dust harvesting technologies, the District evaluated the potential of requiring the replacement of conventional harvesting technology with low dust harvesting technology as a means of reducing PM2.5 emissions from harvesting activities. Pursuant to CAA requirements and EPA's Draft Guidance, the measure would need to be implemented and achieve reductions within one year (up to two years) of a contingency trigger.

Based on conversations with manufacturers, there is a significant amount of time manufacturers need to build low-dust nut harvesters, with a minimum 1 year of required lead time, to deliver one low-dust nut harvester. This does not take into account the need to manufacture harvesters to meet the significant increase in demand to implement this practice Valley-wide. Manufacturers will have to hire new qualified technical staff to ramp up production. Adding to this challenge, due to the supply chain issues that are plaguing the industry, it will take even longer for manufacturers to ramp up production and be able to meet the needs. There are also dust reduction benefits from driving the harvesting equipment slower, leading to needing to balance speed with having to buy more equipment. Covering more acreage per harvesting equipment will not only result in more emissions, but can also lead to more rapid decline in equipment quality, shortening the time to replacement. Considering these factors, manufacturers simply will not be able to manufacture a sufficient amount of harvesters within the implementation time period required under the contingency guidance by EPA. Therefore, a regulatory measure would take significantly longer than the one to two years to achieve reductions pursuant to EPA's draft guidance to fully implement upon a contingency trigger, and is not a suitable contingency measure.

In addition, as with many industries and businesses, the almond industry has continued to evolve and has in recent years started to alter their practices to address shifting industry practices/standards. A major shift that has occurred is the decision made by almond processors to no longer accept materials from almond producers that contain debris, such as sticks, leaves and dirt that is collected as part of the almond harvesting process. This excess material requires additional processing by the almond processors and results in significant wear and tear of the processer's equipment. In response, almond producers have had to adapt to the changing environment and undergo more processing of their almonds before they deliver their products to the processers. Specifically, almond producers have had to invest in additional equipment, conditioners, that are specifically designed to remove this debris. The conditioners work similar to the harvesters by picking up the almonds in the rows by separating and removing the debris and laying the almonds back down in the row to dry. Once the almonds are dry, the harvesting equipment is then used to pick up the nuts. Since the methodology has changed significantly in the almond industry, the overall impact on total emissions from using conditioners in the harvesting process is unclear, including the overall efficacy of the low-dust nut harvesters using this approach. Therefore, the District believes that more work is needed to better understand the emissions profile of this new method and recommends additional research be undertaken in collaboration with USDA-NRCS and agricultural stakeholders prior for any regulatory consideration.

There are also significant challenges in regards to the cost of this equipment and the ability of growers to afford these new low-dust harvesters without incentive dollars that have been the primary vehicle for the conversion to low-dust new technology. The average cost of a new low-dust nut harvester ranges from approximately $80,000 to $100,000 for new pull-behind harvesters, to $180,000 to $500,000 for self-propelled and off-ground harvesters. Notably, the wholesale price of almonds is the lowest it has been in years, significantly limiting the amount of money growers and custom harvesters have for purchasing this expensive equipment.

Based on the District's analysis for this source category, this is not a feasible source category for a contingency measure at this time for the following reasons:

- Long lead time needed to meet significant increased demand including supply chain issues and need to hire additional qualified technical staff
- Prohibitively high cost of equipment
- Need to conduct additional research to better understand the changing landscape in harvesting techniques and associated emissions

Although this measure is not appropriate for addressing contingency measure requirements, the District will continue to support the use of low-dust harvesting technologies and provide incentives through our Low-Dust Nut Harvester Incentive Program and advocate for more state and federal funding. Additionally, the District will continue to work with USDA-NRCS, CARB, and industry stakeholders to identify potential research opportunities to further understand emissions from nut harvesting activities.

Emissions from Oil and Gas Production Combustion Equipment

District Rules 4306 and 4320 apply to any gaseous fuel or liquid fuel fired boiler, steam generator, or process heater with a total rated heat input greater than 5 million British thermal units per hour (MMBtu/hr). The purpose of these rules is to limit NOx, carbon monoxide (CO), and PM emissions from boilers, steam generators, and process heaters of this size range. Facilities with units subject to these rules represent a wide range of industries, including but not limited to electrical utilities, cogeneration, oil and gas production, petroleum refining, manufacturing and industrial processes, food and agricultural processing, and service and commercial facilities. Rule 4320 establishes technology-forcing limits separate from Rule 4306.

The District Governing Board adopted amendments to Rules 4306 and 4320 on December 17, 2020. Based on a comprehensive technical analysis, in-depth review of local, state, and federal regulations, and a robust lengthy public process that took two years to complete, the District adopted several modifications to Rules 4306 and 4320 to reduce emissions from boilers, process heaters, and steam generators in the Valley. Modifications to Rule 4306 and 4320 include lowered NOx emissions limits for a variety

of unit classes and categories and established dates for emission control plans, authorities to construct, and compliance deadlines.

Rule 4306 is one of the most stringent regulations in the country for the subject type of units and goes above and beyond federal standards of RACT, and meets the Most Stringent Measure (MSM) requirements pursuant to the CAA and as approved by EPA. Rule 4320 goes one step further by establishing even lower emission limits, well beyond MSM levels due to the technology forcing nature of the Rule. Although the District is already implementing the most stringent requirements, the District evaluated opportunities for potential contingency measures, as detailed below.

Direct Control of PM2.5 from Boilers and Steam Generators

The District conducted technological and economic feasibility analyses for direct control of PM2.5 emissions from boilers and steam generators (Appendix I). These analyses show that the typical exhaust PM2.5 concentration from natural gas (NG)-fired boilers and steam generators is significantly below the recommended range of inlet loading concentrations for all of the PM2.5 emission control technologies assessed. Additionally, with the exception of wet ESP and Venturi Scrubbers, these control technologies offer poor control of condensable PM2.5 and therefore poor control of total PM2.5 emissions from natural gas-fired boilers and steam generators. Furthermore, this analysis shows that the cost of direct PM2.5 control on natural gas-fired boilers and steam generators with these technologies ranges between $494,482 and $6,783,207 per ton of PM2.5 emissions reduced. Therefore, use of these emission control technologies to control direct PM2.5 emissions from NG-fired boilers and steam generators is either not technologically feasible or not cost effective.

Electrification of Oilfield Steam Generators

Currently, there are no electric steam generators capable of meeting the demands of conventional steam generators. One of the largest electric generators produces 4,882 lb/hr @ 135 pounds per square inch gauge (psig). This flow rate is only 1/10 of the rate needed from one conventional steam generator and the pressure rating of 135 psig is far below the needed pressure of 800 – 900 psig.

Furthermore, a typical conventional natural gas-fired steam generator is rated (designed) to burn up to 62.5 million Btu/hr of natural gas and consumes approximately 50 million Btu/hr (i.e. 80% firing rate). This will require, on average, 13.75 MW of electricity to replace one conventional steam generator. Therefore, the electricity needs to replace one conventional steam generator with electric steam generation would be the equivalent electricity demand of over 10,000 homes. To replace conventional steam generators operating in the San Joaquin Valley with electric steam generation would require approximately 5,160 MW, which would be the equivalent electricity demand of 3,800,000 homes. The immense amount of power needed to electrify all steam generators in the District would require significant infrastructure upgrades to California's power grid. Therefore, electric steam generators are not technologically feasible at this

time.

Solar Powered Oilfield Steam Generation

Emissions from oilfield steam generators that provide steam to reduce the viscosity of oil in thermally enhanced oil recovery operations have been significantly reduced through decades of increasingly stringent rule requirements. Instead of fuel oil, steam generators today are powered by natural gas or field gas which are significantly cleaner. To ensure that all potential emission reduction opportunities are evaluated, the District performed a comprehensive review of solar powered steam generators.

In the Valley, small pilot projects have been conducted to demonstrate the feasibility of solar powered steam generation technologies and found that such technologies were not feasible:

Berry Petroleum Company: In February 2011, Berry Petroleum Company installed a small pilot test facility designed to use solar energy to pre-heat feed water for the existing natural gas fired steam generators. The system consisted of mirrors in a glass greenhouse (supplied by Glasspoint Solar). The mirrors were designed to focus solar energy onto a pipe carrying water to heat the water. The heated water is then sent to the input of the steam generators. The facility had a designed heat production of 300 kW. This project operated for a short time and was ultimately shut down based on the following shortcomings:

1) Significant heat loss: The heat losses to the water from the pipe runs from the solar installation to the actual steam generator locations were such that the water delivered to the steam generators was ambient or only slightly warmer.
2) Excessively large footprint requirement: The footprint of the solar steam generators needed to provide the thermal output of one 85 MMBtu steam generator would be excessively large.
3) Inconsistent steam quality: The inability of the solar steam generators to consistently generate the quality of steam that is needed for injection that is currently supplied by the steam generators.
4) Unreliable power: The solar steam generators would still need to be supplemented by gas fired steam generators at night and during cloudy days.

Chevron: This company installed a pilot solar thermal steam plant near Coalinga, consisting of 7,600 mirrors that would direct solar energy towards a single solar collector tower (supplied by Brightsource Energy). The heat collected in the tower would turn water into steam. The installation had a footprint of 100 acres. This system discontinued operation in 2014. Although information from Chevron on their findings on the performance of this project is unavailable, based on news articles[28], the system was

[28] http://www.naturalgasintel.com/articles/103562-potential-for-solar-assisted-eor-in-california-oilfield-still-unfulfilled and https://gigaom.com/2011/10/12/brightsources-solar-steam-project-went-way-over-budget/

excessively costly. A news article referencing the manufacturer's SEC filings stated the company realized a 40 million dollar loss on the project.

Aera Energy: Despite the above-described challenges, in 2019, Aera Energy in collaboration with GlassPoint Solar considered the installation of a large 770-acre solar steam generation system adjacent to an Aera Energy oil production operation in western Kern County. However, in April of 2020, GlassPoint cancelled the project due to a lack of funding. This system would have generated the steam equivalent to approximately 10 gas-fired steam generators. The solar steam generators would still need to be supplemented by gas-fired steam generators at night and during cloudy days.

Based on discussions with Aera Energy, the project heavily relied on solar tax credits, the generation and sale of low carbon fuel standard credits, and the reduction in costs of greenhouse gas allowances for Aera. According to Aera Energy, there is no economic benefit to implementing such technologies. In fact, without the LCFS credits, the cost of steam using this solar technology would be as much as three times the current cost.

The project also faced technical challenges, similar to the above pilot projects. Furthermore, the gas-fired steam generators that are required to supplement the system could face difficulty meeting current rule limits due to the need to ramp up and down. There has not been a successful large scale implementation of such technologies. In summary, solar powered oilfield steam generators are not yet feasible and still face significant technical and economic challenges as outlined below:

- Costs: The use of solar steam generation rely on a complex set of funding sources to make the operations economically feasible, including the Federal 30% tax credit, the value of California low-carbon fuel standards credits that may be generated as a result of using solar steam generation to produce oil, and a reduction in the costs for the oil producer of AB32 cap-and-trade credits required for their operations in California. The value of the GHG credits generated varies based on the price of credits on the open market. As the value of the credits is not fixed, the economic viability of a project may change depending on the value of the credits prior to construction and during operation. Even with available credits, the costs continue to be a challenge.

- Land Availability: Adequate open land next to the steam injection wells is needed to house the solar collectors. Both the amount of land and the distance of the land to the injection point are important factors. It is estimated that to create the steam needed to replace one steam generator would require 60 acres of solar generation. Finding the required amount of land available next to oilfield operations may be difficult. The solar systems have to be close to the steam injection wells. Otherwise, additional solar capacity will need to be developed to account for the heat loss because of travel distance.

- Variability of Solar Steam Generation Output: Solar steam generation plants need sunny days to be able to collect enough energy to make steam. During cloudy days and also during the night, the solar equipment would not make enough steam. Oilfield operators will need to supplement the solar operation with natural gas fired steam generators for when the solar equipment is not producing enough steam. On partly cloudy days, the natural gas steam generators would need to cycle on and off depending on the cloud cover. This may cause operational difficulties as the gas fired steam generators are tuned to operate at constant load. A variable load could cause emissions variability and potentially have emissions higher than that allowed in permit limits and/or District prohibitory rules.

The District will continue to work with operators of boilers, steam generators, and process heaters to develop, demonstrate, and deploy new emission control technologies. As part of this continued effort, the District will evaluate any advancements in addressing the above feasibility issues.

Evaluation of Lower Emission Limits for Boilers and Steam Generators

The District's rules which set emission requirements for boilers, steam generators, and process heaters (Rules 4306/4320) are already the most stringent in the nation. Rule 4306 was adopted on September 18, 2003, amended in March 2005, October 2008, and most recently in December 2020. Prior to the adoption of Rule 4306, these sources were controlled by Rule 4305, which was first adopted on December 16, 1993, and amended four times before the adoption of the more stringent Rule 4306. Rule 4320 was first adopted on October 16, 2008 and also recently amended in December 2020. The purpose of Rule 4320 is to establish more stringent, technology forcing NOx, CO, SO2, and PM10 emission limits.

Prior to the 2020 amendments, NOx emissions from boilers, steam generators, and process heaters subject to these rules had already been reduced by 96%. In fact, these rules were designated by EPA as meeting Most Stringent Measures requirements, and were later strengthened even further through the amendments in 2020. Notably, through an extensive public process, the recent amendments to the rules took close to two years to develop and adopt. As part of the rule development process the District conducted a critical analysis of all the control technology options and emission limits that could be adopted to obtain additional emissions reductions from this source category. After careful consideration of all the information gathered and the input from affected stakeholders and the industry; the District adopted NOx limits that go as low as 2.5 ppmv @ 3% O2 for some categories of units, but also included a phase-in of permitting and compliance deadlines in order to allow adequate time for planning and installation of needed control techniques and technologies to meet the technology-forcing limits.

Since the affected units have had several generations of NOx limits to comply with, obtaining additional reductions require expensive add-on control systems, if even

feasible, based on space constraints and other practical challenges. In order to achieve these low NOx levels and ensure continuous compliance, facilities must consider a number of factors before simply adding controls. While many operations already have installed the latest controls including selective catalytic reduction (SCR) systems, SCR has not yet been proven to be either technologically feasible or cost-effective for certain categories of units. In these cases, the District re-evaluated this control option or other potential technologies. Specifically, SCR has significant initial capital cost and require large footprints. The installed cost of an SCR system is $230,000 to $750,000 depending on the size of the unit. Some facilities may also require additional construction costs to accommodate the large size of the catalyst and the storage of the injection reagent (such as anhydrous ammonia), while for other facilities this technology is not even a feasible option. For example, SCR technology is not a common NOx emission control technology for oilfield steam generators. The temperature required for SCR to work (400-800 F) is higher than the temperature that of oilfield steam generator exhaust (~250 F). The steam generators would have to be cut open to retrofit SCR into the convection section of the steam generator to operate the SCR system at the correct temperature. This would cause heat loss, preventing the production of the steam necessary for the oil field operation. Additional feasibility limitations associated with the installation of SCR for oil field steam generators include space limitations within installed infrastructure, and concerns with the storage of anhydrous ammonia in the remotely located, unsecure oil fields where these types of units operate.

In addition, over the past few years since the 2020 amendments, operators have been planning and preparing to comply with the stringent requirements of Rules 4306/4320 and are just now in the final stages of the permitting process and are beginning to expend capital investments by installing equipment to comply with the rule requirements that become effective in December 2023. As discussed above, contingency measures are required by the CAA to be automatically implemented (or up to two years) should an area fail to make reasonable further progress or attain the NAAQS by a specified date. Facilities spend a considerable amount of time planning and preparing for the installation of equipment including budgeting appropriate funds for large projects such as these (2-3 years) and are now expending capital and installing equipment to comply with the rule requirements (2023). It is not reasonable to impose additional requirements to a source category that is already significantly controlled, and in many cases exceeding MSM requirements, especially within the implementation deadlines allowed by the contingency guidance. Planning for additional controls beyond MSM will require even more planning, budgeting, and investment, and operations would most likely face a number of technological and economic challenges. These operators would not even be able to recoup the costs incurred for complying with the 2020 rule requirements before having to expend more money to comply with a contingency measure requirement.

Given that the District recently amended the rules to go beyond EPA’s Most Stringent Measures requirements, containing the toughest requirements anywhere in the nation, and operations are still in the stages of complying with those limits and investing significantly in the required technologies, and the technical infeasibility nature of

installing further controls to meet the technology forcing NOx limits of Rule 4320, it would be infeasible to impose further requirements and lower limits on these facilities and therefore, requiring more stringent emission limits for this source category of emissions is not appropriate for contingency.

Conclusion

The District concludes that this source category is not an appropriate contingency measure due to the following reasons:

- Analyses provided by the District shows that further controls are either technologically infeasible, or not cost effective
- District is already requiring the most stringent feasible controls, exceeding MSM requirements
- Significant time is needed to plan and prepare for the installation of equipment including budgeting appropriate funds for large projects (2-3 years), which is incompatible with a contingency trigger
- Operations are in the process of investing in and installing technologies to meet recently amended rule limits
- A contingency trigger is incompatible with the technologies involved in reducing emissions from this category, as operations would need time to plan and install technology and reductions would not be achieved within one to two years of a contingency trigger

Therefore, for the reasons outlined above, a contingency measure is not feasible for this source category.

5. OPPORTUNITIES FOR STATEWIDE CONTINGENCY MEASURES

[This section provided by the California Air Resources Board]

Contingency measures are required by the Clean Air Act to be implemented quickly if triggered when an area fails to make reasonable further progress or attain the National Ambient Air Quality Standards (NAAQS) by the required date. Over the last few years, multiple court decisions by the United States Court of Appeals for the Ninth Circuit (Ninth Circuit) and in other parts of the country have effectively disallowed the SIP-approved approach which the California Air Resources Board (CARB), the local air districts and the rest of the country have historically used to meet contingency measure requirements. The United States Environmental Protection Agency (U.S. EPA) released new draft guidance on March 17, 2023[29] to provide states direction in response to the court decisions. Unfortunately, the draft guidance does not comprehensively address all of the issues related to contingency measures and will not be final for months. Timely, comprehensive, and practical final guidance is needed for CARB, and other air

[29] See 88 Fed.Reg. 17571-17572 (March 23, 2023).

agencies across California and the U.S., to ensure that the significant resources devoted to creating, adopting, and implementing a contingency measure result in a measure that meets federal requirements and which can be approved into the State Implementation Plan (SIP).

California faces the most difficult air quality challenges in the nation and, accordingly, leads the country with the most stringent air pollution control programs. Historically, U.S. EPA guidance required contingency measures to achieve approximately one year's worth of emission reductions in the context of reasonable further progress (RFP). Although the new draft guidance proposes a change to the way that one year's worth of emissions reductions is calculated such that it connects more directly to attainment inventories (termed now as "one year's worth of progress") and thereby reduces the amount needed for contingency measures, CARB's control programs are advanced, and primarily-federally regulated sources contribute over half of the mobile source NOx emissions. Thus, opportunities for a triggered contingency measure that can be implemented by the State and result in one year's worth of progress in the required time frame are not readily available. Further, if any measure that could achieve this level of emission reductions existed, it would be adopted to improve air quality and support attainment of the NAAQS and would not be withheld for contingency purposes. California continues to work toward meeting contingency measure requirements, while U.S. EPA finalizes its draft guidance.

5.1 Background

The Clean Air Act specifies that SIPs must provide for contingency measures, defined in section 172(c)(9) as "specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard by the attainment date…." The Clean Air Act is silent though on the specific level of emission reductions that must flow from contingency measures. In the absence of specific requirements for the amount of emission reductions required, in 1992, U.S. EPA conveyed that the contingency measures should, at a minimum, ensure that an appropriate level of emissions reduction progress continues to be made if attainment of RFP is not achieved and additional planning by the State is needed (57 Federal Register 13510, 13512 (April 16, 1992)). Further, U.S. EPA ozone guidance states that "contingency measures should represent one year's worth of progress amounting to reductions of 3 percent of the baseline emissions inventory for the nonattainment area". U.S. EPA, though, has accepted contingency measures that equal less than one year's worth of RFP when the circumstances fit under "U.S. EPA's long-standing recommendation that states should consider 'the potential nature and extent of any attainment shortfall for the area' and that contingency measures 'should represent a portion of the actual emissions reductions necessary to bring about attainment in the area.'"[30]

[30] See, e.g. 78 Fed.Reg. 37741, 37750 (Jun. 24, 2013), approval finalized with 78 Fed.Reg. 64402 (Oct. 29, 2013).

Historically, U.S. EPA allowed contingency measure requirements to be met via excess emission reductions from ongoing implementation of adopted emission reduction programs, a method that CARB has used to meet contingency measure requirements and U.S. EPA has approved in the past. In 2016, in *Bahr v. U.S. Environmental Protection Agency*[31] *(Bahr),* the Ninth Circuit determined U.S. EPA erred in approving a contingency measure that relied on an already-implemented measure for a nonattainment area in Arizona, thereby rejecting U.S. EPA's longstanding interpretation of section 172(c)(9). U.S. EPA staff interpreted this decision to mean that contingency measures must include a future action triggered by a failure to attain or failure to make RFP. This decision was applicable to the states covered by the Ninth Circuit. In the rest of the country, U.S. EPA still allowed contingency measures using their pre-Bahr stance. In January 2021, in *Sierra Club v. Environmental Protection Agency*[32], the United States Court of Appeals for the D.C. Circuit, ruled that already implemented measures do not qualify as contingency measures for the rest of the country (*Sierra Club*).

In response to *Bahr* and as part of the 75 ppb 8-hour ozone SIPs due in 2016, CARB developed the statewide Enhanced Enforcement Contingency Measure (Enforcement Contingency Measure) as a part of the *2018 Updates to the California State Implementation Plan* to address the need for a triggered action as a part of the contingency measure requirement. CARB worked closely with U.S. EPA regional staff in developing the contingency measure package that included the triggered Enforcement Contingency Measure, a district triggered measure and emission reductions from implementation of CARB's mobile source emissions program. However, as part of the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard* SIP action, U.S. EPA wrote in their final approval that the Enforcement Contingency Measures did not satisfy requirements to be approved as a "standalone contingency measure" and approved it only as a "SIP strengthening" measure. U.S. EPA did approve the district triggered measure and the implementation of the mobile reductions along with a CARB emission reduction commitment as meeting the contingency measure requirement for this SIP.

Subsequently, the Association of Irritated Residents filed a lawsuit against the U.S. EPA for their approval of various elements within the *San Joaquin Valley 2016 Ozone Plan for 2008 8-hour Ozone Standard*, including the contingency measure. The Ninth Circuit issued its decision in *Association of Irritated Residents v. EPA*[33] (*AIR*) that U.S. EPA's approval of the contingency element was arbitrary and capricious and rejected the triggered contingency measure that achieves much less than one year's worth of RFP. Most importantly, the Ninth Circuit said that, in line with U.S. EPA's longstanding interpretation of what is required of a contingency measure and the purpose it serves, together with *Bahr*, all reductions needed to satisfy the Clean Air Act's contingency

[31] *Bahr v. U.S. Environmental Protection Agency,* (9th Cir. 2016) 836 F.3d 1218.
[32] *Sierra Club v. Environmental Protection Agency,* (D.C. Cir. 2021) 985 F.3d 1055.
[33] *Association of Irritated Residents v. U.S. Environmental Protection Agency*, (9th Cir. 2021) 10 F.4th 937

measure requirements need to come from the contingency measure itself and the amount of reductions needed for contingency should not be reduced by the fact of surplus emission reductions from ongoing programs absent U.S. EPA formally changing its historic stance on the amount of reductions required. U.S. EPA staff has interpreted *AIR* to mean that triggered contingency measures must achieve the entirety of the required one year's worth of emission reductions on their own. In addition, surplus emission reductions from ongoing programs cannot reduce the amount of reductions needed for contingency.

In response to *Bahr* and *Sierra Club*, in 2021, U.S. EPA convened a nation-wide internal task force to develop guidance to support states in their development of contingency measures. The draft guidance released in March 2023 is currently undergoing a public review process. The draft guidance proposes a new method for how to calculate one year's worth of progress for the targeted amount of reductions needed for contingency, and provides new clarification on the reasoned justification that would be needed for measures to be approved with a lesser amount of reductions. Per the draft guidance, the reasoned justification would need to include an infeasibility analysis detailing why there are insufficient measures to meet one year's worth of progress.

Since *Bahr*, CARB and air districts across California have worked closely with our U.S. EPA regional office in developing contingency measures with little success. CARB will continue to work closely with our regional U.S. EPA partners and is committed to meeting the Clean Air Act requirements for contingency measures. U.S. EPA needs to finalize national guidance on this complex issue to ensure states can effectively develop approvable contingency measures consistent with the new guidance.

5.2 CARB's Opportunities for Contingency Measures

Much has changed since U.S. EPA's 1992 guidance on contingency measures. Control programs across the country have matured as have the health-based standards. Ozone standards have strengthened in 1997, 2008 and 2015 with attainment dates out to 2037. California has the only three extreme ozone nonattainment areas in the country. Thus, control measures are needed for meeting the NAAQS as expeditiously as possible, rather than being held in reserve.

To address contingency measure requirements given the courts' decisions and draft U.S. EPA guidance, CARB and local air districts would need to develop a measure or measures that, when triggered by a failure to attain or failure to meet RFP, will achieve one year's worth of progress for the given nonattainment area unless it is determined that it is infeasible to achieve one year's worth of emission reductions. Given CARB's wide array of mobile source control programs, the relatively limited portion of emissions primarily regulated by the local air districts, and the fact that primarily-federally regulated sources are expected to account for approximately 52 percent of statewide nitrogen oxides (NOx) emissions by 2037[34], finding triggered measures that will achieve the

[34] Source: CARB 2022 CEPAM v1.01; based on 2037 emissions totals.

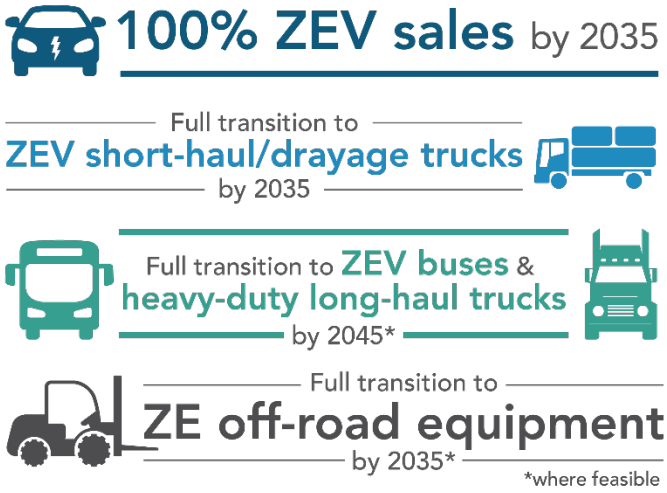
required reductions is nearly impossible. That said, even discounting the amount to reflect the proportion of sources that are primarily federally regulated, additional control measures that can be identified by CARB that would achieve the required emissions reductions needed for a contingency measure are scarce or nonexistent.

Adding to the difficulty of identifying available control measures, not only does the suite of contingency measures need to achieve a large amount of reductions, but they will also need to achieve these reductions in the year following the year in which the failure to attain or meet RFP has been identified. Although the newly released draft guidance proposes allowing for up to two years to achieve those reductions, control measures achieving the level of reductions required often take more than two years to implement and will likely not result in immediate reductions. In California's 2022 State SIP Strategy, CARB's three largest NOx reduction measures, In-Use Locomotive Regulation, Advanced Clean Fleets, and Transportation Refrigeration Unit II, rely on accelerated turnover of older engines/trucks and a shift to zero-emission equipment. Buildup of infrastructure and equipment options limits the availability to have significant emission reductions in a short amount of time. Options for a technically and economically feasible triggered measure that can be implemented and achieve the necessary reductions in the time frame required are scarce in California and may not be possible.

CARB has over 50 years of experience reducing emissions from mobile sources like cars and trucks, as well as other sources of pollution under State authority. The Reasonably Available Control Measures for State Sources analysis illustrates the reach of CARB's current programs and regulations, many of which set the standard nationally for other states to follow. Few sources CARB has primary regulatory authority over remain without a control measure, and all control measures that are in place support the attainment of the NAAQS. There is a lack of additional control measures that would be able to achieve the necessary reductions for a contingency measure. Due to the unique air quality challenges California faces, should such additional measures exist, CARB would pursue those measures to support expeditious attainment of the NAAQS and would not reserve such measures for contingency purposes. Nonetheless, CARB continues to explore options for potential statewide contingency measures utilizing its authorities and applying U.S. EPA's draft guidance.

A central difficulty in considering a statewide contingency measure under CARB's authority, is that CARB is already fully committed to driving sources of air pollution in California to zero emissions everywhere feasible and as expeditiously as possible. In 2020, Governor Newsom signed Executive Order N-79-20 (Figure 3) that established a first-in-the-nation goal for 100 percent of California sales of new passenger cars and trucks to be zero emission by 2035. The Governor's order set a goal to transition 100 percent of the drayage truck fleet to zero- e-mission by 2035, all off-road equipment where feasible to zero-emission by 2035, and the remainder of the medium and heavy-duty vehicles to zero-emission where feasible by 2045.

Figure 3 Governor Newson Executive Order N-79-20



California is committed to achieving these goals and CARB is pursuing an aggressive control program in conjunction with other state and local agencies to turn the Executive Order into reality. Thus, CARB's programs not only go beyond emissions standards and programs set at the federal level, but many include zero-emissions requirements or otherwise, through incentives and voluntary programs, that drive mobile sources to zero-emissions, as listed in Table 15 below. CARB is also exploring and developing a variety of new measures to drive more source categories to zero-emissions and reduce emissions even further, as detailed in CARB's 2022 State SIP Strategy. With most source categories being driven to zero-emissions as expeditiously as possible, opportunities for having triggered measure that could reduce emissions by the amount required for contingency measures are scarce.

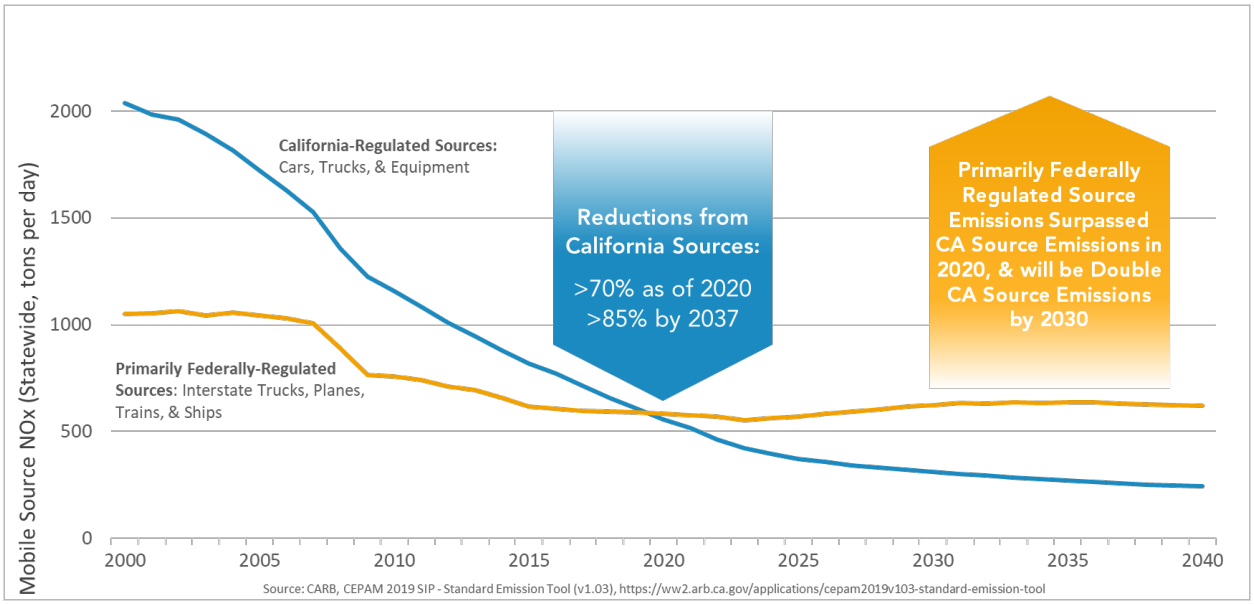
Table 15 Emissions Sources and Respective CARB Programs with a Zero-Emissions Requirement/Component

Emission Source	Regulatory Programs
Light-Duty Passenger Vehicles and Light-Duty Trucks	• Advanced Clean Cars Program (I and II), including the Zero Emission Vehicle Regulation • Clean Miles Standard
Motorcycles	• On-Road Motorcycle Regulation*
Medium Duty-Trucks	• Advanced Clean Cars Program (I and II), including the Zero Emission Vehicle Regulation • Zero-Emission Powertrain Certification Regulation • Advanced Clean Trucks Regulation • Advanced Clean Fleets Regulation*
Heavy-Duty Trucks	• Zero-Emission Powertrain Certification Regulation • Advanced Clean Trucks Regulation

Emission Source	Regulatory Programs
	• Advanced Clean Fleets Regulation*
Heavy-Duty Urban Buses	• Innovative Clean Transit • Advanced Clean Fleets Regulation*
Other Buses, Other Buses – Motor Coach	• Zero-Emission Airport Shuttle Regulation • Advanced Clean Fleets Regulation*
Commercial Harbor Craft	• Commercial Harbor Craft Regulation
Recreational Boats	• Spark-Ignition Marine Engine Standards*
Transport Refrigeration Units	• Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (Parts I and II*)
Industrial Equipment	• Zero-Emission Forklifts* • Off-Road Zero-Emission Targeted Manufacturer Rule*
Construction and Mining	• Off-Road Zero-Emission Targeted Manufacturer Rule*
Airport Ground Support Equipment	• Zero-Emission Forklifts*
Port Operations and Rail Operations	• Cargo Handling Equipment Regulation • Off-Road Zero-Emission Targeted Manufacturer Rule*
Lawn and Garden	• Small Off-Road Engine Regulation • Off-Road Zero-Emission Targeted Manufacturer Rule*
Ocean-Going Vessels	• At Berth Regulation
Locomotives	• In-Use Locomotive Regulation*

*Indicates program or regulation is in development

There are few sources of air pollution remaining in California that are not already being aggressively controlled by CARB or the local air districts, and as mentioned previously, those sources that are not as well controlled are primarily-federally regulated sources. This includes interstate trucks, ships, locomotives, aircraft, and certain categories of off-road equipment, constituting a large source of potential emissions reductions. Since these are primarily regulated at the federal and, in some cases, international level, options to implement a contingency measure with reductions approximately equivalent to one year's worth of progress are limited.



Additionally, CARB is currently working across the agency on efforts to advance racial equity and alleviate the environmental burdens priority communities in California experience. For contingency, like with all of our programs, any measure considered must be evaluated to understand whether there could be any disparate impacts on priority communities. Given the existing disproportionate impacts overburdened communities already face, CARB must ensure that any new measure adopted does not have a disproportionate impact or place any further burden on these communities.

5.3 Measure Analysis

Despite these challenges, CARB is analyzing control measures for all sources under CARB authority to identify potential contingency measure options. CARB currently has programs in place or under development for most of these sources, and we are evaluating a variety of regulatory mechanisms within our existing and new programs for potential contingency triggers.

Criteria for Contingency Feasibility

CARB has evaluated potential options for a contingency measure within each of CARB's regulations (Table 16) using three criteria to determine its feasibility given the contingency measure requirements under the Clean Air Act, recent court decisions and U.S. EPA draft guidance. First, each measure was evaluated on whether it could be implemented within 60 days of being triggered and achieve the necessary reductions within 1-2 years of being triggered. Second, the technological feasibility of each option was considered to assess whether the measure would be technically feasible to implement. Measure requirements may be unavailable or cost prohibitive to implement, especially in the time frame required for contingency. Lastly, CARB evaluated whether the timeline for adoption would be compatible with the current consent decree deadline

of September 30, 2024[35]. The contingency measure must be adopted by CARB and submitted to and fully approved by U.S. EPA by this date. A statewide measure needing a full regulatory process typically requires five years for development and adoption by CARB and additional time for U.S. EPA's approval process.

Challenges for CARB Measures

Based on CARB's feasibility analysis, there are a few common components of CARB regulations that limit the options for contingency measures. CARB regulations that require fleet turnover or new engine standards require a long lead time for implementation. Engine manufacturers would need lead time to design, plan, certify, manufacture, and deploy cleaner engines to meet a new or accelerated engine standard, while fleet regulations necessitate that manufacturing is mature so that there is enough supply available to meet that demand. Fleet regulations also require vehicle and equipment owners and operators to plan, purchase and deploy new, often zero-emission, equipment which may require changes to their business operations and the installation of new infrastructure. Thus, measures that require fleet turnover or new engine standards are not appropriate to be used as a triggered contingency measure.

CARB regulations are also technology forcing, which makes it difficult to amend regulations or pull compliance timelines forward with only 1-2 years notice as industry needs time to plan, develop, and implement these new technologies. It would be infeasible to require industry to turn over their fleets within one year if the technology is not readily available at a reasonable cost. Further, because they are technology forcing, many CARB regulations require an interim technology or implementation review and assessment to ensure that the requirements are achievable; as a part of these reviews, CARB routinely considers whether regulations can be accelerated or strengthened. CARB regulations are the most stringent air quality control requirements in the country, so there are few opportunities to require additional stringency. CARB is driving sources under our authority to zero-emission everywhere feasible to ensure attainment of air quality standards across the State, and to support near-source toxics reductions and climate targets. However, the zero-emissions targets also eliminates opportunities for contingency based on more stringent standards.

Lastly, many of CARB's options for a contingency measure would require a full rulemaking process and would not be adopted by CARB and approved by U.S. EPA within the timeframe specified, making many of the options infeasible. Based on the U.S. EPA Federal Implementation Plan (FIP) timeline, CARB would need to find a measure that could realistically be adopted within the next year. However, most CARB measures must go through a regulatory process for adoption that can take approximately five years from start to finish.

[35] See 87 Fed.Reg. 71631 (Nov. 23, 2022).

Table 16 Assessment of Potential CARB Contingency Measures

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
Light-Duty Passenger Vehicles and Light-Duty Trucks	Advanced Clean Cars Program (I and II), including the Zero Emission Vehicle (ZEV) Regulation	Amended 8/25/22 Requires 100% ZEV new vehicle sales by 2035 and increasingly stringent standards for gasoline cars and passenger trucks.	Pulling compliance timelines forward. Setting more stringent standards.	No; standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard or manufacturing requirements within 60 days and achieve reductions within one year.	No; current standards and requirements are technology forcing and most stringent in the nation, including a zero-emission requirement. Further stringency would not be feasible.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Clean Miles Standard	Adopted 5/20/21 Set eVMT (electric miles traveled) and greenhouse gas (GHG) requirements for Transportation Network Companies (TNCs).	Pulling forward timeline to achieve 100% eVMT.	No; standards and fleet requirements need lead time to be implemented; infeasible to implement new standard or purchasing requirements within 60 days and achieve reductions within one year.	No; zero-emissions technology requirement is most stringent standard; TNCs are only a small portion of on-road vehicles, depending on area, may not achieve many reductions.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	On Board Diagnostics II (OBD)	Amended July 22, 2021 Required updates to program to address cold start emissions and diesel particulate matter (PM) monitoring. Many of the regulatory changes included phase-ins that are not 100% until 2027.	Removing or pulling phase-in timelines forward. Setting more stringent OBD requirements.	No; OBD requirements need significant lead time to be developed, adopted, and implemented; infeasible to fully implement new requirements within 60 days and achieve similar reductions within one year.	No; the OBD requirements require sufficient lead time to implement with significant development time needed for hardware/ software changes and verification/validation testing.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	California Smog Check Program	Amended 2010 via legislation Smog Check Program enhancements, including new technologies and test methods.	Require annual Smog Check. Require annual Smog Check for only high mileage vehicles.	No; Smog Check requirements need significant lead time to be developed, adopted, and implemented; infeasible to fully implement new requirements within 60 days and achieve similar reductions within one year.	Yes, but would disproportionately impact low-income populations and disadvantaged communities.	No; any potential changes could require a regulatory process with California Bureau of Automotive Repair; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Reformulated Gasoline	Amended May 2003 Required removal of methyl tert-butyl ether (MTBE) and included refinery limits and cap limits.	Require more stringent standards. Change cap limits and refinery limits.	No; fuel standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year.	No; current standards and requirements are some of most stringent in the world; not feasible to require further stringency of specifications and develop or manufacture in a compressed timeline.	No; infeasible to develop and certify according to newer specifications; infeasible to achieve reductions within one year. Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Motorcycles	On-Road Motorcycle Regulation*	Proposed hearing: 2023 May require exhaust emissions standards (harmonize with European standards), evaporative emissions standards, and Zero Emission Motorcycle sales thresholds.	Pulling compliance timelines forward. Require more stringent emissions standards.	No; standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year.	No; Any increase to the stringency of proposed standards would require an additional 1 to 2 years of lead time for 1) CARB staff to evaluate feasibility, and 2) manufacturers to develop and certify compliant motorcycles.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Medium Duty-Trucks	Clean Diesel Fuel	Amended 2013 Established more stringent standards for diesel fuel.	Require more stringent fuel standard.	No; fuel standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year.	No; infeasible to require more stringent standards in compressed timeline.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Heavy-Duty Engine and Vehicle Omnibus Regulation	Adopted 8/27/20 Established new low NOx and lower PM tailpipe standards and lengthened the useful life and emissions warranty of in-use heavy-duty diesel engines.	Require more stringent standard, make optional idling standard required. Update testing requirements or corrective action procedures.	No; standards need years of lead time to be implemented; infeasible to implement new sales requirement within 60 days and achieve reductions within one year.	No; infeasible to require more stringent standards in compressed timeline.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Advanced Clean Trucks Regulation	Adopted 6/25/20 Established manufacturer zero-emission truck sales requirement and company and fleet reporting.	Move up timeline for ZEV sales requirement. Reduce threshold for compliance.	No; manufacturer sales requirements need years of lead time to be implemented; infeasible to implement new sales requirement within 60 days. Sales requirement would not happen immediately or within one year of trigger; infeasible to achieve reductions within one year.	No; current sales requirement is technology forcing and most stringent in the nation.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Advanced Clean Cars Program (I and II*), including the Zero Emission Vehicle Regulation	Amended 8/25/22 Requires 100% ZEV new vehicle sales by 2035 and increasingly stringent standards for gasoline cars and passenger trucks.	Pulling compliance timelines forward. Setting more stringent standards.	No; standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard or manufacturing requirements within 60 days and achieve reductions within one year.	No; current standards and requirements are technology forcing and most stringent in the nation, including a zero-emission requirement. Further stringency would not be feasible.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Advanced Clean Fleets Regulation*	Proposed CARB hearing in 2023 would establish zero-emission purchasing requirements for medium- and heavy-duty vehicle fleets (including state and local agencies, and drayage fleets, high priority, and federal fleets); would also require 100% zero-emission new vehicle sales starting 2040.	Pulling compliance timelines forward. Reduce threshold for compliance.	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing requirements within 60 days. Purchasing requirement and turnover would not happen immediately; infeasible to achieve reductions within one year. Because of near term compliance deadlines, moving forward deadlines would not result in many reductions.	No; current fleet requirements are technology forcing and most stringent in the nation, eventually requiring zero-emissions only.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Heavy-Duty Trucks	Heavy-Duty Low NOx Engine Standards	See Omnibus.	More stringent standards were set with Omnibus Regulation.	No; engine standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard or purchasing requirements within 60 days and achieve reductions within one year.	No; infeasible to require more stringent technology forcing standards in compressed timeline if technology/ alternatives are not widely available.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Optional Low-NOx Standards for Heavy-Duty Diesel Engines	Amended 8/27/20 as a part of Omnibus to lower the optional low NOx emission standards for on-road heavy-duty engines.	Make option required.	No; engine standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard or purchasing requirements within 60 days and achieve reductions within one year.	No; infeasible to require more stringent technology forcing standards in compressed timeline if technology/ alternatives are not widely available.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Heavy-Duty Inspection and Maintenance Regulation	Adopted 12/9/21 Requires periodic vehicle emissions testing and reporting on nearly all heavy-duty vehicles operating in California.	Increase frequency of testing.	No; increased I/M requirements need significant lead time to be developed, adopted, and implemented; infeasible to fully implement new requirements within 60 days and achieve similar reductions within one year.	Yes, but costs would disproportionally impact small businesses and low-income populations.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Heavy-Duty OBD	Amended July 22, 2021 Required updates to program to address cold start emissions and diesel PM monitoring. Many of the regulatory changes included phase-ins that are not 100% until 2027.	Removing or pulling phase-in timelines forward. Setting more stringent OBD requirements.	No; OBD requirements need significant lead time to be developed, adopted, and implemented; infeasible to fully implement new requirements within 60 days and achieve similar reductions within one year.	No; the OBD requirements require sufficient lead time to implement with significant development time needed for hardware/ software changes and verification/validation testing.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Heavy-Duty Engine and Vehicle Omnibus Regulation	Adopted 8/27/20 Established new low NOx and lower PM Standards and lengthened the useful life and emissions warranty of in-use heavy-duty diesel engines.	Require more stringent standard, make optional idling standard required. Update testing requirements or corrective action procedures.	No; standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard or sales requirements within 60 days and achieve reductions within one year.	No; infeasible to require more stringent technology forcing standards in compressed timeline.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Cleaner In-Use Heavy-Duty Trucks (Truck and Bus Regulation)	Adopted 12/17/10 Requires heavy-duty diesel vehicles that operate in California to reduce exhaust emissions. By January 1, 2023, nearly all trucks and buses will be required to have 2010 or newer model year engines to reduce PM and NOx.	None	-	-	-
	Zero-Emission Powertrain Certification Regulation	Adopted 12/6/19 Establishes certification requirements for zero-emission powertrains.	None	-	-	-
	Advanced Clean Trucks Regulation	Adopted 6/25/20 Established manufacturer zero-emission truck sales requirement and company and fleet reporting.	Move up timeline for ZEV sales requirement. Reduce threshold for compliance.	No; manufacturer sales requirements need years of lead time to be implemented; infeasible to implement new sales requirement within 60 days. Sales requirement would not happen immediately or within one year of trigger; infeasible to achieve reductions within one year.	No; current sales requirement is technology forcing and most stringent in the nation.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Advanced Clean Fleets Regulation*	Proposed CARB hearing in 2023. Would establish zero-emission purchasing requirements for medium- and heavy-duty vehicle fleets (including state and local agencies, and drayage fleets, high priority, and federal fleets); would also require 100% zero-emission new vehicle sales starting 2040.	Pulling compliance timelines forward. Reduce threshold for compliance.	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing requirements within 60 days. Purchasing requirement and turnover would not happen immediately; infeasible to achieve reductions within one year. Because of near term compliance deadlines, moving forward deadlines would not result in many reductions.	No; current fleet requirements are technology forcing and most stringent in the nation, eventually requiring zero-emissions only.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Heavy-Duty Urban Buses	Innovative Clean Transit	Adopted 12/14/2018 Requires all public transit agencies to gradually transition to a 100% zero-emission bus fleet.	Move compliance timelines forward. Remove various exemptions or compliance options.	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing requirements within 60 days. Purchasing requirement and turnover would not happen immediately; infeasible to achieve reductions within one year.	No; current requirements are technology forcing and most stringent (zero-emission requirement). Further stringency is not possible; expediting timelines would not be feasible.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Advanced Clean Fleets Regulation*	Proposed CARB hearing in 2023. Would establish zero-emission purchasing requirements for medium- and heavy-duty vehicle fleets (including state and local agencies, and drayage fleets, high priority, and federal fleets); would also require 100% zero-emission new vehicle sales starting 2040.	Pulling compliance timelines forward. Reduce threshold for compliance.	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing requirements within 60 days. Purchasing requirement and turnover would not happen immediately; infeasible to achieve reductions within one year. Because of near term compliance deadlines, moving forward deadlines would not result in many reductions.	No; current fleet requirements are technology forcing and most stringent in the nation, eventually requiring zero-emissions only.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Other Buses, Other Buses – Motor Coach	Zero-Emission Airport Shuttle Regulation	Adopted 6/27/19 Requires airport shuttles to transition to zero-emission fleet.	Pull compliance timelines forward. Remove reserve airport shuttle exemption.	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing requirements within 60 days. Purchasing requirement and turnover would not happen immediately; infeasible to achieve reductions within one year.	No; current requirements are technology forcing and most stringent (zero-emission requirement). Further stringency is not possible. Not many shuttles in area, would not achieve many reductions.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Advanced Clean Fleets Regulation*	Proposed CARB hearing in 2023. Would establish zero-emission purchasing requirements for medium- and heavy-duty vehicle fleets (including state and local agencies, and drayage fleets, high priority, and federal fleets); would also require 100% zero-emission new vehicle sales starting 2040.	Pulling compliance timelines forward. Reduce threshold for compliance.	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing requirements within 60 days. Purchasing requirement and turnover would not happen immediately; infeasible to achieve reductions within one year. Because of near term compliance deadlines, moving forward deadlines would not result in many reductions.	No; current fleet requirements are technology forcing and most stringent in the nation, eventually requiring zero-emissions only.	No; requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Commercial Harbor Craft	Commercial Harbor Craft (CHC) Regulation	Amended 3/24/22 Established more stringent standards, all CHC required to use renewable diesel, expanded requirements, and mandates zero-emission and advanced technologies.	Set more stringent standards. Pull compliance timelines forward.	No; Technology requirements and standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard or requirements within 60 days and achieve reductions within one year.	No; standards set are technology forcing and most stringent; not technologically feasible to require increased stringency in compressed timeline.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Recreational Boats	Spark-Ignition Marine Engine Standards*	Proposed hearing: 2029 Would establish catalyst-based emission standards and percentage of zero-emission technologies for certain applications.	Set more stringent standard.	No; standards need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year.	No; standards being set will be most stringent feasible, including zero-emission requirement); would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
Transport Refrigeration Units	Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRUs) (Parts I and II*)	Amended 2/24/22 (Part I), Part II proposed CARB hearing in 2025 Requires diesel-powered truck TRUs to transition to zero-emission, PM emission standard for newly manufactured non-truck TRUs. Part II would establish zero-emission options for non-truck TRUs.	Set more stringent standards. Pull compliance timelines forward	No; standards and fleet requirements need years of lead time to be implemented; infeasible to implement new standard or purchasing requirements within 60 days and achieve reductions within one year.	No; current requirements are technology forcing and most stringent (zero-emission requirement). Further stringency is not possible; expediting timelines would not be feasible; would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Industrial Equipment	Large Spark-Ignition (LSI) Engine Fleet Requirements Regulation	Amended July 2016 Extended recordkeeping requirements, established labeling, initial reporting, and annual reporting requirements.	Set more stringent performance standards	No; standards and fleet requirements need years of lead time to be implemented; infeasible to implement new standard or purchasing requirements within 60 days and achieve reductions within one year.	No; Infeasible to require further stringency within one year given timeline for technology development and certification. See Zero-Emission Forklifts below.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Off-Road Regulation	Amended 11/17/22 Requires phase out of oldest and highest-emitting engines, restricts addition of Tier 3 and 4i engines, mandates renewable diesel for all fleets.	Pull phase-out or compliance timelines forward	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing and turnover requirements within 60 days and achieve reductions within one year.	No; Infeasible to require further stringency within one year given timeline for technology development and certification.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Zero-Emission Forklifts*	Proposed CARB hearing in 2023. Would require model-year phase-out and reporting requirements and manufacturer sales restrictions.	Pull phase-out or compliance timelines forward	No; standards requirements need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year.	No; standards being set will be technology forcing and most stringent feasible, including zero-emission requirement; would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Off-Road Zero-Emission Targeted Manufacturer Rule*	Proposed CARB hearing in 2027. Would require manufacturers of off-road equipment and/or engines to produce for sale zero-emission equipment and/or powertrains as a percentage of their annual statewide sales volume.	Pull forward compliance timelines or increase percentage sales requirements	No; Manufacturing and sales requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days and achieve reductions within one year.	No; standards being set will be technology forcing and most stringent feasible, including zero-emission requirement; would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Construction and Mining	Off-Road Zero-Emission Targeted Manufacturer Rule*	Proposed CARB hearing in 2027. Would require manufacturers of off-road equipment and/or engines to produce for sale zero-emission equipment and/or powertrains as a percentage of their annual statewide sales volume.	Pull forward compliance timelines or increase percentage sales requirements	No; Manufacturing and sales requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days and achieve reductions within one year.	No; standards being set will be technology forcing and most stringent feasible, including zero-emission requirement; would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
	Off-Road Regulation	Amended 11/17/22 Requires phase out of oldest and highest-emitting engines, restricts addition of Tier 3 and 4i engines, mandates renewable diesel for all fleets.	Pull phase-out or compliance timelines forward	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing and turnover requirements within 60 days and achieve reductions within one year.	No; Infeasible to require further stringency within one year given timeline for technology development and certification.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Airport Ground Support Equipment	Zero-Emission Forklifts*	Proposed CARB hearing in 2023. Would require model-year phase-out and reporting requirements and manufacturer sales restrictions.	Pull phase-out or compliance timelines forward	No; standards requirements need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year.	No; standards being set will be technology forcing and most stringent feasible, including zero-emission requirement; would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Large Spark-Ignition (LSI) Engine Fleet Requirements Regulation	Amended July 2016 Extended recordkeeping requirements, established labeling, initial reporting, and annual reporting requirements.	Set more stringent performance standards	No; standards and fleet requirements need years of lead time to be implemented; infeasible to implement new standard or purchasing requirements within 60 days and achieve reductions within one year.	No; Infeasible to require further stringency within one year given timeline for technology development and certification.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Off-Road Regulation	Amended 11/17/22. Requires phase out of oldest and highest-emitting engines, restricts addition of Tier 3 and 4i engines, mandates renewable diesel for all fleets.	Pull phase-out or compliance timelines forward	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing and turnover requirements within 60 days and achieve reductions within one year.	No; Infeasible to require further stringency within one year given timeline for technology development and certification.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
Port Operations and Rail Operations	Cargo Handling Equipment Regulation*	Proposed CARB hearing in 2025. Amendments to transition to zero-emission technology.	None	No; Standards requirements need years of lead time to be developed, certified, and implemented; infeasible to implement new standard within 60 days and achieve reductions within one year. Fully implemented in 2017 and relies on other engine standards, making it infeasible to trigger without regulatory process changing other standards.	No; Considering regulation to move towards zero-emissions. Currently assessing availability of technologies.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Off-Road Zero-Emission Targeted Manufacturer Rule*	Proposed CARB hearing in 2027. Would require manufacturers of off-road equipment and/or engines to produce for sale zero-emission equipment and/or powertrains as a percentage of their annual statewide sales volume.	Pull forward compliance timelines or increase percentage sales requirements	No; Manufacturing and sales requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days and achieve reductions within one year.	No; standards being set will be technology forcing and most stringent feasible, including zero-emission requirement; would not save a more stringent standard for contingency	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Lawn and Garden	Small Off-Road Engine (SORE) Regulation	Amended 12/9/21 Requires most newly manufactured SORE to meet emission standards of zero starting in model year (MY) 2024.	Move up implementation deadlines	No; Standards requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days. Purchasing would not happen immediately or within one year of trigger; infeasible to achieve reductions within one year.	No; current standards and requirements are a technology forcing zero-emission certification requirement. Further stringency would not be possible.	No; Zero emission standard starts in MY 2024. Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
Ocean-Going Vessels	At Berth Regulation	Amended 8/27/20 Expands requirements to roll-on roll-off vessels and tankers, smaller fleets, and new ports and terminals.	Remove option to use alternate control technology or set more stringent alternate control technology requirements. Reduce threshold for 'low activity terminals' exemption.	No; control technology requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days and achieve reductions within one year.	No; regulation already requires use of shorepower or alternate control technology for every visit.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
	Ocean-going Vessel Fuel Regulation	Amended 2011 Extended clean fuel zone and included exemption window.	Set more stringent requirements	No; fleet requirements need years of lead time to be implemented; infeasible to implement new purchasing and turnover requirements within 60 days and achieve reductions within one year.	No; not feasible to require further stringency in a compressed timeline.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

Emission Source	Regulatory Programs	Latest Amendment Requirements	Contingency Options	Trigger Feasibility	Technological Feasibility	Timing for San Joaquin Valley FIP
Locomotives	In-Use Locomotive Regulation*	Proposed CARB hearing in April 2023, Requires each operator to deposit funds into spending account for purchasing cleaner locomotive technology, sets idling limits, and requires registration and reporting. Starting in 2030, only locomotives less than 23 years old can operate in the state. Newly built passenger, switch, and industrial locomotives must operate in a zero emission configuration, and in 2035 newly built freight line haul locomotives.	Move up implementation deadlines. Set stricter idling requirements.	No; Fleet requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days and reductions within one year. No, for idling requirements.	No; current standards and requirements are technology forcing, include a zero-emission requirement. Further stringency would not be possible. No, for idling requirements, CARB is committing to re-evaluate the requirement during next assessment.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.
Areawide Sources	Zero-Emission Standard for Space and Water Heaters	Proposed CARB hearing in 2025. Beginning in 2030, 100% of sales of new space heaters and water heaters would need to meet a zero-emission standard.	Set trigger for more stringent standards or timelines.	No; Standards requirements need years of lead time to be implemented; infeasible to pull forward standards within 60 days. Purchasing would not happen immediately or within one year of trigger; infeasible to achieve reductions within one year.	No; current standards and requirements are a technology forcing zero-emission certification requirement. Further stringency would not be possible.	No; Requires a regulatory process; infeasible to adopt and have U.S. EPA approve by FIP deadline.

5.4 Summary

At this time, CARB is including a zero-emission component in most of our regulations, both those already adopted and those that are in development, and the vast majority of these regulations are statewide in scope. Beyond the wide array of sources CARB has been regulating over the last few decades, and especially considering those we are driving to zero-emission, there are few sources of emissions left for CARB to implement additional controls upon under its authorities for PM2.5 contingency purposes in the San Joaquin Valley. The few source categories that do not have control measures are primarily-federally and internationally regulated.

Given the courts' decisions over the last few years, CARB will need to implement contingency measures that, when triggered, would achieve one year's worth of progress, or at least the relevant portion equivalent to the contribution of sources primarily regulated at the State and local level, unless a reasoned justification for achieving less emission reductions can be provided. Considering the air quality challenges California faces, if a measure achieving such reductions were feasible, CARB would implement the measure to support expeditious attainment of the NAAQS as the Clean Air Act requires rather than withhold it for contingency measure purposes. Further, should there be a measure achieving the required emission reductions, the measure would likely take more than 1-2 years to implement during which time the expected emission benefits would be reduced due to natural turnover of equipment.

At this time, CARB has not identified feasible contingency measures for the 15 ug/m^3 and 12 ug/m^3 annual and 35 ug/m^3 24-hour NAAQS in the San Joaquin Valley. CARB continues to assess opportunities for identifying feasible contingency measures.

6. SUMMARY OF CONTINGENCY MEASURE REDUCTIONS

Based on the evaluation of potential contingency measures that could contribute towards the Valley meeting the Clean Air Act requirements, the following table summarizes and compares the emission reduction requirements under the OYW_P approach and what is being achieved through the proposed measures.

Table 17 Comparison of Emission Reductions from Selected Measures to Requirements under RFP and OYWP

PM2.5 Standard	PM2.5 (tons/day)		NOx (tons/day)	
	OYW_P Approach	Selected Measures	OYW_P Approach	Selected Measures
1997 Annual	0.41	0.69	7.91	0.1
2006 24-hour	0.52	0.69	6.66	0.1
2012 Annual	0.43	0.69	8.65	0.1

In comparing the emission reductions that would be achieved through the selected contingency measures against the requirements of the OYW_P approach, it is clear that there is a surplus in PM2.5 emission reductions, and a shortfall in NOx emission reductions. However, through PM2.5 and NOx interpollutant trading ratios that have

been established through photochemical modeling analysis that has been conducted for the San Joaquin Valley, the surplus in PM2.5 emission reductions can be traded for NOx emission reductions. Recent modeling analysis for PM2.5 in the Valley has shown that emission reductions in direct PM2.5 is 6 times more effective than NOx emission reductions when observing the change in the Valley's PM2.5 design value measured in $\mu g/m^3$.[36] This means that an emission reduction of 1 ton per day of direct PM2.5 is as effective at reducing the Valley's PM2.5 design value as 6 tons per day of NOx emission reductions.

By using this ratio, the remaining NOx emissions reductions needed to completely fulfill the OYW_P requirements would be reduced. The following table, which assumes that the OYW_P approach will be finalized by EPA, display how using this trading ratio would be used to close the required NOx emission reduction gap.

Table 18 Surplus PM2.5 Emission Reductions Traded for NOx

PM2.5 Standard	PM2.5 (tons/day)			NOx (tons/day)				
	OYW_P Approach (A)	**Selected Measures (B)**	**Balance (C: B-A)**	**OYW_P Approach (D)**	**Selected Measures (E)**	**Initial Balance (F: E-D)**	**PM2.5 Surplus to NOx (6:1 Plan ratio) (G: C*6)**	**Remaining Balance *(including mobile source emissions)* (F+G)**
1997 Annual	0.41	0.69	0.28	7.91	0.10	(7.81)	1.68	(6.13)
2006 24-hr	0.52	0.69	0.17	6.66	0.10	(6.56)	1.02	(5.54)
2012 Annual	0.43	0.69	0.26	8.65	0.10	(8.55)	1.56	(6.99)

Through this approach, the Valley's contingency submittal fulfills the direct PM2.5 emission reduction requirements, and through trading surplus PM2.5 emission reductions for NOx, the remaining NOx reductions required has been reduced. As shown earlier in the document, there are no other technically feasible measures that can be implemented and that fit within the constraints of contingency measure requirements to further minimize this emission reduction need for NOx. Based on the analysis here and the technical infeasibility analysis earlier in this document, the Valley fulfills the contingency measure requirements for the federal PM2.5 standards.

6.1 Jurisdictional Considerations on Fulfilling OYW_P Requirements

As the District only has jurisdiction over a portion of the sources of direct PM2.5 and NOx sources in the Valley, it is important to consider what the OYW_P calculation and obligation would be for contingency measures emission reductions when only focused on what the District can control. This approach would result in an OYW_P value over which the District can take direct action to satisfy, while relying on state and EPA actions on sources over which they have jurisdictional control to address the overall OYW_P called for under EPA guidance.

[36] https://ww2.arb.ca.gov/sites/default/files/2021-11/SJV_Progress_Report_Technical_Submittal_2012_PM25_Standard.pdf

Following the approach already used and described in Section 3 of this document, the penultimate step of the calculation for OYW_P is calculating the tons per day change per year over the planning timeline as a percentage of the base year; however, in this jurisdictional approach, we would then apply this percentage to the District controlled attainment inventory in the future year. This would focus the analysis on the proportional portion of the total attainment future year inventory over which the District has jurisdiction.

Through this approach, contingency measure emission reduction obligations for direct PM2.5 and NOx are decreased, and thereby, the surplus in direct PM2.5 emission reductions is increased, as well as the resulting NOx emission reductions when the interpollutant trading ratio is applied. The following table displays the results of these calculations.

Table 19 Surplus PM2.5 Emission Reductions Traded for NOx for Sources under District's Jurisdiction

PM2.5 Standard	PM2.5 (tons/day)			NOx (tons/day)				
	OYW_P Approach (A)	Selected Measures (B)	Balance (C: B-A)	OYW_P Approach (D)	Selected Measures (E)	Initial Balance (F: E-D)	PM2.5 Surplus to NOx (6:1 Plan ratio) (G: C*6)	Remaining Balance (F+G)
1997 Annual	0.35	0.69	0.34	1.87	0.10	(1.77)	2.02	0.25
2006 24-hr	0.46	0.69	0.23	1.94	0.10	(1.84)	1.41	(0.43)
2012 Annual	0.36	0.69	0.33	1.73	0.10	(1.63)	1.96	0.33

As a result of this analysis focused specifically on District emissions jurisdictional control, through the District's proposed contingency commitments, the direct PM2.5 and NOx OYW_P targets are fully or almost fully addressed, highlighting the need to achieve continued fair-share emissions reductions from mobile sources, particularly with respect to federally-regulated mobile sources.

7. FEDERAL CONTINGENCY MEASURE OPPORTUNITIES

As described above, for decades, the District has promulgated and implemented measures to reduce emissions from sources of air pollution under its regulatory authority. The District has also deployed innovative measures to reduce emissions from mobile and indirect sources of air pollution that fall outside its traditional regulatory authority with stationary sources. The District continues to seek additional local emissions reductions, but the Valley has reached a point where attainment of the health-based standards established under the Federal Clean Air Act is not viable without significant quantifiable and enforceable reductions in emissions from mobile sources that fall exclusively under federal jurisdiction such as interstate heavy-duty trucks, locomotives, aircraft, and other mobile sources. The South Coast air basin and other nonattainment areas find themselves in similar situations. With newly established

federal air quality standards, many other regions throughout the nation will also face similar difficulties.

Under current law, local jurisdictions could be subject to devastating federal sanctions even though failure to attain the standards may be due to emissions from sources under federal jurisdiction. These federal sanctions include:

- Permitting barriers for new and expanding businesses (2:1 offset requirement)
- Loss of billions of federal highway funds and numerous jobs lost in the San Joaquin Valley
- Federal takeover and loss of local control
- Expensive federal nonattainment penalties

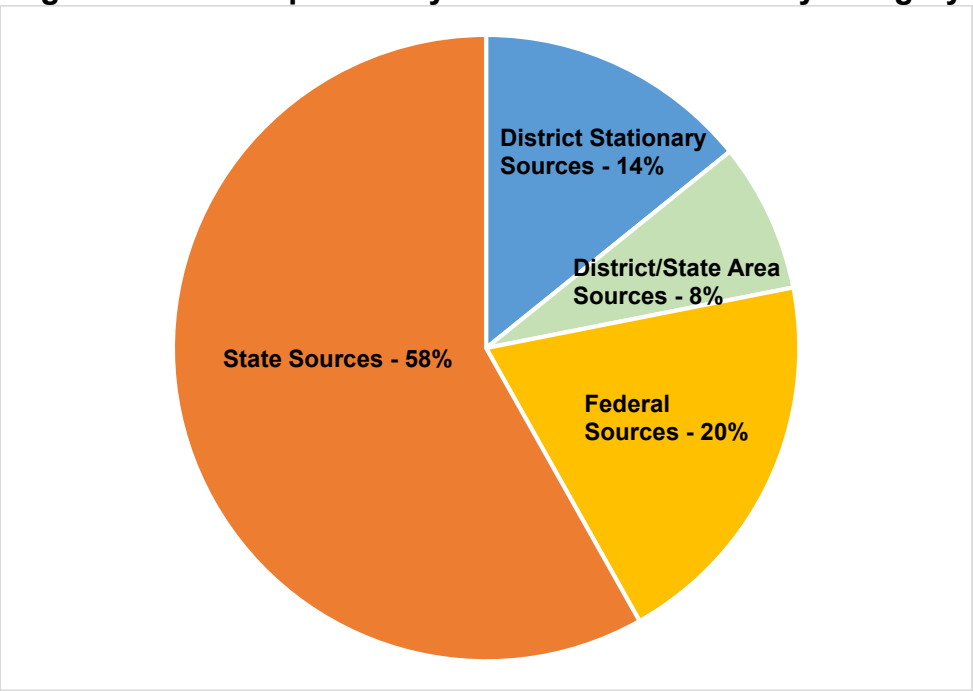
CARB's primary regulatory authority is the regulation of mobile sources of emissions. Mobile sources are the largest contributor to criteria pollutant and air toxic emissions (e.g. diesel particulate matter) in the San Joaquin Valley and throughout the State. In recent Valley attainment plans for PM2.5 and ozone, a large piece of the overall emissions reduction commitment has come from mobile source measures under the jurisdiction of CARB. CARB's progress in developing and implementing these measures has contributed to the substantial improvements in Valley air quality, and will continue to do so in the future.

Although CARB has promulgated stringent mobile source measures for vehicles and fleets in California, emissions from interstate heavy-duty trucks, locomotives, and other federal mobile sources have not been reduced as significantly. Considering the continuing emissions reductions from sources regulated by the District and CARB, and the remaining challenges under federal air quality standards, it is increasingly critical that the federal government take action to reduce emissions from sources under federal regulatory control.

As an example of this, and as displayed in Section 5, the level of NOx emissions from mobile sources across the state is now dominated by federal sources under the jurisdiction of the federal EPA, highlighting the importance of the advocacy for tighter national emissions standards for interstate sources like heavy-duty trucks, locomotives, aircraft, and other sources. Ongoing emissions reductions from these sources will be key for the Valley to improve air quality and meet the latest federal air quality standards.

Specifically for the San Joaquin Valley, and focusing on the current NOx emission inventory for 2023, the figure below shows that emissions from sources under federal jurisdiction makes up a significant portion of the overall NOx pollution in the region. A similar shift could occur in the Valley, where as ongoing mobile source emission reductions are being achieved through CARB's strategies, the NOx emissions under federal jurisdiction will continue to become a larger portion of the remaining pollution in the region, highlighting the critical importance of EPA regulatory action on these sources.

Figure 4 San Joaquin Valley 2023 NOx Emissions by Category



With stringent planning requirements and shortened attainment timeframes under the Clean Air Act for PM2.5, securing additional NOx reductions from federal mobile sources is vital. In light of EPA currently reviewing the PM2.5 standards to potentially establish more stringent standards, which would establish a new tight planning and attainment deadline cycle, increasing the stringency of federal emissions standards and providing funding support for interstate mobile sources will become even more important.

Significant State and Federal Funding Opportunities

Through strong collaboration with state agencies and residents, businesses, public agencies, community-based organizations, and other stakeholders, the San Joaquin Valley has served as a center of innovation for many of the state's recent transformative clean air, low carbon strategies. As a related important opportunity that could play a major role in assisting the San Joaquin Valley and other Extreme ozone and Serious PM2.5 nonattainment areas, recent state and federal budget and funding actions have created unprecedented opportunities for investing in transformational clean technology changes across the mobile source sector. At the federal level, recent authorizations under the Infrastructure Investment Jobs Act (IIJA) and Inflation Reduction Act (IRA) provide wide-ranging funding for a variety of important clean technology and infrastructure programs. Notably, IRA includes an estimated $369 billion in funding for climate and energy-related programs, and over $20 billion in new funding for sustainable agriculture and programs of importance to the San Joaquin Valley. Given the Valley's air quality challenges, EPA and other federal agencies must prioritize these new funding opportunities for Serious and Extreme nonattainment areas, and provide

opportunities for incentive-based contingency measures, taking into consideration that areas such as the Valley have limited additional opportunities for regulatory strategies given the level of stringency of District rules.

Current EPA Actions to Reduce Emissions under Federal Jurisdiction

In addition to the analysis and commitments within this document, the District and CARB urge the federal government to develop contingency measures for federal sources, which make up a significant portion of the District's emissions inventory, and will continue to become more significant over the coming years. To provide context on the make-up of the remaining sources of emissions in the Valley, mobile sources now account for over 80% of PM2.5-forming NOx emissions in the region, with statewide mobile source emissions under federal jurisdiction now surpassing those under California jurisdiction. It is becoming critically important for the EPA to be strong partners in reducing emissions in California and the Valley to meet the current air quality standards, including helping in meeting contingency requirements for the region.

As the District continues to work with CARB and EPA on addressing federal air quality standards, there are a number of time-sensitive opportunities for achieving significant additional emissions reductions from mobile sources, including opportunities for reductions from heavy-duty trucks, locomotives, and other mobile sources.

The District Governing Board has previously submitted petitions to the federal government requesting that they reduce their fair share of emissions in an equitable manner through more stringent national standards for heavy-duty trucks and locomotives.[37] In response to the District and similar petitions submitted by CARB and South Coast AQMD, on March 3, 2022, EPA proposed a rule to reduce emissions from new heavy-duty trucks nationwide. The District is participating in this regulatory process to communicate the Valley's need for emissions reductions from this sector. In addition, in November 2022, and in response to the District's petition, EPA committed to conducting regulatory analyses to consider the potential of setting a national standard for locomotives.[38] Subsequently, on April 12, 2023, EPA issued a Notice of Proposed Rulemaking (NPRM) to propose more stringent standards to reduce greenhouse gas emissions from heavy-duty vehicles beginning in model year 2027.[39] As part of this action, EPA is also proposing to revise its regulations addressing preemption of state regulation of locomotives. On April 12, 2023, in a separate action, EPA proposed standards to further reduce criteria pollutants and greenhouses gases from light-duty and medium-duty vehicles starting with model year 2027, building on EPA's final

[37] https://www.epa.gov/sites/default/files/2016-11/documents/san_joaquin_valley_petition_for_hd_and_locomotive.pdf
[38] https://www.epa.gov/system/files/documents/2022-11/locomotive-regs-san-joaquin-regs-petition-response.pdf
[39] EPA. *Pre-Publication Copy, Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles - Phase 3; Proposed Rule (signed April 12, 2023)*. Retrieved from: https://www.epa.gov/system/files/documents/2023-04/hd-ghg-veh-phase-3-nprm-2023-04.pdf

standards for model years 2023 through 2026. The proposed standards would be phased in starting in 2027 through 2032.[40]

Conclusion

While the above strategies, if finalized by EPA, would reduce emissions in the long-term, they do not assist the District and CARB in addressing needed contingency measures for the following reasons:

- The proposed measures are currently under development and will take several years for promulgation (if promulgated). In addition to the lengthy period to promulgate the measures, emissions reductions from these measures will be realized in the long-term over an extended period, and not in the rapid, trigger-based, and short-term fashion required for contingency measures.
- EPA's recently promulgated or proposed mobile source emissions standards are not designed to serve as contingency measures. Without meeting all of the requirements for contingency measures (held in reserve, triggered upon various Clean Air Act findings, etc.), federal mobile source regulatory measures currently under development will not assist in addressing contingency measure requirements.

As summarized in Table 18 and Table 19, the District and CARB are able to satisfy contingency requirements as outlined in EPA's draft contingency guidance. However, it is clear that in order for the San Joaquin Valley to identify the total emissions reductions called for under EPA's OYW_P, further emissions reductions will be needed from mobile sources, particularly from federally-regulated mobile sources.

8. PUBLIC PROCESS

This Contingency Measure SIP Revision was prepared through an involved public process that provided multiple opportunities for the public and interested stakeholders to offer comments and suggestions. The District held two public workshops in March 2023 and April 2023 to present, discuss, and receive feedback on the development of the District's strategy, and solicited specific feedback on the measures evaluated. This process also included numerous updates at District Governing Board meetings, Citizen Advisory Committee (CAC) meetings, and Environmental Justice Advisory Group (EJAG) meetings. During these updates, meetings, and workshops, the public had the opportunity to provide comment, ask questions, or request additional information. Workshop materials were available in English and Spanish, and the District provided

[40] EPA. *Pre-Publication Copy, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles; Proposed Rule (signed April 12, 2023)*. Retrieved from: https://www.epa.gov/system/files/documents/2023-04/lmdv-multi-pollutant-emissions-my-2027-nprm-2023-04.pdf

Spanish translation during the workshops. The District also accepted written comments throughout development of this plan.

9. CONCLUSION

Both the District and CARB have decades of experience developing stringent regulations and, as a result, have robust control programs which limit the ability to identify potential contingency measures that achieve surplus reduction. At this time, CARB and the District are including zero-emission and near-zero emission components in most of their regulations, both those already adopted and those that are in development. Beyond the wide array of sources the District and CARB have been regulating over the last few decades, and especially considering those they are driving to zero-emission, there are few sources of emissions left for the District and CARB to implement additional controls upon under its authorities. The few source categories that do not have control measures are primarily-federally and internationally regulated.

To fulfill contingency measure requirements, the District is amending Rule 4901. The SIP revision and rule revision included in this document will be submitted to CARB and EPA for approval and inclusion into the California SIP.