

# SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

## FINAL DRAFT STAFF REPORT

### Proposed Amendments to Rule 4905 (Natural Gas-fired, Fan-Type Central Furnaces)

December 16, 2021

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#### I. SUMMARY

In 2015, the San Joaquin Valley Air Pollution Control District (District) amended Rule 4905 (Natural Gas-Fired, Fan-Type Central Furnaces) to fulfill commitments in the *2008 PM2.5 Plan*, *2012 PM2.5 Plan*, and *2013 Plan for the Revoked 1-Hour Ozone Standard* to further reduce NOx emissions from this source category. Amendments to the rule included lowering the NOx emission limit from 40 nanograms of NOx per joule of heat output (ng/J) to 14 ng/J. To address manufacturer concerns about the short time-frame to implement these technology-forcing limits, the 2015 amendments to Rule 4905 also allowed for the sale of non-compliant units during an initial 36-month implementation period in exchange for the payment of an emissions fee for each non-compliant unit sold, distributed, or installed in or into the San Joaquin Valley (Valley).

The lower NOx limits required by this rule amendment were guided by a technology assessment funded by the District, the South Coast Air Quality Management District (SCAQMD), and others to evaluate the performance of ultra-low NOx furnace technologies.<sup>1</sup> The technology assessment resulted in the successful demonstration of several low-NOx furnace designs, which were expected to be commercially available by the compliance dates as established in the current Rule 4905, and through SCAQMD's amendment to their Rule 1111 in September 2014. For those manufacturers that are not able to respond to increased demand for new compliant units by the compliance dates, the emissions fee option allowed them to continue selling units in the Valley. Rule 4905 was amended in 2018 to extend the emissions fee period to allow additional time for

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<sup>1</sup> SCAQMD. (2014, September 5). *Governing Board Agenda Item, September 5, 2014: Amend Rule 1111 – Reduction of NOx Emissions from Natural-gas-fired, Fan-type Central Furnaces*. Retrieved 9/9/14 from <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2014/2014-sep5-032.pdf?sfvrsn=2>.

manufacturers to commercialize compliant 14 ng/J furnaces, and was amended again in 2020 to extend the emissions fee period for weatherized furnaces.

While manufacturers have successfully developed the necessary technologies to comply with rule requirements for condensing, non-condensing, and weatherized units, manufacturers have informed the District and SCAQMD that additional time is needed to develop compliant *manufactured home* furnaces. The emissions fee period for manufactured home furnaces ended September 30, 2021, and currently no manufacturers have developed a compliant 14 ng/J manufactured home furnace. Manufacturers have reported COVID-19 has caused manufacturing delays and supply chain disruptions, affecting their ability to develop compliant manufactured home units. Manufacturers are also working to develop furnaces to comply with standards set by the U.S. Department of Housing and Urban Development and the Department of Energy.

For the reasons listed above, SCAQMD amended their furnace rule (Rule 1111 – Reduction of NO<sub>x</sub> Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces) on October 1, 2021, to extend the compliance fee option period to allow additional time for furnace manufacturers to develop manufactured home furnaces that comply with 14 ng/J NO<sub>x</sub> limit. In addition, SCAQMD also included:

- A three month extension of the high-altitude (≥ 4,200 feet above sea level) exemption end date;
- An exemption for downflow and large-sized (≥100,000 btu/hr) condensing or non-condensing furnaces, replacing existing furnaces in the high-altitude area;

At this time, the District is only proposing to provide the additional time necessary for manufacturers to continue the technology development for manufactured home furnaces. There is a limited application of high-altitude natural gas furnaces in the Valley, and for this reason, the District does not propose the inclusion of high-altitude condensing and non-condensing furnace installations. However, the proposed amendments to District Rule 4905 requirements for manufactured home units are analogous to the changes in SCAQMD's Rule 1111, and provide for regulatory consistency in California.

## **II. BACKGROUND**

### **A. Source Category**

Rule 4905 is a point-of-sale rule that applies to any person who supplies, sells, offers for sale, installs, or solicits the installation of natural gas-fired, fan-type central furnaces with a rated heat input capacity of less than 175,000 Btu/hr and a rated cooling capacity of less than 65,000 Btu/hr for combination heating and cooling units. Affected parties include furnace manufacturers, residential heating wholesalers, supply stores, contractors and end-users. The point-of-sale approach has allowed the District to

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achieve NO<sub>x</sub> reductions without placing an undue financial burden on residents, operators and businesses that sell these units in the Valley.

The most common residential and commercial heat sources are boilers and furnaces. Other heating options include heat pumps, active solar heating, electric heating, wood or pellet stoves, portable and direct vent wall heaters, and fireplaces.<sup>2</sup> Heat distribution systems are either central heating, meaning heat is generated in a central location and distributed throughout the building, or point-of-use or space heating, meaning supplemental heat is provided to a specific room. Types of central heating systems include forced air, steam radiant, radiant, hot water baseboards, and electric baseboards. Types of space heaters include wood or pellet stoves, portable and direct vent wall heaters, and fireplaces. Fuel types include natural gas, propane, heating oil, electricity, and solid fuels such as wood or pellets.

All heating systems have three basic components: a heat source, a heat distribution system, and a control system. The control system is usually a programmable thermostat. The heat source, which generally determines the type of distribution system used, is selected based on many factors. The most important factor is geographical location, which determines the climate and types of available fuel. Most commercial and residential buildings in the Valley have access to natural gas, which is typically the cheapest and most convenient fuel source in areas where it is available.

Rule 4905 applies to furnaces fueled by natural gas that use forced air distribution, the most common type of heating system for residential and commercial buildings. Central furnaces are controlled by a thermostat, which sends signals to turn the device on or off when the building temperature does not match a chosen set point. A valve then opens to send natural gas to the burners, which combust the gas directly into the heat exchangers. A blower pulls air from outside the building through a filter, across the heat exchanger, and through a series of ducts and vents to different areas of the building. Exhaust from the combustion exits the building through a separate duct. Condensing units use an additional heat exchanger to extract the latent heat in the flue (exhaust) gas by cooling the combustion gasses to near ambient temperature and thereby increase the heating efficiency by up to 10%. The water vapor in the flue gas is condensed, collected, and drained.

Units installed in manufactured homes utilize the same types of materials and operating principles as commercial and residential units; however, significant differences exist. Furnaces installed in manufactured homes use sealed combustion, meaning all of the combustion air is taken from outside the building. These units also pre-heat the air, typically to 50-60°F, using a concentric vent where the combustion air is drawn in through the outer ring, while exhaust gases are vented through the inside core of the

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<sup>2</sup> Department of Energy. (2013, December 16). *Energy Saver 101: Everything You Need to Know About Home Heating*. Retrieved 12/17/13 from <http://energy.gov/articles/energy-saver-101-infographic-home-heating>.

vent pipe. The air is pre-heated because the cold outside air does not mix well with the fuel, while pre-heated air blends well and allows for quieter ignition and combustion.

**B. Current District Rule 4905**

Current District Rule 4905 limits NO<sub>x</sub> emissions from natural gas-fired, fan-type central furnaces with rated heat inputs less than 175,000 Btu/hr and for combination heating and cooling units rated at a cooling capacity less than 65,000 Btu/hr. Unit types include condensing furnaces, non-condensing furnaces, weatherized furnaces, and furnaces installed in manufactured homes.

The rule requires units to comply with a 14 ng/J NO<sub>x</sub> emission limit, and requires units be certified through the District's certification program, the SCAQMD certification process for SCAQMD Rule 1111, or another emission certification program approved by the United States Environmental Protection Agency (EPA) and the District's Air Pollution Control Officer (APCO). Manufacturers are also required to display the model number of the unit on the shipping carton and rating plate. If requested by the APCO, each manufacturer must submit a statement confirming the unit is in compliance, including a source test report verifying compliance with the emission limit.

To help minimize unfair competitive disadvantage for manufacturers that will provide compliant units to the San Joaquin Valley, this rule allows the sale of non-compliant units during the initial implementation period (36-months) in exchange for the payment of an emissions fee for each non-compliant unit sold. This allowance has been necessary to ensure adequate supply for the expected demand for new units in the San Joaquin Valley. The emissions fee was set at a level to provide a financial disincentive for continued sale of non-compliant units, requiring a fee of \$225 for each non-condensing, weatherized, and manufactured home units and \$290 for each condensing unit. These initial emissions fees have been increased over time through various amendments to District Rule 4905. The emissions fee compliance option has expired for all units.

**C. South Coast AQMD Rule 1111**

SCAQMD amended Rule 1111 (Reduction of NO<sub>x</sub> Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces) in November 2009 to lower the NO<sub>x</sub> emission limit for applicable units from 40 ng/J to 14 ng/J.<sup>3</sup>

In 2009, because no compliant units for the new lower NO<sub>x</sub> limit were commercially available, the District, SCAQMD, and others funded a technology assessment to

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<sup>3</sup> SCAQMD. (2009, November 6). *Final Staff Report with Socioeconomic Impact Assessment*. Retrieved 9/16/14 from <http://www3.aqmd.gov/hb/2009/November/091130a.htm>.

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evaluate the performance of ultra-low NOx furnace technologies.<sup>4</sup> The technology assessment resulted in the successful demonstration of several low-NOx furnace designs, which were expected to be commercially available by the compliance dates.

SCAQMD amended Rule 1111 again in September 2014, to extend the compliance date and add an emissions fee option due to lack of commercially available compliant units.<sup>5</sup> The alternate compliance option allowed manufacturers to pay a per unit fee in lieu of meeting the 14 ng/J NOx limit.

At the request of furnace manufacturers, on March 2, 2018, SCAQMD amended Rule 1111 to extend the fee period by up to 1.5 years and increase the alternative compliance emissions fee amounts. In December 2019, SCAQMD amended Rule 1111 to provide a limited exemption from the 14 ng/J emission limit for condensing and non-condensing furnace installations at elevations greater than or equal to 4,200 feet above sea level until October 1, 2020.<sup>6</sup> In September 2020, SCAQMD amended Rule 1111 once again to extend the mitigation fee option for weatherized units for one year and extend an exemption for high-altitude furnaces.<sup>7</sup>

Most recently, SCAQMD amended Rule 1111 on October 1, 2021. The amendment extended the mitigation fee option end date from September 30, 2021 to September 30, 2023 for mobile home furnaces, extended the high-altitude exemption end date, and provided an exemption for downflow and large-sized condensing or non-condensing furnaces being replaced in the high-altitude areas.<sup>8</sup>

## D. Control Technology

Furnace manufacturers have been successful in developing compliant non-weatherized condensing and non-condensing natural gas-fired furnaces by the September 30, 2019 emissions fee option end date established in Rule 4905. Manufacturers have also been successful in developing compliant weatherized furnaces, since last year's amendment of Rule 4905 that extended the weatherized furnace emissions fee option to September 30, 2021. Based on information provided by the manufacturers, the market availability

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<sup>4</sup> SCAQMD. (2014, September 5). *Governing Board Agenda Item, September 5, 2014: Amend Rule 1111 – Reduction of NOx Emissions from Natural-gas-fired, Fan-type Central Furnaces*. Retrieved 9/9/14 from <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2014/2014-sep5-032.pdf?sfvrsn=2>.

<sup>5</sup> SCAQMD. (2014, September 5). *Governing Board Agenda Item, September 5, 2014: Amend Rule 1111 – Reduction of NOx Emissions from Natural-gas-fired, Fan-type Central Furnaces*. Retrieved 9/9/14 from <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2014/2014-sep5-032.pdf?sfvrsn=2>.

<sup>6</sup> SCAQMD. (2020, September 4). *Governing Board Agenda Item, September 4, 2020: Amend Rule 1111 – Reduction of NOx Emissions from Natural-gas-fired, Fan-type Central Furnaces*. Retrieved 9/5/20 from <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2020/2020-Sept4-031.pdf?sfvrsn=6>

<sup>7</sup> SCAQMD. (2020, September 4). *Governing Board Agenda Item, September 4, 2020: Amend Rule 1111 – Reduction of NOx Emissions from Natural-gas-fired, Fan-type Central Furnaces*. Retrieved 9/5/20 from <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2020/2020-Sept4-031.pdf?sfvrsn=6>

<sup>8</sup> SCAQMD. (2021, October 1). *Governing Board Agenda Item, October 1, 2021: Amend Rule 1111 – Reduction of NOx Emissions from Natural-gas-fired, Fan-type Central Furnaces*. Retrieved 11/15/21 from <http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2021/2021-Oct1-023.pdf?sfvrsn=6>

for weatherized compliant furnaces has increased during the past year since the last amendment, and these units are commercially and widely available.

The emissions fee option period for manufactured home furnaces also ended on September 30, 2021, however, manufacturers have not been successful at developing compliant manufactured home furnace technology to meet the 14 ng/J NO<sub>x</sub> limit. The size and design of manufactured home furnaces is significantly different from that of furnaces available for other structures. New manufactured home gas furnaces must also meet requirements set by the U.S. Department of Housing and Urban Development for propane compatibility, however, current ultra-low NO<sub>x</sub> furnace technology used in other furnaces is not compatible with liquid propane. Manufactured home furnaces must also be brought into compliance with the U.S. Department of Energy's upcoming energy efficiency standards by January 1, 2023. In addition, manufacturers are facing delays due to the supply chain disruptions, labor shortage, and other impacts to business operations caused by the COVID-19 pandemic.

Based on input received from the two furnace manufacturers that develop manufactured home furnaces for sale in the Valley, a two-year extension of the compliance fee provision will be sufficient time to complete the development, commercialization and certification of compliant manufactured home furnaces. The extension of the District's compliance fee provision is consistent with the extension being provided in the South Coast AQMD, and will provide for regulatory consistency in California.

### **III. PROPOSED AMENDMENTS TO RULE 4905**

District staff are recommending that the purpose, applicability, definitions, exemptions, and the majority of the requirements in Rule 4905 be maintained. The proposed change to the rule would be to extend the emissions fee compliance option for manufactured home units from September 30, 2021 to September 30, 2023, as further discussed below.

#### **Requirements (Section 5.0)**

##### *Section 5.3 – Emissions Fee Option*

Manufacturers have yet to develop, certify, and mass-produce compliant units to meet Valley consumer demands for manufactured home furnaces. In response to the lack of compliant units available, the District is proposing to amend Rule 4905 to extend the emissions fee option period for manufactured home units, with no changes in the fee structure. This extension will allow the additional time necessary to continue technology development and certification, while providing strong incentive for accelerated deployment of compliant units (see table below). The current fee structure, amount, and timeline was previously established based on several discussions with multiple stakeholders, including manufacturers, distributors, and contractors to ensure sufficient time necessary to continue technology development and the certification process while

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providing strong incentive for accelerated deployment of compliant units. The fees and timelines for each furnace category below are similar to SCAQMD’s latest rule, adopted October 1, 2021.

**Table 1 - Proposed Rule 4905 Emissions Fee Option Table**

Size Range (Btu/hr)	Furnace Category	Phase One		Phase Two		
		Fee Start Date	Fee Amount (\$/unit)	Fee Start Date	Fee Amount (\$/unit)	Fee End Date
≤ 60,000	Condensing Units	August 1, 2018	\$275	October 1, 2018	\$350	September 30, 2019
	Non-condensing Units	October 1, 2018	\$225	April 1, 2019	\$300	September 30, 2019
	Weatherized Units	October 1, 2018	\$225	April 1, 2019	\$300	September 30, 2021
	Manufactured Homes Units	October 1, 2018	\$150	April 1, 2019	\$150	September 30, 2023
>60,000 and ≤90,000	Condensing Units	August 1, 2018	\$300	October 1, 2018	\$400	September 30, 2019
	Non-condensing Units	October 1, 2018	\$250	April 1, 2019	\$350	September 30, 2019
	Weatherized Units	October 1, 2018	\$250	April 1, 2019	\$350	September 30, 2021
	Manufactured Homes Units	October 1, 2018	\$150	April 1, 2019	\$150	September 30, 2023
>90,000	Condensing Units	August 1, 2018	\$325	October 1, 2018	\$450	September 30, 2019
	Non-condensing Units	October 1, 2018	\$275	April 1, 2019	\$400	September 30, 2019
	Weatherized Units	October 1, 2018	\$275	April 1, 2019	\$400	September 30, 2021
	Manufactured Homes Units	October 1, 2018	\$150	April 1, 2019	\$150	September 30, 2023

**IV. ANALYSES**

**A. Emission Reduction Analysis**

The 2015 amendments to Rule 4905 lowered the NOx emission limit for residential units and added NOx emission limits for units installed in commercial buildings (commercial units) and units installed in manufactured homes. Because Rule 4905 is a point-of-sale rule, the emissions reduced from the 2015 amendments of 2.10 tons per day are achieved gradually as older units are replaced over the 20-year turnover period from 2017 through 2036. Annual NOx emission reductions were determined to be 0.105 tons per day.

Lowering the NOx emission limit from 40 ng/J to 14 ng/J results in more than 1 pound per year of NOx emissions reductions for each furnace. With total manufactured home furnace sales in the Valley estimated at 1,000 units per year<sup>9</sup>, a 2-year delay in compliance would result in an emissions reduction delay of approximately 0.003 tons per day [calculated as:  $(2 \text{ yrs} \times 1,000 \text{ units} \times 1.0 \text{ lb/yr/unit}) / (2,000 \text{ lbs/ton} \times 365 \text{ days/yr})$ ].

This emissions reduction delay of 0.003 tons per day represents only 0.13% of the total emissions reductions of this rulemaking, and therefore does not have a significant effect on air quality or result in any change in the overall emissions reductions. With this rule amendment, 99.87% of the total emissions reductions will be achieved by 2036, with full emissions reductions reached by 2038.

**B. Cost Effectiveness Analysis**

The proposed amendments do not impose additional requirements on manufacturers of compliant furnaces. An extension to the emissions fee option is proposed, but the fee amount will not increase. Therefore, a cost effectiveness analysis is not required.

**C. Socioeconomic Analysis**

Pursuant to California Health and Safety Code (CH&SC) §40728.5, the District conducts a socioeconomic analysis of a proposed rule or rule amendment that will significantly affect air quality or emission limitations prior to rule adoption. A socioeconomic analysis examines how a rule project may impact industries, businesses, employment rates, and the economy in the Valley. Proposed amendments would extend the emission fee option by up to two years, with no significant impact on air quality, emissions limits, or costs. In addition, the higher initial capital cost of compliant units are offset by the energy cost savings these newer and more efficient units will provide throughout the life

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<sup>9</sup> Annual sales estimate based on number of emissions fees collected by the District from manufactured home units sold in fiscal years 2019-2020 and 2020-2021.

of the unit. Due to these reasons, a socioeconomic analysis is not required for this rule amendment project.

**D. Rule Consistency Analysis**

Pursuant to CH&SC §40727.2, prior to adopting, amending, or repealing a rule or regulation, the District is required to perform a written analysis that identifies and compares the air pollution control elements of the rule or regulation with corresponding elements of existing or proposed District and EPA rules, regulations, and guidelines that apply to the same source category. The elements analyzed are emission standards, monitoring and testing requirements, and recordkeeping and reporting requirements.

Based on the following analysis, District staff found that the proposed amendments to Rule 4905 would not conflict with any District or federal rules, regulations, or policies covering similar stationary sources.

*District Rules*

There is no other District prohibitory rule or regulation tailored specifically for natural gas-fired, fan-type central furnaces.

*Federal Rules, Regulations, and Policies*

There are no applicable Control Technique Guidelines (CTG), Alternative Control Techniques (ACT), New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), Best Available Control Technology (BACT), or Maximum Achievable Control Technology (MACT) guidelines for natural gas-fired, fan-type central furnaces with a rated heat input capacity less than 175,000 Btu/hr or, for combination heating and cooling units, a rated cooling capacity less than 65,000 Btu/hr.

EPA Policy on Recordkeeping: EPA has a policy that mandates stationary sources keep and maintain records for at least five years; however, as a point-of-sale rule, natural gas-fired, fan-type commercial and residential central furnaces of this size are not permitted sources and are thus not required to follow specific recordkeeping guidelines. Therefore, units subject to Rule 4905 are not subject to EPA's Policy on Recordkeeping.

**E. Environmental Impact Analysis**

Based on the District's assessment of the Rule Amendment, the District concludes that the Rule Amendment will not cause either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment, and as such is not a "project" as that term is defined under the CEQA Guidelines § 15378.

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The Rule Amendment, (i.e.: to Adopt the Proposed Amendments to Rule 4905 (Natural Gas-Fired Fan-Type Central Furnaces)), is to extend the emission fee compliance option for two years from September 30, 2021 to September 30, 2023. According to Section 15061 (b)(3) of the CEQA Guidelines, a project is exempt from CEQA if, “(t)he activity is covered by the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA.” As such, substantial evidence supports the District’s assessment that assuming the Rule Amendment is a “project” under CEQA, it will not have any significant adverse effects on the environment.

Furthermore, the Rule Amendment is an action taken by a regulatory agency, the San Joaquin Valley Air Pollution Control District, as authorized by state law to assure the maintenance, restoration, enhancement, or protection of air quality in the San Joaquin Valley where the regulatory process involves procedures for protection of air quality. CEQA Guidelines §15308 (Actions by Regulatory Agencies for Protection of the Environment), provides a categorical exemption for “actions taken by regulatory agencies, as authorized by state or local ordinance, to assure the maintenance, restoration, enhancement, or protection of the environment where the regulatory process involves procedures for protection of the environment. Construction activities and relaxation of standards allowing environmental degradation are not included in this exemption.” No construction activities or relaxation of standards are included in this Rule Amendment.

Therefore, for all the above reasons, the Rule Amendment is exempt from CEQA. Pursuant to Section 15062 of the CEQA Guidelines, District staff will file a Notice of Exemption upon Governing Board approval of Rule Amendment.

## **V. RULE DEVELOPMENT PROCESS**

### **A. Public Workshop for Rule 4905**

The District hosted a public workshop to present draft amendments and receive public comments on November 18, 2021, followed by a public comment period ending at 5:00 PM on December 2, 2021. All significant comments received have been reviewed and incorporated into the proposed rule and staff report. A summary of significant comments and District responses will be available in Appendix A of the final staff report.

### **B. Public Hearing for Rule 4905**

In accordance with CH&SC § 40725, the proposed amendments to Rule 4905 and the final draft staff report were publicly noticed prior to the Governing Board public hearing to consider adoption of the proposed amendments and made available on November

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16, 2021. All significant comments received will be considered and incorporated into the proposed rule and staff report, as appropriate. A summary of significant comments and District responses will be available in Appendix A of the final staff report. The public is also invited to provide comments on the proposed amendments to Rule 4905 and staff report during the public hearing on December 16, 2021, for proposed adoption of this rule.