DATE: January 22, 2015

TO: SJVUAPCD Governing Board

FROM: Seyed Sadredin, Executive Director/APCO
Project Coordinator: Sheraz Gill

**RE: ITEM NUMBER 11: ADOPT PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE CENTRAL FURNACES)**

## RECOMMENDATIONS:

1. Adopt proposed amendments to Rule 4905 (Natural Gas-Fired, Fan-Type Central Furnaces).

2. Authorize the Chair to sign the attached Resolution.

## BACKGROUND:

Rule 4905 is the District's point of sale rule that reduces oxides of nitrogen (NOx) emissions from natural gas-fired, fan-type residential central furnaces (residential units) with a rated heat input capacity of less than 175,000 British thermal units per hour (Btu/hr) and less than 65,000 Btu/hr cooling capacity for combination heating and cooling units.

The proposed Rule 4905 amendments would lower the allowed NOx emission rates by 65% for new units sold in the San Joaquin Valley and extend the applicability of Rule 4905 to commercial units and units installed in manufactured homes. These proposed amendments will satisfy the commitments included in the *2008 PM2.5 Plan*, *2012 PM2.5 Plan*, and *2013 Plan for the Revoked 1-hour Ozone Standard.*

During the last Governing Board meeting on December 18, 2014, District staff recommended postponing rule adoption in response to late concerns raised by some manufacturers regarding their potential inability to accommodate increased production demand in time to meet the compliance deadlines in proposed Rule 4905. As a result, your Board elected to continue the adoption of this rule until the next

regularly scheduled meeting of the Governing Board to allow staff time to make necessary rule amendments and fulfill California Health and Safety Code requirements for public notices regarding rule amendments. The proposed amendments now include an additional option for manufacturers to pay emissions fees if non-compliant units are sold during the initial phase of implementation.

## DISCUSSION:

Rule 4905 was adopted on October 20, 2005 to establish a 0.093 lb/MMBtu (or 55 ppmv) NOx emission limit for natural gas-fired, fan-type residential central furnaces (residential units) with a rated heat input 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.

The District committed in its *2008 PM2.5 Plan* to lower the NOx emissions limitation for residential units subject to Rule 4905. The District further committed in the *2012 PM2.5 Plan* and *2013 Plan for the Revoked 1-hour Ozone Standard* to evaluate the potential of including commercial units within the applicability of Rule 4905. In 2010, the District determined that advanced low NOx technology for residential furnaces was still in the early stages of development and was not yet commercially available. Therefore, your Board approved an extension to amend the rule to allow for the development of new advanced low NOx residential furnace technology in partnership with the South Coast Air Quality Management District (SCAQMD). The extension resulted in a revision to the State Implementation Plan (SIP) and committed the District to amending Rule 4905 in 2014, with compliance starting in 2015.

The District partnered with the SCAQMD and provided $50,000 to fund a $1.5 million technology assessment project to develop and test low-NOx furnace technologies that could meet more stringent NOx limits. The assessment project was completed in early 2014 and resulted in the successful development and testing of compliant units. To provide manufacturers sufficient time to complete the commercialization process for the new technologies, and to provide for regulatory consistency in California, the proposed compliance deadlines are analogous with those in SCAQMD Rule 1111, including the 300-day periods for manufacturers and retailers to sell through existing inventories.

However, while some manufacturers indicated that they would be able to produce enough compliant units to meet projected demands, the District received comments from a few manufacturers raising concerns regarding the compliance deadlines and their ability to comply.

One manufacturer indicated that their primary focus has been on meeting expected demand in Southern California and additional time is needed to meet expected demand in the San Joaquin Valley. Another manufacturer has developed compliant units, but expressed the need for additional time to demonstrate the reliability and durability necessary to be able to go to market. However, information obtained through the multi-agency technology assessment project indicated that due to low anticipated demand,

high cost to produce, new and costly tooling, and other products with higher potential return on investment currently using development resources, the manufacturer is not actively pursuing the development and manufacturing of complying units.

To help minimize unfair competitive disadvantage for manufacturers that will provide compliant units to the San Joaquin Valley, the proposed amendments will allow 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 is necessary to ensure adequate supply for the expected demand for new units in the San Joaquin Valley. However, the emissions fee is set at a level to provide a financial disincentive for continued sale of non-compliant units as follows:

It is estimated that the retail value for non-compliant units will be approximately $150 less for non-condensing units and $200 less for condensing units. One way to disincentivize the sale of non-compliant units would have been to set the emissions fees at this price differential. However, to encourage manufacturers to produce compliant units with lower emissions the proposed emissions fees include an additional surcharge of $75 for non-condensing units and $90 for condensing units. This surcharge equates to the incentive rebate currently provided by South Coast AQMD and is expected to put the Valley in a more favorable position for receiving compliant units. Therefore, the emissions fee would be set to $225 for each non-condensing unit and $290 for each condensing unit.

**Summary of Proposed Amendments to Rule 4905**

The District is proposing the following amendments to Rule 4905:

- Lower the NOx emission limit for residential units to 14 ng/J, effective on April 1, 2015 for condensing units, October 1, 2015 for non-condensing units, and October 1, 2016 for weatherized units
- Expand applicability to include commercial units with a 14 ng/J NOx emission limit effective on April 1, 2015 for condensing units, October 1, 2015 for non-condensing units, and October 1, 2016 for weatherized units
- Expand applicability to include units installed in manufactured homes with a 40 ng/J NOx emission limit effective January 1, 2015
- Lower the NOx emission limit for units installed in manufactured homes to 14 ng/J in 2018
- Allow 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
- Revise definitions to remove redundancy and improve clarity
- Expire the exemptions for units installed in manufactured homes, units using fuel other than natural gas, and nonfan-type units
- Add labeling requirements to ensure compliance with proposed amendments

## Emission Reduction Analysis

The District did not commit to a specific quantity of emission reductions for this rule amendment in the state implementation plans. Since Rule 4905 is a point-of-sale rule, emission reductions would occur over the 20 year lifespan of existing units as they are replaced with new units. Proposed rule amendments would result in approximately 2.10 tpd of NOx emission reductions upon full turnover of existing units by 2036, reflecting a greater than 50% reduction from projected emissions. The complete Emission Reduction Analysis is presented in Appendix B of the Final Draft Staff Report.

## Cost Effectiveness Analysis

Pursuant to California Health and Safety Code (CH&SC) Section 40920.6(a), the District analyzed the cost effectiveness of proposed amendments. The cost effectiveness of implementing the proposed amendments is conservatively estimated to range from $30,598 to $40,808 per ton of NOx emission reductions, based on a cost increase of $150 to $200 to purchase new compliant units. The cost effectiveness analysis is attached as Appendix C of the Final Draft Staff Report.

## Socioeconomic Impact Analysis

Pursuant to CH&SC Section 40728.5, the District analyzed the socioeconomic impacts of proposed rule amendments. No significant socioeconomic impacts are expected from these proposed rule amendments. The socioeconomic analysis is attached as Appendix D of the Final Draft Staff Report.

## Rule Consistency Analysis

Pursuant to CH&SC Section 40727.2, the District compared the elements of the proposed amendments for Rule 4905 with the corresponding elements of other District rules and federal regulations and guidelines that apply to the same type of equipment or source category. Proposed amendments would not conflict with other District rules, federal regulations, or policies covering similar stationary sources. The rule consistency analysis is presented in Appendix E of the Final Draft Staff Report.

## Environmental Impacts

According to the California Environmental Quality Act (CEQA) statutes and pursuant to Section 15061 (b)(3) of the CEQA Guidelines, the District investigated the possible environmental impacts of the proposed amendments to Rule 4905. Based on the District's investigation and lack of evidence to the contrary, the District has concluded that the proposed rule amendments will not have any significant adverse effects on the environment. As such, the District finds that the rule amendments do not constitute a project under the provisions of the California Environmental Quality Act of 1970 (CEQA). Furthermore, the rule amendments are exempt per the general rule that CEQA applies only to projects which have the potential for causing a significant effect

on the environment (CEQA Guidelines §15061 (b)(3)). Therefore pursuant to Section 15062 of the CEQA Guidelines, the Staff will file a Notice of Exemption upon Governing Board approval of amendments to Rule 4905.

**Rule Development Process**

The District hosted a public workshop to present, discuss, and hear comments on the draft rule and draft staff report on October 16, 2014. Comments received were considered and incorporated into Proposed Rule 4905 and the Final Draft Staff Report, as appropriate.

In accordance with CH&SC Section 40725, the Proposed Amendments to Rule 4905 and Final Draft Staff Report were publicly noticed prior to the Governing Board public hearing to consider adoption of the proposed amendments. The proposed amendments to Rule 4905, Final Draft Staff Report, and other supporting documents were made available for public comment on December 22, 2014. Comments received during the subsequent two-week comment period were considered and incorporated into the Final Draft Staff Report, as appropriate. The public is also invited to provide comments during the public hearing for proposed adoption of this rule.

## FISCAL IMPACT:

The District expects no fiscal impact to result from this action.

*Attachments:*

*Attachment A: Resolution for Proposed Amendments to Rule 4905 (5 pages)*
*Attachment B: Proposed Amendments to Rule 4905 (6 pages)*
*Attachment C: Final Draft Staff Report with Appendices for Proposed Amendments to Rule 4905 (50 pages)*

San Joaquin Valley Unified Air Pollution Control District
Meeting of the Governing Board
January 22, 2015

# ADOPT PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE CENTRAL FURNACES)

Attachment A:

## Resolution for Proposed Amendments to Rule 4905

**(5 PAGES)**

**BEFORE THE GOVERNING BOARD OF THE SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT**

**IN THE MATTER OF: PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE CENTRAL FURNACES)** ) **RESOLUTION NO. _____**

**WHEREAS**, the San Joaquin Valley Unified Air Pollution Control District (District) is a duly constituted unified air pollution control district, as provided in California Health and Safety Code (CH&SC) Sections (§) 40150 et seq. and 40600 et seq.; and

**WHEREAS**, said District is authorized by CH&SC §40702 to make and enforce all necessary and proper orders, rules, and regulations to accomplish the purpose of Division 26 of the CH&SC; and

**WHEREAS**, pursuant to federal Clean Air Act (CAA) §107, the San Joaquin Valley Air Basin (Valley) has been classified as a nonattainment area for the national health-based air quality standards for ozone and particulate matter 2.5 microns and smaller (PM2.5); and

**WHEREAS,** pursuant to CH&SC §39608, the Valley has been classified as a nonattainment area for the state health-based air quality standards for ozone and PM2.5; and

**WHEREAS,** for each federal nonattainment pollutant, federal CAA §172 requires the District to adopt a plan that provides for the implementation of all reasonably available control measures as expeditiously as possible, and that provides for attainment of the applicable health-based air quality standard; and

**WHEREAS**, federal CAA §182(f) provides that for certain nonattainment areas, states must revise their state implementation plans (SIPs) to include Reasonably Available Control Technology (RACT) for all major sources of oxides of nitrogen (NOx) that are located in the area; and

**WHEREAS**, pursuant to the federal CAA and California CAA, the District's *2008*

*PM2.5 Plan*, *2012 PM2.5 Plan*, and *2013 Plan for the Revoked 1-Hour Ozone Standard* commit the District to amend Rule 4905 to lower the oxides of nitrogen (NOx) emission limits for this source category; and

**WHEREAS**, pursuant to the federal CAA and California CAA, the District's *2012 PM2.5 Plan*, and *2013 Plan for the Revoked 1-Hour Ozone Standard* commit the District to explore the feasibility of amending Rule 4905 to expand the rule applicability to include requirements for natural gas-fired, fan-type central furnaces installed in non-residential buildings; and

**WHEREAS**, proposed amendments to Rule 4905 would lower the NOx emission limit for natural gas-fired, fan-type residential central furnaces to 14 ng/J; and

**WHEREAS**, proposed amendments to Rule 4905 would expand the rule applicability to include natural gas-fired, fan-type central furnaces installed in non-residential (commercial) buildings and require a NOx emission limit of 14 ng/J; and

**WHEREAS**, proposed amendments to Rule 4905 would establish an initial NOx emission limit of 40 ng/J for natural gas-fired, fan-type central furnaces installed in manufactured homes in 2015 and then lower said limit to 14 ng/J in 2018; and

**WHEREAS**, proposed amendments to Rule 4905 would add labeling requirements for new units; and

**WHEREAS**, proposed amendments to Rule 4905 would allow a 300-day period after the applicable compliance deadlines for affected stakeholders to sell through existing inventory of natural gas-fired, fan-type central furnaces, except those installed in manufactured homes; and

**WHEREAS**, proposed amendments to Rule 4905 would allow 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, in the amount of $225 for each non-condensing unit and $290 for each condensing unit sold in the Valley that does not meet the proposed emission limits, and

**WHEREAS**, payments shall be made annually which includes a report of all non-compliant units sold during the previous 12-month period, and

**WHEREAS**, amendments to Rule 4905 will result in a reduction of 2.10 tons per day of NOx emissions upon full turnover of existing units; and

**WHEREAS**, a public hearing for the adoption of proposed amendments to Rule 4905 was duly noticed for January 22, 2015 in accordance with CH&SC §40725.

**NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS:**

1. The Governing Board hereby adopts the proposed amendments to Rule 4905 (Natural Gas-Fired, Fan-Type Central Furnaces). Said rule shall become effective on January 22, 2015.

2. The Governing Board hereby finds, based on the evidence and information presented at the hearing upon which its decision is based, all notices required to be given by law have been duly given in accordance with CH&SC §40725, and the Governing Board has allowed public testimony in accordance with CH&SC §40726.

3. In connection with said rulemaking, the Governing Board makes the following findings as required by CH&SC §40727:

a. **NECESSITY.** The Governing Board finds, based on the staff report, public testimony, and the record for this rulemaking proceeding, that a need exists for said rule amendments and said new rule. Adopting said rule is necessary to meet the commitments of the SIP and requirements of the federal CAA and the California CAA. Said rule satisfies the commitments in the District's *2008 PM2.5 Plan*, *2012 PM2.5 Plan*, and *2013 Plan for the Revoked 1-Hour Ozone Standard*.

b. **AUTHORITY.** The Governing Board finds that it has the legal authority for said rulemaking under CH&SC §40000 and 40001.

c. **CLARITY.** The Governing Board finds that said rule is written or displayed so that the meaning can be easily understood by those persons or industries directly affected by said rule.

d. **CONSISTENCY.** The Governing Board finds that said rule is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.

e. **NONDUPLICATION.** The Governing Board finds that said rule does not impose the same requirements as any existing state or federal regulation.

f. **REFERENCE.** The Governing Board finds that said rulemaking implements federal CAA §172(c)(1) and CH&SC §40920.

4. The Governing Board hereby finds that the requirements of CH&SC §40728.5 and 40920.6 have been satisfied to the greatest extent possible, and that the Governing Board has actively considered and made a good faith effort to minimize any adverse socioeconomic impacts associated with the proposed rulemaking.

5. The Governing Board finds that, because this rulemaking will have no possible significant adverse effect on the environment, the proposed actions do not constitute a project under the provisions of the California Environmental Quality Act of 1970 (CEQA). Furthermore, the proposed actions are exempt from CEQA per the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061 (b)(3)). Therefore pursuant to Section 15062 of the CEQA guidelines, Staff will file a Notice of Exemption upon Governing Board approval of amendments to Rule 4905.

6. The Executive Director/Air Pollution Control Officer is directed to file a Notice of Exemption with the County Clerks of each of the counties in the District.

7. The Executive Director/Air Pollution Control Officer is directed to file with all appropriate agencies certified copies of this resolution and the rule adopted herein and is directed to maintain a record of this rulemaking proceeding in accordance with CH&SC §40728.

8. The Executive Director/Air Pollution Control Officer is directed to transmit said rule to the California Air Resources Board for incorporation into the SIP.

9. The Governing Board authorizes the Executive Director/Air Pollution Control Officer to include in the submittal or subsequent documentation any technical corrections, clarifications, or additions that may be needed to secure EPA approval, provided such changes do not alter the substantive requirements of the approved rule.

**THE FOREGOING** was passed and adopted by the following vote of the Governing Board of the San Joaquin Valley Unified Air Pollution Control District this 22nd day of January 2015, to wit:

**AYES:**

**NOES:**

**ABSENT:**

SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL DISTRICT

By _____
Tom Wheeler, Chair
Governing Board

ATTEST:
Deputy Clerk of the Governing Board

By _____
Michelle Franco

San Joaquin Valley Unified Air Pollution Control District
Meeting of the Governing Board
January 22, 2015

# ADOPT PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE CENTRAL FURNACES)

Attachment B:

## Proposed Amendments to Rule 4905

**(6 PAGES)**

RULE 4905 NATURAL GAS-FIRED, FAN-TYPE ~~RESIDENTIAL~~ CENTRAL FURNACES (Adopted October 20, 2005, Amended January 22, 2015)

1.0 Purpose

The purpose of this rule is to limit NOx emissions from natural gas-fired, fan-type ~~residential~~ central furnaces.

2.0 Applicability

The provisions of this rule shall apply to any person who supplies, sells, offers for sale, installs, or solicits the installation of natural gas-fired, fan-type ~~residential~~ central furnaces for use within the ~~District~~ San Joaquin Valley Air Basin with a rated heat input capacity of less than 175,000 British thermal units per hour, and for combination heating and cooling units with a rated cooling capacity of less than 65,000 British thermal units per hour.

3.0 Definitions

3.1 Air Pollution Control Officer (APCO): as defined in Rule 1020 (Definitions).

3.2 Annual Fuel Utilization Efficiency: the efficiency descriptor as defined by Section 430.2 of the Code of Federal Regulations, Title 10, Part 430, Subpart A.

3.3 Condensing Unit: for purposes of this rule, a natural gas-fired, fan-type central furnace, as defined in Section 3.8, that uses a second heat exchanger to extract the latent heat in the flue gas by cooling the combustion gasses to near ambient temperature so that water vapor condenses in the heat exchanger, is collected, and is drained.

3.4~~3~~ District: as defined in Rule 1020 (Definitions).

3.5~~4~~ Fan-type ~~Residential~~ Central Furnace: a self-contained space heater providing for circulation of heated air at pressures other than atmospheric through ducts more than 10 inches in length.

3.6~~5~~ Heat Output (Central Furnace): the product obtained by multiplying the annual fuel utilization efficiency ~~as defined by Section 430.2 of the Code of Federal Regulations (CFR), Title 10, Part 430, Subpart A,~~ by the rated heat input capacity of the natural gas-fired, fan-type central furnace.

3.7~~6~~ Manufactured Home: as defined in 42 United States Code Section 5402 and California Health and Safety Code Section 18007~~, means a structure, transportable in one or more sections, which, in the traveling mode, is eight body feet or more in width, or 40 body feet or more in length, or, when erected on site, is 320 or more square feet, and which is built on a permanent chassis and~~

~~designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air conditioning, and electrical systems contained therein; except that such term shall include any structure which meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification and complies with the standards established under this part.~~ "Manufactured home" includes a mobile home subject to the National Manufactured Housing Construction and Safety Act of 1974 (42 U.S.C., Sec. 5401, et seq.).

3.8~~7~~ Natural Gas: a mixture of gaseous hydrocarbons containing at least 80 percent methane by volume, as determined according to Standard Method ASTM D1945-64.

3.9~~8~~ NOx: any oxides of nitrogen.

3.10~~9~~ Rated Cooling Capacity: ~~the cooling capacity specified on the nameplate of the cooling unit. Cooling capacity is~~ the amount of heat energy the cooling system can displace in one hour (British thermal units per hour), as specified on the rating plate of the cooling unit.

3.11~~0~~ Rated Heat Input Capacity: ~~the heat input capacity specified on the nameplate of the combustion unit. Heat input is~~ the amount of energy consumed in one hour (British thermal units per hour), as specified on the rating plate of the combustion unit.

3.12 Responsible Official: for the purposes of this rule: for a corporation, a president or vice-president of the corporation in charge of a principal business function or a duly authorized person who performs similar policy-making functions; for a partnership or sole proprietorship, a general partner or proprietor, respectively.

3.13 Weatherized Unit: for the purposes of this rule, a natural gas-fired, fan-type central furnace designed for installation outside of a building, equipped with a protective jacket and integral venting, and labeled for outdoor installation.

4.0 Exemptions

[Reserved] ~~The provisions of this rule shall not apply to :~~

~~4.1 Units installed in manufactured homes.~~
~~4.2 Units using fuels other than natural gas.~~

~~4.3 Nonfan-type residential central furnaces.~~

5.0 Requirements

5.1 No person shall supply, sell, offer for sale, install, or solicit the installation of any natural gas-fired, fan-type residential central furnace ~~for use within the District~~ unless it ~~has~~ is certified pursuant to Section 6.1 to have NOx emissions ~~of oxides of nitrogen~~ less than or equal to 40 nanograms per joule (ng/J) ~~0.093 pounds per million BTU (lb/MMBtu)~~ of heat output ~~or 55 ppm NOx at 3.00% $O_2$ stack gas by volume(dry)~~.

5.2 Effective on and after the specified compliance dates in Table 1, no person shall supply, sell, offer for sale, install, or solicit the installation of any natural gas-fired, fan-type central furnace unless it is certified pursuant to Section 6.1 and complies with the applicable NOx emission limit in Table 1.

Table 1 NOx Emission Limits and Compliance Schedule

| Unit Type | NOx Emission Limit (nanograms/Joule) | Compliance Date |
|---|---|---|
| Units installed in manufactured homes | 40 | February 1, 2015 |
| All non-weatherized condensing units except those installed in manufactured homes | 14 | April 1, 2015 |
| All non-weatherized, non-condensing units except those installed in manufactured homes | 14 | October 1, 2015 |
| Weatherized units | 14 | October 1, 2016 |
| Units installed in manufactured homes | 14 | October 1, 2018 |

5.3 Sell-Through Period

Any natural gas-fired, fan-type central furnace manufactured prior to the applicable compliance date in Table 1 may be supplied, sold, offered for sale, or installed until the applicable sell-through period end-date in Table 2, provided the unit is compliant with the following requirements:

5.3.1 The NOx emission limits and certification requirements in effect on the date of manufacture of the unit, and

5.3.2 The labeling requirements specified in Section 6.1.2.

| Table 2 Sell-through Period End-Dates for Units Manufactured Prior to the Applicable Compliance Dates in Table 1 | |
|---|---|
| Unit Type | Sell-through Period End-date |
| All non-weatherized condensing units except those installed in manufactured homes | January 26, 2016 |
| All non-weatherized, non-condensing units except those installed in manufactured homes | July 27, 2016 |
| Weatherized units | July 27, 2017 |
| Units installed in manufactured homes (for certified 40 ng/J units) | July 27, 2019 |

5.4 Emissions Fee Option

Any manufacturer of units regulated by this rule may elect to pay a per unit emissions fee of $290 for each condensing furnace and $225 for each non-condensing or manufactured home furnace distributed or sold into the San Joaquin Valley in lieu of meeting the 14 ng/J emission limit in Table 1 of this rule, provided the NOx emission rate is less than or equal to 40 ng/J. A manufacturer may elect to pay the per unit emissions fee for a time period of no more than 36 months after the applicable compliance date in Table 1. A manufacturer shall submit a compliance plan for each 12-month time period after the applicable compliance date during which the manufacturer elects to pay the emissions fee in lieu of meeting the NOx emission limit.

5.4.1 Any manufacturer electing to comply using this emissions fee option shall submit to the APCO a compliance plan no later than 30 days prior to the applicable compliance date in Table 1. The compliance plan shall include the following:

5.4.1.1 A letter with the name of the manufacturer requesting the emissions fee option signed by a responsible official identifying the unit type and the 12-month emissions fee option compliance period that the emissions fees cover.

5.4.1.2 An estimate of the quantity of applicable units to be distributed or sold into the San Joaquin Valley Air Basin during the emissions fee option compliance period and supporting documentation. The estimate shall be based on total distribution and sales records or invoices of condensing, non-condensing, weatherized or mobile home fan-type central furnaces that were distributed or sold into the San Joaquin Valley Air Basin during the 12-month period of July 1 to June 30 prior to the applicable compliance date, along with supporting documentation.

5.4.2 The manufacturer shall submit a report to the APCO, signed by the responsible official for the manufacturer, identifying by model number the quantity of applicable units actually distributed or sold into the San Joaquin Valley Air Basin during the applicable 12-month emissions fee option compliance period and a check for payment of emissions fees for those units. The report and payment of emissions fees must be submitted to the APCO no later than thirty (30) days after the end of each 12-month emissions fee option compliance period.

6.0 Administrative Requirements

6.1 Emission Certification

6.1.1 Certified emissions levels shall be demonstrated by an emission certification approved under any of the following:

6.1.1.1 Certification testing as described in Section 6.2 of this rule,

6.1.1.2 The South Coast Air Quality Management District Certification List for Rule 1111 (NOx Emissions From Natural-gas-fired, Fan-type Central Furnaces), or

6.1.1.3 Other emission certification programs approved by the APCO and the United States Environmental Protection Agency.

6.1.2 The manufacturer of the natural gas-fired, fan-type central furnace shall comply with the following labeling requirements:

6.1.2.1 ~~The central furnace manufacturer shall d~~ Display the model number of the unit ~~appliance~~ complying with Section 5.0 on the shipping container ~~carton~~ and the rating plate of the unit ~~appliance.~~; and

6.1.2.2 Units manufactured after the applicable compliance date in Table 1 shall display the following on the shipping container and the rating plate of the unit, in addition to the labeling requirements under Section 6.1.2.1:

6.1.2.2.1 Rated heat input capacity or rated cooling capacity,

6.1.2.2.2 The applicable NOx emission limit in Section 5.0, and

6.1.2.2.3 The date of manufacture or date code of the unit.

6.1.3 Upon request of the APCO, each manufacturer shall submit to the District a statement confirming the ~~appliance~~ unit subject to this rule is in compliance with the emission limit specified in Section 5.0. The statement shall be signed, dated, and shall attest to the accuracy of all information. The statement shall include:

6.1.3.1~~2~~ Name and address of manufacturer,

6.1.3.2~~3~~ Brand name,

6.1.3.3~~4~~ Model number, as it appears on the rating plate of the unit,

6.1.3.4~~5~~ Rated heat input ~~rating~~capacity, British thermal units per hour, and

6.1.3.5~~6~~ A source test report verifying compliance with Section 5.0.

6.2 Certification Testing

6.2.1 During testing, each tested natural gas-fired, fan-type central furnace model shall be operated in accordance with the procedures specified in 10 CFR 430, Subpart B, Appendix N.

6.2.2 Compliance with the ~~oxides of nitrogen~~ NOx emission requirements in Section 5.0 shall be determined using California Air Resources Board Method 100, SCAQMD Method 100.1, or United States Environmental Protection Agency Methods 7E and 3A.

6.3 Recordkeeping

Compliance testing records shall be maintained for five years and made available to the APCO upon request.

~~7.0 Compliance Schedule~~

~~On and after January 1, 2007, no person shall supply, sell, offer for sale, install, or solicit the installation of a unit subject to this rule unless it meets the requirements of section 5.0.~~

San Joaquin Valley Unified Air Pollution Control District
Meeting of the Governing Board
January 22, 2015

# ADOPT PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE CENTRAL FURNACES)

Attachment C:

## Final Draft Staff Report with Appendices for Proposed Amendments to Rule 4905

**(56 PAGES)**

**SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT**

# FINAL DRAFT STAFF REPORT

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

January 22, 2015


Prepared by: Jesse Madsen, Air Quality Specialist

Reviewed by: Sharla Yang, Air Quality Specialist
Brian Clerico, Air Quality Engineer II
Patrick Houlihan, Senior Air Quality Specialist
Anna Myers, Senior Air Quality Specialist
Errol Villegas, Strategies and Incentives Manager
Sheraz Gill, Director of Strategies and Incentives


## I. SUMMARY

Through extensive efforts during the development of the *2008 PM2.5 Plan*, the San Joaquin Valley Air Pollution Control District (District) identified the opportunity to reduce the oxides of nitrogen (NOx) emissions from sources subject to Rule 4905. This would be accomplished by lowering the NOx emission limit for natural-gas-fired, fan-type residential central furnaces (residential units) with a rated heating capacity of less than 175,000 British thermal units per hour (Btu/hr), and for combination heating and cooling units with a rated cooling capacity of less than 65,000 Btu/hr.[1] The District initially committed to amend Rule 4905 (Natural Gas-fired, Fan-type Residential Central Furnaces) in 2010; however, because advanced low-NOx technology was still in the early stages of development for residential furnaces, the District revised its commitment in the *2008 PM2.5 Plan* to amend Rule 4905 in 2014.[2] The District's *2012 PM2.5 Plan*[3] and *2013 Plan for the Revoked 1-Hour Ozone Standard*[4] include this commitment and an additional commitment to explore the feasibility and cost effectiveness of adding a NOx emission limit for units installed in commercial buildings (commercial units).

The purpose of the proposed rule amendment is to fulfill the commitments in the *2008 PM2.5 Plan, 2012 PM2.5 Plan, and 2013 Plan for the Revoked 1-Hour Ozone Standard* to

[1] SJVAPCD. (2008, April 30). *2008 PM2.5 Plan*. Retrieved 9/29/14 from http://www.valleyair.org/Air_Quality_Plans/AQ_Final_Adopted_PM25_2008.htm.
[2] SJVAPCD. (2010, June 17). *Proposed Amendment to the 2008 PM2.5 Plan to Extend the Rule Amendment Schedule for Rule 4905 (Natural Gas-Fired, Fan-Type Residential Central Furnaces*. Retrieved 9/29/14 from http://valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2010/June/Agenda_Item_9_June_17_2010.pdf.
[3] SJVAPCD. (2012, December 20). *2012 PM2.5 Plan*. Retrieved 5/22/13 from http://www.valleyair.org/Air_Quality_Plans/PM25Plans2012.htm.
[4] SJVAPCD. (2013, September 19). *2013 Plan for the Revoked 1-Hour Ozone Standard*. Retrieved 9/29/14 from http://www.valleyair.org/Air_Quality_Plans/OzoneOneHourPlan2013/AdoptedPlan.pdf.

further reduce NOx emissions from residential units and explore the possibility of extending rule applicability to include NOx emission limits for commercial units. The proposed amendments are analogous to the requirements of South Coast Air Quality Management District (SCAQMD) Rule 1111 (NOx Emissions from Natural Gas-fired, Fan type Central Furnaces) and provide for regulatory consistency in California. Proposed amendments include the following:

- Lower the NOx emission limit for residential units to 14 nanograms of NOx per joule of heat output (ng/J) ,
- Expand the applicability to include commercial units with a NOx emission limit of 14 ng/J,
- Expand the applicability to include units installed in manufactured homes with an initial NOx emission limit of 40 ng/J which would then be lowered to 14 ng/J in 2018, and
- Allow 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

SCAQMD amended Rule 1111 in November 2009 to lower the NOx emission limit for applicable units from 40 ng/J to 14 ng/J,[5] and amended it again in September 2014 to extend the first compliance deadline and add an emissions fee option.[6] SCAQMD Rule 1111 already applies to both residential and commercial furnaces, and units installed in manufactured homes have been required to comply with a 40 ng/J limit since October 2012 and will be required to comply with a 14 ng/J limit starting October 2018. Because no compliant units for the new lower NOx limit were commercially available at the time of the 2009 amendment, SCAQMD and the District co-funded a technology assessment to evaluate the performance of ultra-low NOx furnace technologies.[7] The technology assessment resulted in the successful demonstration of several low-NOx furnace designs, which are expected to be commercially available by the SCAQMD Rule 1111 compliance dates.

The District expects technology required for compliance with proposed amendments to be commercially available by the SCAQMD Rule 1111 compliance dates and is therefore proposing to amend Rule 4905 as described above. For those manufacturers that are not able to respond to increased demand for new units by the proposed compliance dates, the emissions fee option will allow them to continue selling units in the San Joaquin Valley (Valley). Proposed rule amendments would contribute to the Valley's progress towards attainment of federal air quality standards for PM2.5 and ozone by reducing NOx, which is

[5] 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.

[6] 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.

[7] 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.

a precursor for both PM2.5 and ozone. Proposed amendments to Rule 4905 would achieve an estimated 2.10 tons per day (tpd) of NOx emission reductions and ensure that Rule 4905 aligns with similar rules in other California air districts.

## II. PROJECT 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 residential 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 achieve NOx reductions without placing an undue financial burden on the residents, operators and businesses that sell these units in the Valley.

The above units are used in approximately 71% of Valley residences[8] and are not labeled for retail as "residential" or "commercial" furnaces. Units used in commercial buildings, while currently not subject to the requirements of Rule 4905, are essentially the same as residential units with the exception of possible differences in usage patterns and indoor/outdoor location. An estimated 1,252,190 residential and commercial units will be operating in the Valley in 2017 (see Appendix C). Replacement will occur gradually as these units reach the end of the 20-year useful life.

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.[9] 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

[8] KEMA, Inc. (Prepared for California Energy Commission). (2010, October). *2009 California Residential Appliance Saturation Study*. Retrieved 9/17/13 from http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF.

[9] 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.

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 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. Furnaces installed in manufactured homes also have to comply with strict space restrictions.[10] Proposed amendments would allow until October 1, 2018 to comply for these units.

## B. Current Rule

The purpose of Rule 4905 is to limit NOx emissions from natural gas-fired, fan-type residential 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. The rule currently requires that no person supply, sell, offer for sale, install, or solicit the installation of any unit within the Valley that exceeds a NOx emission limit of 0.093 lb/MMBtu or 55 ppmv; this NOx emission limit is equivalent to 40 ng/J. The rule is not applicable to units installed in manufactured homes, nonfan-type units and units using fuel other than natural gas.

[10] U.S. Department of Energy. (2014, July 7). *Energy Conservation Program for Consumer Products: Energy Conservation Standards for Residential Furnace Fans.* Retrieved 9/23/14 from https://www.federalregister.gov/articles/2014/07/03/2014-15387/energy-conservation-program-for-consumer-products-energy-conservation-standards-for-residential.

Rule 4905 requires that manufacturers of units subject to the rule certify their units through either 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 District's Air Pollution Control Officer. Manufacturers are also required to display the model number of the unit on the shipping container 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.

The District's Governing Board adopted Rule 4905 on October 20, 2005 to establish the NOx limits mentioned above. EPA finalized approval for Rule 4905 on May 30, 2007.

### C. South Coast AQMD Rule 1111

SCAQMD adopted Rule 1111 (Reduction of NOx Emissions from Natural-Gas-Fired, Fan-type Central Furnaces) in December 1978 to limit NOx emissions from the same units as Rule 4905. The rule was amended in July 1983, November 2009, and September 2014.

The July 1983 amendment to SCAQMD Rule 1111 expanded applicability to include commercial units. November 2009 amendments lowered the NOx limit for residential and commercial units from 40 ng/J to 14 ng/J and added a requirement for units installed in manufactured homes to comply with a 40 ng/J limit starting in October 2012 and a 14 ng/J limit starting in October 2018. Tiered compliance deadlines were set for condensing, non-condensing, and weatherized units on October 1 of 2014, 2015, and 2016, respectively. The 2009 amendments also established an incentive program for early compliance and committed to conducting a technology assessment to develop and test ultra-low-NOx burner technologies.[11]

The September 2014 amendments extended the October 1, 2014 compliance deadline for condensing units to April 1, 2015 to provide manufacturers additional time for testing new furnace designs and submitting and receiving approval of compliance plans for selling non-compliant condensing units. An emissions fee option was added to allow manufacturers to pay to sell non-compliant units for up to 36 months after the applicable compliance date. The emissions fees are set at $150 for non-condensing units and $200 for condensing units. The fees were set based on upper-limit estimates of the expected cost increase for consumers to purchase new compliant units. Manufacturers of units complying with the 14 ng/J emission limit, 90 days prior to the applicable compliance date, may receive $75 in incentive monies for each non-condensing unit and $90 for each condensing unit.[12]

[11] 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.
[12] 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.

## D. Control Technology

At the time of the November 2009 amendment to SCAQMD Rule 1111, no compliant units were available to meet the new 14 ng/J emission limit. The District partnered with SCAQMD to fund a technology assessment, with additional funding provided by Southern California Gas Company, to develop and test low-NOx furnace technologies. The manufacturer-specific details of the technologies developed during this assessment remain proprietary and confidential; however, the assessment was completed in the first quarter of 2014 and resulted in the successful development and testing of several prototypes that achieved the 14 ng/J NOx emission limit from SCAQMD Rule 1111.[13]

Four participants were selected to develop and test prototypes including two furnace manufacturers, a burner manufacturer, and a research institute experienced with combustion technologies. Successful prototypes included condensing and non-condensing furnaces with single and variable firing rates and a variety of heat input capacities that encompassed the sizes of most units found in residential and small commercial buildings. These prototypes demonstrated that the proposed NOx emission limit of 14 ng/J is achievable in all unit types subject to Proposed Rule 4905, although development of units installed in manufactured homes will likely take significantly longer. The prototypes implemented enhanced pre-mixing and modified burners and passed safety and reliability testing.

At the time of completion for the technology assessment, manufacturers still faced several obstacles to commercialization including design, materials, controls, and manufacturing. Conversations with technology assessment participants indicated that most manufacturers will have new compliant furnaces commercially available by the SCAQMD Rule 1111 compliance deadlines, and more than one manufacturer claimed to already have compliant units ready for commercialization. However; a few of the manufacturers, and the Air Conditioning, Heating, and Refrigeration Institute (AHRI) raised concerns regarding the compliance dates and requested an option that would allow the sale of non-compliant units during the initial implementation period in exchange for emissions fees.

One manufacturer indicated that their primary focus has been on meeting expected demand in Southern California and additional time is needed to meet expected demand in the San Joaquin Valley. Another manufacturer has developed compliant units, but expressed the need for additional time to demonstrate the reliability and durability necessary to be able to go to market. However, information obtained through the multi-agency technology assessment project indicated that due to low anticipated demand, high cost to produce, new and costly tooling, and other products with higher potential

[13] 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.

return on investment currently using development resources, the manufacturer is not actively pursuing the development and manufacturing of complying units.

## III. PROPOSED AMENDMENTS TO RULE 4905

### A. Overview

The District is proposing the following amendments to Rule 4905:

- Lower the NOx emission limit for residential units to 14 ng/J[14]
- Expand the applicability of Rule 4905 to include:
  - Commercial units with a NOx emission limit of 14 ng/J
  - Units installed in manufactured homes with a NOx emission limit of 40 ng/J, and lower that NOx emission limit to 14 ng/J in 2018
- Allow 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
- Add labeling requirements to new units shipped to or sold in the Valley
- Remove redundant and expired language, including Section 7.0 (Compliance Schedule)

### B. Proposed Amendments to Rule 4905

The following discussion details the proposed amendments to Rule 4905. See Proposed Rule 4905 for exact language.

#### Section 1.0—Purpose

Proposed amendments would remove the word “residential” to expand the purpose of Rule 4905 to include commercial units and units installed in manufactured homes.

#### Section 2.0—Applicability

Proposed amendments would remove the word “residential” to expand rule applicability to include commercial units of the same type and in the same size range and units installed in manufactured homes. Commercial units in this size range are essentially the same as residential units. According to industry representatives, natural gas-fired, fan-type central furnaces are not labeled as “residential” or “commercial” when sold. The word “District” would be replaced with “San Joaquin Valley Air Basin” to improve clarity.

[14] The previous version of Rule 4905 used pounds of NOx per million British thermal units of heat output (lb/MMBtu). Proposed Rule 4905 would use nanograms NOx per joule of heat output (ng/J) to allow for regulatory consistency in California. The two units of measurement are interchangeable using equivalency factors.

## Section 3.0—Definitions

To improve clarity, proposed amendments would revise the term and definition for "Fan-type Residential Central Furnace" (3.4) to delete "residential" to reflect expansion of rule applicability. Proposed amendments would add the same definition for "Condensing Unit" as used in SCAQMD Rule 1111, for use with the tiered compliance deadlines. Proposed amendments would also remove redundant language from definitions 3.6 (Heat Output (Central Furnace)) and 3.7 (Manufactured Home). The term "Annual Fuel Utilization Efficiency" is already defined in 3.2; hence, the definition does not need to be repeated. Similarly, the United States Code and California Health and Safety Code references are included in the definition for Manufactured Home, making the language from those references redundant and unnecessary. Subsection numbers would be changed to reflect the proposed amendments. Proposed amendments would add definition 3.12 which would define "responsible official" as "for the purposes of this rule: for a corporation, a president or vice-president of the corporation in charge of a principal business function or a duly authorized person who performs similar policy-making functions; for a partnership or sole proprietorship, a general partner or proprietor, respectively." Proposed amendments would also add definition 3.13, which would define "weatherized unit" as "for the purposes of this rule, designed for installation outside of a building, equipped with a protective jacket and integral venting, and labeled for outdoor installation." This definition is consistent with SCAQMD Rule 1111.

## Section 4.0—Exemptions

Proposed amendments would remove exemptions and reserve the section for potential future exemptions.

## Section 5.0—Requirements

**More Stringent NOx Emission Limits**

Proposed amendments would lower the NOx emission limit to 14 ng/J for residential units with a rated heat input of less than 175,000 Btu/hr, and for combination heating and cooling units a rated cooling capacity of less than 65,000 Btu/hr. Proposed amendments would also require new commercial units to meet the 14 ng/J NOx emission limit and require new units installed in manufactured homes to meet a NOx emission limit of 40 ng/J. The proposed NOx emission limits in Table 1 would take effect pursuant to the compliance dates in the same table.

| Table 1 NOx Emission Limits (Effective on and after February 1, 2015) | | |
|---|---|---|
| Unit Type | NOx Emission Limit (ng/J heat output) | Compliance Date |
| Units installed in manufactured homes | 40 | February 1, 2015 |
| All non-weatherized condensing units except those installed in manufactured homes | 14 | April 1, 2015 |
| All non-weatherized, non-condensing units except those installed in manufactured homes | 14 | October 1, 2015 |
| Weatherized units | 14 | October 1, 2016 |
| Units installed in manufactured homes | 14 | October 1, 2018 |

**Compliance Deadlines**

Proposed amendments would provide retailers the opportunity to sell through existing stock consisting of units manufactured prior to the applicable compliance dates in Table 1 until the sell-through period end dates in Table 2, provided the units are compliant with labeling requirements and the standards in effect on the date of manufacture.

| Table 2 Sell-through Period End-Dates for Units Manufactured Prior to the Applicable Compliance Dates in Table 1 | |
|---|---|
| Unit Type | Sell-through Period End-date |
| All non-weatherized condensing units except those installed in manufactured homes | January 26, 2016 |
| All non-weatherized, non-condensing units except those installed in manufactured homes | July 27, 2016 |
| Weatherized units | July 27, 2017 |
| Units installed in manufactured homes (for certified 40 ng/J units) | July 27, 2019 |

SCAQMD included the same tiered compliance deadlines based on unit type to accommodate difficulties associated with commercializing different unit types. This accommodation was granted because the SCAQMD NOx emission limits were scheduled to take effect October 2014 for condensing units, but some manufacturers needed additional time to commercialize the newly developed compliant units. Based on the results of the low-NOx furnace technology assessment and discussions with manufacturers and industry representatives, the technology for compliant units will be available by the SCAQMD Rule 1111 compliance dates, and some units are even expected to be available at the time of this amendment.

**Emissions Fee Option**

To address concerns from manufacturers, the District is proposing an option to allow manufacturers to pay a per unit emissions fee for units sold in the Valley that meet the current emission limits but do not meet the proposed emission limits.

To help minimize unfair competitive disadvantage for manufacturers that will provide compliant units to the San Joaquin Valley, the proposed amendments will allow 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 is necessary to ensure adequate supply for the expected demand for new units in the San Joaquin Valley. However, the emissions fee is set at a level to provide a financial disincentive for continued sale of non-compliant units as follows:

It is estimated that the retail value for non-compliant units will be approximately $150 less for non-condensing units and $200 less for condensing units. One way to disincentivize the sale of non-compliant units would have been to set the emissions fees at this price differential. However, to encourage manufacturers to produce compliant units with lower emissions the proposed emissions fees include an additional surcharge of $75 for non-condensing units and $90 for condensing units. This surcharge equates to the incentive rebate currently provided by South Coast AQMD and is expected to put the Valley in a more favorable position for receiving compliant units. Therefore, the emissions fee would be set to $225 for each non-condensing unit and $290 for each condensing unit.

Section 5.4 is being added to Rule 4905 with the following language:

5.4 Emissions Fee Option

Any manufacturer of units regulated by this rule may elect to pay a per unit emissions fee of $290 for each condensing furnace and $225 for each non-condensing or manufactured home furnace distributed or sold into the San Joaquin Valley in lieu of meeting the 14 ng/J emission limit in Table 1 of this rule, provided the NOx emission rate is less than or equal to 40 ng/J. A manufacturer may elect to pay the per unit emissions fee for a time period of no more than 36 months after the applicable compliance date in Table 1. A manufacturer shall submit a compliance plan for each 12-month time period after the applicable compliance date during which the manufacturer elects to pay the emissions fee in lieu of meeting the NOx emission limit.

5.4.1 Any manufacturer electing to comply using this emissions fee option shall submit to the APCO a compliance plan no later than 30 days prior to the applicable compliance date in Table 1. The compliance plan shall include the following:

5.4.1.1 A letter with the name of the manufacturer requesting the emissions fee option signed by a responsible official identifying the unit type and the 12-month emissions fee option compliance period that the emissions fees cover.

5.4.1.2 An estimate of the quantity of applicable units to be distributed or sold into the San Joaquin Valley Air Basin during the emissions fee option compliance period and supporting documentation. The estimate shall be based on total distribution and sales records or invoices of condensing, non-condensing, weatherized or mobile home fan-type central furnaces that were distributed or sold into the San Joaquin Valley Air Basin during the 12-month period of July 1 to June 30 prior to the applicable compliance date, along with supporting documentation.

5.4.2 The manufacturer shall submit a report to the APCO, signed by the responsible official for the manufacturer, identifying by model number the quantity of applicable units actually distributed or sold into the San Joaquin Valley Air Basin during the applicable 12-month emissions fee option compliance period and a check for payment of emissions fees for those units. The report and payment of emissions fees must be submitted to the APCO no later than thirty (30) days after the end of each 12-month emissions fee option compliance period.

At the end of each 12 month emissions fee option compliance period, the number of units distributed or sold into the District will be reconciled and the manufacturer will pay fees for each noncompliant unit sold under the emissions fee option.

**Units Installed in Manufactured Homes**

The District examined whether other air districts regulate units installed in manufactured homes and found that until 2009 these units were not regulated in any of the air districts, including SCAQMD, Bay Area Air Quality Management District (BAAQMD), Sacramento Metropolitan Air Quality Management District (SMAQMD) and Ventura County Air Pollution Control District (VCAPCD). SCAQMD added requirements during the 2009 amendment of Rule 1111 for units installed in manufactured homes to meet a NOx emission limit of 40 ng/J, effective October 1, 2012, and an emission limit of 14 ng/J, effective October 2018. Most of the basic technology is the same for residential units and units installed in manufactured homes, but there are significant differences in configuration, sizing, and air supply between the two unit types. Even so, SCAQMD added the new requirements because units installed in manufactured homes are capable

of complying with the 40 ng/J NOx emission limit without additional modifications.[15] Proposed amendments would not allow for a sell-through period for these units in the proposed rule, because they have already been required in SCAQMD since 2012. Proposed amendments would allow until October 2018 for manufacturers to develop and commercialize units installed in manufactured homes that comply with the proposed 14 ng/J NOx emission limit and provide for a 300-day sell-through period.

**Weatherized Units**

Proposed amendments address weatherized units as a separate technology, consistent with SCAQMD Rule 1111. Conversations with manufacturers and comments from stakeholders indicated that some of the manufacturers produce weatherized units using the same components and technology as non-weatherized units, while others produce them as a separate unit type, utilizing different components than non-weatherized units. Because some manufacturers produce weatherized units using different components and technology as non-weatherized units, some of the manufacturers have requested additional time to commercialize weatherized units that comply with the proposed 14 ng/J NOx emission limit. Proposed amendments would allow until October 1, 2016 for manufacturers to comply with the new 14 ng/J NOx emission limit, with a sell-through period until July 27, 2017. These compliance deadlines are consistent with SCAQMD Rule 1111.

## Section 6.0—Administrative Requirements

Proposed amendments would revise the labeling requirements for clarity and add a new requirement to accompany the proposed emission limits. The proposed labeling requirements would take effect on and after the applicable compliance dates in Table 1, and would require manufacturers to display the heat input capacity or cooling capacity, the applicable NOx emission limit, and the date of manufacture or date code on the shipping container and rating plate of the unit. The proposed labeling requirements would ensure compliance with the multiple proposed emission limits and the sell-through period requirements and align the requirements of Rule 4905 with those of SCAQMD Rule 1111.

Proposed amendments would clarify the testing requirements of Section 6.2.1 by specifying that each natural gas-fired, fan-type central furnace model must be tested according to the requirements, rather than each unit.

[15] 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.

### Section 7.0—Compliance Schedule

Section 7.0 (Compliance Schedule) would be removed to eliminate redundancy. The compliance schedule is already specified in Sections 5.0 (Requirements) and 6.0 (Administrative Requirements).

## IV. SUPPORTING ANALYSES

### A. Global Climate Change and Greenhouse Gases

The California Global Warming Solutions Act of 2006 (AB 32) created a comprehensive, multi-year program to reduce greenhouse gas (GHG) emissions in California, with the overall goal of restoring emissions to 1990 levels by the year 2020. ARB and the Legislature are developing policies and programs to implement AB 32. The District believes that the evidence and the rationale that climate change is occurring is compelling and convincing. In addition to the long-term consequences of climate change, the District is concerned with the potential ramifications of more moderate but imminent changes in weather patterns. The Valley depends heavily on agriculture for its economy and has developed agricultural practices based on the last several decades of weather patterns. Unanticipated and large fluctuations in these patterns could have a devastating effect on the Valley's economy.

While there are many win-win strategies that can reduce both GHG and criteria/toxic pollutant emissions, when faced with situations that involve tradeoffs between the two, District staff believes that the more immediate public health concerns that may arise from an increase in criteria or toxic pollutant emissions should take precedence. The District's Governing Board adopted the Climate Change Action Plan (CCAP) in August 2008. For California Environmental Quality Act (CEQA) requirements, one of the goals of the CCAP is to establish District processes for assessing the significance of greenhouse gas impacts. The District has developed a policy and guidance for addressing greenhouse gases under CEQA.

### B. Health Benefits

The District is a public health agency whose mission is to improve the health and quality of life for all Valley residents through efficient, effective and entrepreneurial air quality management strategies. The District periodically compiles attainment plans to identify individual regulations and other strategies that will achieve the emissions reductions needed for the Valley to meet federal health-based air quality standards (National Ambient Air Quality Standards, or NAAQS). Guided by its Health-Risk Reduction Strategy, the District develops and implements both attainment plans and regulations to attain the NAAQS in the quickest, most health-protective, and most cost-effective manner. Proposed amendments to Rule 4905 are one component of this overall control

strategy. Since this rule amendment reduces NOx, it benefits public health by contributing to improved ozone and PM2.5 air quality.

## C. Emission Reduction Analysis

As presented in the *2012 PM2.5 Plan*, the annual NOx emissions from the source category currently subject to Rule 4905 are expected to be 2.54 tons per day (tpd) in 2017. The District did not make a specific emission reduction commitment for this rule amendment in that plan in lieu of conducting a more thorough emission reduction analysis in this rule amendment.

Proposed amendments would lower the allowed NOx emission rates by 65% for new units sold in the San Joaquin Valley. This would result in approximately 2.10 tpd NOx emission reductions upon full turnover of existing units in 2036, reflecting a greater than 50% reduction from projected emissions without the reductions achieved by proposed amendments. The complete emission reduction analysis is presented in Appendix B of this Final Draft Staff Report.

## D. Cost Effectiveness Analysis

Pursuant to California Health & Safety Code (CH&SC) Section 40920.6(a), the District has prepared a cost effectiveness analysis to analyze the economic feasibility of the proposed rule amendments. The estimated cost effectiveness for implementing the proposed amendments for natural gas-fired, fan type central furnaces is estimated to range from $30,598 to $40,808 per ton of NOx emission reductions. The differential cost to purchase a 14 ng/J compliant unit is estimated to range from $160.12 to $213.49, making these proposed amendments cost effective. The complete analysis is presented in Appendix C of this Final Draft Staff Report.

## E. Socioeconomic Analysis

Pursuant to CH&SC 40728.5(a), “Whenever a district intends to propose the adoption, amendment, or repeal of a rule or regulation that will significantly affect air quality or emissions limitations, that agency shall, to the extent data are available, perform an assessment of the socioeconomic impacts of the adoption, amendment, or repeal of the rule or regulation.” No significant socioeconomic impacts are expected from proposed rule amendments. The complete socioeconomic analysis is presented in Appendix D of this Final Draft Staff Report.

## F. Rule Consistency Analysis

Pursuant to CH&SC Section 40727.2, the District prepared a rule consistency analysis, comparing the elements of the amendments with the corresponding elements of other District rules and federal regulations. The District found that none of the proposed amendments would conflict with other District rules, or federal rules, regulations, or

policies covering similar stationary sources. The complete rule consistency analysis is presented in Appendix E of this *Final Draft Staff Report*.

### G. CEQA

According to the California Environmental Quality Act (CEQA) statues and pursuant to Section 15061 of the CEQA Guidelines, the District investigated the possible environmental impacts of the amendments to Rule 4905. Based on the District's investigation and lack of evidence to the contrary, the District has concluded that the rule amendments will not have any significant adverse effects on the environment. As such, the District finds that the rule amendments do not constitute a project under the provisions of the California Environmental Quality Act of 1970 (CEQA). Furthermore, the rule amendments are exempt per the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment (CEQA Guidelines §15061 (b)(3)). Therefore pursuant to Section 15062 of the CEQA Guidelines, Staff will file a Notice of Exemption upon Governing Board approval of amendments to Rule 4905.

## 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 October 16, 2014. The draft rule and staff report were made available for the public workshop. The public workshop was followed by a two-week public comment period ending at 5:00 PM on October 30, 2014. All significant comments received before the comment period deadline were reviewed and incorporated into the proposed rule, staff report, and appendices as appropriate.

### B. Public Hearing for Rule 4905

In accordance with CH&SC Section 40725, the proposed amendments to Rule 4905 and the final draft staff report were publicly noticed and made available prior to the December 18, 2014 Governing Board public hearing to consider adoption of the proposed rule amendments. The public was invited to provide comments to District Governing Board members during the public hearing. At the public hearing the Governing Board made a motion to postpone the adoption of the rule until the next regularly scheduled Governing Board public hearing meeting, on January 22, 2015.

Because significant changes were made to the proposed rule from the version made available on November 18, 2014 for public review and comment the District published a new version of the rule in accordance with CH&SC Section 40725 requirements prior to the January 22, 2015 Governing Board public hearing to consider adoption of the

proposed rule amendments. The public is again invited to provide comments to the District Governing Board at the public hearing on January 22, 2015.

# APPENDIX A

## Summary of Significant Comments and Responses For Proposed Amendments to Rule 4905

**January 22, 2015**

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## SUMMARY OF SIGNIFICANT COMMENTS FOR PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE RESIDENTIAL CENTRAL FURNACES) PROPOSED RULE PACKAGE – January 22, 2015

The rule package for proposed amendments to Rule 4905 (Natural Gas-Fired, Fan-Type Residential Central Furnaces) was heard before the District's Governing Board at a public hearing on January 22, 2015. The following is a summary of comments received at the public hearing.

### EPA REGION IX COMMENTS:

1. **COMMENT:** The proposed addition of provisions allowing fee payment in lieu of compliance with emission limits (Section 5.4) undermines Rule 4905's enforceability and thus limits our ability to rely on it for SIP emission reduction credit in accordance with long-standing national policy on economic incentive programs (EIPs) and other non-traditional emission reduction measures (see, e.g., Improving Air Quality with Economic Incentive Programs, EPA-452/R-01-001, January 2001).

   **RESPONSE:** The emissions fee option is only allowed in the first three years of implementation, while projected emission reductions are based on the 20 year period to reach full turnover of existing units. The District expects compliant units to be available by the compliance dates and manufacturer participation in the emissions fee option will be minimal.

2. **COMMENT:** To clarify the impact of the proposed rule revisions, we request that the District clarify, in the associated staff report, the calculated cost of NOx reductions ($/ton) based on the fee included in Section 5.4 in the revised draft of Rule 4905.

   **RESPONSE:** The District has included sufficient information in the Staff Report regarding the cost effectiveness of implementing the proposed amendments.

### ARB COMMENTS:

A comment letter was not received from ARB.

### PUBLIC COMMENTS:

Comments were received from the following:

Air-Conditioning, Heating, & Refrigeration Institute (AHRI)

1. **COMMENT:** The emissions fee should be $150-$200 consistent with the South Coast Air Quality Management District's (SCAQMD) Rule 1111, because in concept, the fee in the SCAQMD rule puts compliant and noncompliant units on an approximate equal cost base. (AHRI)

   **RESPONSE:** The proposed emissions fee is designed to provide an advantage to manufacturers that produce compliant units while still offering an avenue for manufacturers of noncompliant units to offer products while ramping up production of compliant units during the initial implementation period.

## SUMMARY OF SIGNIFICANT COMMENTS FOR PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE RESIDENTIAL CENTRAL FURNACES) PROPOSED RULE PACKAGE – December 18, 2014

The rule package for proposed amendments to Rule 4905 (Natural Gas-Fired, Fan-Type Residential Central Furnaces) was heard before the District's Governing Board at a public hearing on December 18, 2014. The following is a summary of comments received at the public hearing.

### EPA REGION IX COMMENTS:

No verbal comments were received from EPA at the public hearing.

### ARB COMMENTS:

No verbal comments were received from ARB at the public hearing.

### PUBLIC COMMENTS:

Comments were received from the following:

Southern California Gas Company (SCGC)

1. **COMMENT:** We appreciate the District's support in obtaining the research and development funding for the technology assessment. We also appreciate the District making proposed Rule 4905 consistent with South Coast Air Quality Management District (SCAQMD) Rule 1111 and we support the proposed rule amendments. (SCGC)

   **RESPONSE:** The District recognizes and appreciates efforts on the part of SCGC in developing new technology and participating in the rule amendment process for proposed Rule 4905.

## SUMMARY OF SIGNIFICANT COMMENTS FOR PROPOSED AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN-TYPE RESIDENTIAL CENTRAL FURNACES) PROPOSED RULE PACKAGE – November 18, 2014

The rule package for proposed amendments to Rule 4905 (Natural Gas-Fired, Fan-Type Residential Central Furnaces) was made available for public review and comment by the San Joaquin Valley Unified Air Pollution Control District (District) on November 18, 2014. Summaries of significant comments received during the public comment period are summarized below.

### EPA REGION IX COMMENTS:

A comment letter was not received from EPA.

### ARB COMMENTS:

A comment letter was not received from ARB.

### PUBLIC COMMENTS:

Comments were received from the following:

Air-Conditioning, Heating, & Refrigeration Institute (AHRI)
Goodman Global, Inc. (Goodman)

1. **COMMENT:** The District should revise Proposed Rule 4905 in one or both of the following ways:
   - Add an emissions fee option to Proposed Rule 4905.
   - Extend the compliance deadlines in Proposed Rule 4905 by one year to allow additional time for manufacturers to develop compliant units and plan inventory positions. (AHRI, Goodman)

   **RESPONSE:** The compliance deadlines and 300-day sell-through period within Proposed Rule 4905 are consistent with those recently adopted by SCAQMD. It is expected that new units will be available by the proposed compliance deadlines. To satisfy plan commitments and provide for regulatory consistency in California, the District will not extend the proposed amendments an additional year; however, to address the concerns presented, the District will consider adding an emissions fee option to Proposed Rule 4905. This additional option will be presented to the Governing Board at the Public Hearing on December 18, 2014. If the Board approves of adding an emissions fee option to Rule 4905, the District will return to the Board with updated amendments for consideration in early 2015.

## SUMMARY OF SIGNIFICANT COMMENTS FOR DRAFT AMENDMENTS TO RULE 4905 (NATURAL GAS-FIRED, FAN TYPE RESIDENTIAL CENTRAL FURNACES) PUBLIC WORKSHOP – OCTOBER 16, 2014

The San Joaquin Valley Unified Air Pollution Control District (District) held a public workshop to present, discuss, and hear comments on the draft amendments to Rule 4905 and draft staff report on October 16, 2014. Summaries of significant comments received during the public workshop and the associated two-week commenting period following the workshop are summarized below.

### EPA REGION IX COMMENTS:

**3.** **COMMENT:** Clarify if all units or only reference units from the manufacturer should be tested and certified under Section 6.2.1.

**RESPONSE:** Clarifying language has been added to section 6.2.1. See the Proposed Rule and Final Draft Staff Report for these changes.

**4.** **COMMENT:** Correct the typographic error referencing ARB Method 100.1 in section 6.2.2.

**RESPONSE:** The reference to CARB Method 100.1 in Section 6.2.2 was changed to CARB Method 100, which was approved by EPA June 28, 1997. See the Proposed Rule for this change.

**5.** **COMMENT:** The District should reduce the sell-through period from the 1 year that is currently proposed to a shorter period. Analogous South Coast Rule 1111 allows for a 300 day sell through period.

**RESPONSE:** The sell-through period has been amended to be consistent with the sell-through period in South Coast Rule 1111. See the Proposed Rule and Final Draft Staff Report for these changes.

### ARB COMMENTS:

The District did not receive a comment letter from ARB.

**PUBLIC COMMENTS:**
Comments were received from the following:

Air-Conditioning, Heating, & Refrigeration Institute (AHRI)
Ingersoll Rand (IR)
Southern California Gas Company (SCGC)

**6.** **COMMENT:** What is the price differential between new units and old units based on? (SCGC)

**RESPONSE:** The price differential between new units and old units is based on the information used by SCAQMD to set the prices of the emissions fee option during the September 5, 2014 amendments to Rule 1111.

**7.** **COMMENT:** The SCAQMD Rule lists the new lower NOx emission limit as 14 ng/J, and in the Staff Report for September 5, 2014 amendments, states that the this is equivalent to 20 ppmv. The District has a ppmv limit of 19.5. This may cause problems due to regulatory inconsistency between the two air districts. (AHRI, IR, SCGC)

**RESPONSE:** The NOx limit has been revised in proposed Rule 4905 to 20 ppmv for simplicity and consistency.

**8.** **COMMENT:** The District should verify with manufacturers that the labeling requirements added to Draft Rule 4905 are feasible to implement. (SCGC)

**RESPONSE:** The labeling requirements match those in SCAQMD Rule 1111, which were adopted after extensive meetings with industry representatives and public workshops.

**9.** **COMMENT:** The District should add an emissions fee option to proposed Rule 4905 to allow manufacturers that are unable to commercialize new units to still sell non-compliant units in the District. The District should also extend the compliance deadlines beyond those in the SCAQMD to allow additional time for manufacturers to commercialize new units and respond to the increase in production volume. (AHRI, IR)

**RESPONSE:** As discussed in the Final Draft Staff Report, the compliance deadlines within Proposed Rule 4905 are consistent with the deadlines recently adopted by SCAQMD. Additionally, some manufacturers have indicated that compliant models are currently ready for sale, and the District expects additional

manufacturers to have compliant units available by the compliance deadlines. Refer to the Final Draft Staff Report for further details.

**10.** **COMMENT:** The District should address weatherized units as a separate category, with a later compliance deadline than non-weatherized units. (AHRI, IR)

**RESPONSE:** The District amended the Proposed Rule to implement compliance dates that are consistent with SCAQMD. Manufacturers of weatherized units would have until October 1, 2016, with a sell-through period until July 27, 2017, to comply with the proposed 0.0325 lb/MMBtu NOx emission limit. See Proposed Rule 4905 and the Final Draft Staff Report for further details.

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# APPENDIX B

## Emission Reduction Analysis
## For Proposed Amendments to Rule 4905

**January 22, 2015**

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# EMISSION REDUCTION ANALYSIS FOR PROPOSED AMENDMENTS TO RULE 4905

## I. SUMMARY

Rule 4905 reduces emissions of oxides of nitrogen (NOx) by establishing NOx emissions for natural gas-fired, fan-type residential central furnaces (residential units) sold in the San Joaquin Valley (Valley) with a rated heat input capacity of less than 175,000 British thermal units per hour (Btu/hr), and for combination heating and cooling units, a rated cooling capacity less than 65,000 Btu/hr.

Proposed amendments to Rule 4905 would lower the NOx emission limit for residential units and add NOx emission limits for units installed in commercial buildings (commercial units) and units installed in manufactured homes. The NOx emission limit for residential units would be lowered and the applicability expanded to include commercial units and units installed in manufactured homes. Because Rule 4905 is a point-of-sale rule, emission reductions would be achieved gradually as older units are replaced over the 20 year turnover period from 2017 through 2036.

The District's *2008 PM2.5 Plan, 2012 PM2.5 Plan, and 2013 Plan for the Revoked 1-hour Ozone Standard* included commitments to amend Rule 4905, but did not specify an emission reduction commitment for this proposed rule amendment; therefore, there is no comparison between a plan emission reduction commitment and the proposed rule emissions reduction. The baseline NOx emissions and estimated NOx emission reductions for residential and commercial units are summarized in Table B-1 below.

**Table B-1 Summary of Emission Reductions from Natural Gas-Fired, Fan-Type Central Furnaces (2036)**

| Furnace Category | 2036 Baseline NOx Emissions Inventory (tons per day) | NOx Emission Reduction Upon Full Turnover in 2036 (tons per day) | Percent Reduction from Projected 2036 Baseline (%) |
|---|---|---|---|
| Residential | 3.24 | 1.61 | 50.0 |
| Commercial | 0.92 | 0.48 | 52.2 |
| TOTAL | 4.16 | 2.10 | 50.5 |

## II. BACKGROUND

Rule 4905 applies to any person who supplies, sells, offers for sale, installs, or solicits the installation of natural gas-fired, fan-type residential central furnaces with a rated heat input capacity less than 175,000 Btu/hr, and for combination heating and cooling units, a rated cooling capacity less than 65,000 Btu/hr. Units in the applicable size range are used in nearly all residences with access to natural gas and the majority of

commercial buildings. As demonstrated in this appendix, the 2036 total baseline NOx emission inventory for units affected by proposed rule amendments is 4.16 tons per day (tpd).

The proposed rule amendments would lower the NOx emission limit for residential units to 14 ng/J; establish a NOx emission limit of 14 ng/J for commercial units; and require units installed in manufactured homes to comply with a NOx emission limit of 40 ng/J and lower the NOx emission limit for these units to 14 ng/J in 2018. The compliance dates for proposed amendments are as follows:

- February 1, 2015 for units installed in manufactured homes,
- April 1, 2015 for condensing residential and commercial units,
- October 1, 2015 for non-condensing residential and commercial units, and
- October 1, 2018 for the lower NOx emission limit for units installed in manufactured homes.

Manufacturers, distributors, and retailers would also be allowed a 300-day sell-through period for units manufactured prior to the applicable compliance date. Manufacturers that are unable to commercialize new units, or that are unable to respond to the increase in demand in time for the compliance dates would have the option of paying a per unit emissions fee for each noncompliant unit sold in the San Joaquin Valley for up to 36 months after the applicable compliance date. As a point-of-sale rule, Rule 4905 emission reductions would be achieved through attrition as older units are replaced over the 20 year expected life-span of the units during the period from 2017 through the end of 2036.

Units installed in manufactured homes already achieve the proposed 40 ng/J NOx limit without requiring any modifications[1], but residential and commercial units would require new control technologies to achieve the proposed NOx emission limit of 14 ng/J. Based on technology assessment results (see Staff Report), new units will likely exceed the proposed NOx emission limit of 14 ng/J; however, the District would claim SIP credit for emission reductions gained from implementing the proposed NOx emission limit of 14 ng/J. The following section details the assumptions made for the emission reduction analysis, and describes the research and equations used to estimate the total NOx emission reductions upon full turnover at the end of 2036.

## III. EMISSION REDUCTION ANALYSIS

### A. Assumptions for the Emission Reduction Analysis

District staff gathered data from District staff reports, plans, and emissions inventory methodologies; South Coast Air Quality Management District (SCAQMD) Staff Reports

[1] 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.

from the November 2009 and September 2014 amendments to Rule 1111[2,3]; the California Air Resources Board (CARB) emissions inventory[4]; a *2009 California Residential Appliance Saturation Study* prepared by KEMA, Inc. for the California Energy Commission (CEC) (KEMA Study) [5]; and Pacific Gas and Electric's (PG&E) *Commercial Building Survey Report.*[6]

For the purposes of this Emission Reduction Analysis, the following assumptions were made:

1. The emissions inventory category (EIC) used for residential units (610-606-0110-0000) includes emissions from units installed in manufactured homes.

2. The KEMA Study accurately estimates the percent of California population residing in mobile homes and the percent of mobile homes using natural gas heating. These estimates serve as accurate surrogates for the use of natural gas in manufactured homes in the Valley.

   According to the KEMA Study, 3.5% of the California population lives in mobile homes, and 70% of mobile homes use gas heating. Assuming that all gas heating in mobile homes is attributed to furnaces, the fraction of emissions from combustion of natural gas for residential space heating in manufactured homes is (0.035) x (0.7) = 0.0245 (or 2.45%).

3. No additional emission reductions would be achieved from units installed in manufactured homes because these units are already meeting the 40 ng/J NOx emission limit. Although reductions would be achieved from units installed in manufactured homes after the proposed 14 ng/J NOx emission limit is implemented in 2018, these reductions are expected to be insignificant in comparison to total reductions; therefore, the District did not analyze these reductions and would not claim SIP credit for them.

4. The EIC used for commercial units (060-020-0110-0000) was calculated by assuming that commercial natural gas combustion for space heating is attributable to small boilers; however, the PG&E *Commercial Building Survey*

[2] 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.
[3] 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.
[4] CEPAM, Norcal, Version 1.04. Retrieved 9/9/14 from <*planning inventory not available to public*>
[5] KEMA, Inc. (Prepared for California Energy Commission). (2010, October). *2009 California Residential Appliance Saturation Study*. Retrieved 9/17/13 from http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF.
[6] Pacific Gas and Electric Company. (1999). *Commercial Building Survey Report*. Retrieved 9/17/13 from http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/analyzer/buildingreport/ceus_1999.pdf.

*Report* cited in the methodology references gas furnaces as providing the majority of commercial space heating. Because the EIC does not separate space heating device types, an estimate was needed for the portion of commercial natural gas combustion for space heating attributed to gas furnaces.

The PG&E *Commercial Building Survey Report* is assumed to accurately estimate the total capacity of natural gas combustion attributed to space heating from gas furnaces used in commercial buildings in the Valley. The total percent of emissions attributed to gas furnaces was obtained by dividing the total heating capacity of gas furnaces in the Valley by the total heating capacity of all device types in the Valley.

Total percent of heating capacity from gas furnaces in the valley and desert/mountain climate regions:

= (total gas furnace capacity / total heating capacity of all units)
= (12,494 MMBtu/ 17,805 MMBtu) = 70.2%

5. Because the ARB emission inventory only projects up to 2035, an estimate was made for NOx emissions from residential and commercial units in 2036. An estimated increase in emissions based on the average annual increase during the previous five years (2031-2035) was used.

6. The baseline NOx emission factor (EF) for commercial units is the same as the baseline NOx EF for residential units because the units are essentially the same; therefore, the baseline NOx EF for residential and commercial units is assumed to be the current Rule 4905 limit of 40 ng/J.

7. Based on the proposed compliance dates and sell-through periods, the District will claim emission reductions starting in 2017. Non-weatherized units are expected to make up the vast majority of sales in the District because weatherized units are primarily installed in regions with severe weather. The emission reduction calculations in this analysis are conservative because the non-weatherized units are required to comply with the proposed emission limits in January and July of 2016 for condensing and non-condensing units, respectively. The unclaimed reductions from these units in 2016 will easily exceed the reductions that will potentially be claimed early for weatherized units.

8. Based on research conducted for the 2005 adoption of Rule 4905, the average life for applicable units is 20 years.

9. Five percent (5%) of units are replaced every year for 20 years, with full compliance reached at the end of 2036.

10. The proposed emissions fee option will not impact expected emission reductions.

## B. Baseline NOx Emissions Inventory for Uncontrolled Units in 2036

The baseline emissions inventories for units used in residential and commercial buildings were obtained from CARB's CEPAM Norcal V. 1.04. The Emission Inventory Categories (EIC) for residential and commercial units are 610-606-0110-0000 and 060-020-0110-0000, respectively. For both categories, the emissions in 2036 were estimated using the average growth rate of emissions from the previous five years. The total rule baseline emissions inventory for uncontrolled units in residential buildings was calculated as follows:

$Baseline_{residential\ total\ (in\ 2036)}$ = Baseline residential emissions in 2035 + average annual increase in emissions from 2031-2035
= 3.21 tpd (in 2035) + {[3.21 tpd (in 2035) – 3.05 tpd (in 2031)]/5}
= 3.24 tpd (in 2036)

For units used in commercial buildings, the fraction of emissions attributed to furnaces was estimated using the PG&E *Commercial Building Survey Report*. As with residential units, the emissions for 2036 were calculated using average annual emission increase for the previous five years. The rule baseline emissions inventory for uncontrolled units used in commercial buildings was calculated as follows:

$Baseline_{commercial\ total\ (in\ 2036)}$ = Baseline commercial emissions from all devices in 2035 + average annual increase in emissions for previous five years
= 1.30 tpd (in 2035) + {[1.30 tpd (in 2035) - 1.25 tpd (in 2031)]/5}
= 1.31 tpd (in 2036)

$Baseline_{commercial\ net}$ = Baseline emissions from furnaces used in commercial buildings
= (% of heating capacity for gas furnaces in Valley) x ($Baseline_{commercial\ total}$)
= (70.2%) x (1.31 tpd)
= 0.92 tpd (in 2036)

$Baseline_{total}$ = $Baseline_{residential}$ + $Baseline_{commercial}$
= 3.24 tpd + 0.92 tpd
= 4.16 tpd (in 2036)

## C. Annual Reductions

The number of units purchased each year is projected to rise continually during the turnover period; the District would claim reductions from the replacement of units currently in use. Five percent (5%) of the existing units operating in 2017 would be replaced annually, starting in 2017, with full turnover reached at the end of 2036. The annual reductions were calculated as follows:

Annual Reductions = (emissions from 5% of units replaced annually, starting in 2017) x (reduction in NOx EF)
= (net baseline emissions in 2017) x (0.05) x [1-(14 ng/J/ 40 ng/J)]

For residential units, the emissions from units installed in manufactured homes were estimated using the KEMA *California Residential Appliance Saturation Study* and removed from the baseline because no additional emission reductions would be claimed as a result of proposed amendments for these units. The net rule baseline emissions inventory for residential units meeting only the current NOx emission limit of 0.093 lb/MMBtu (or 55 ppm), with emissions from manufactured homes removed, was calculated as follows:

$Baseline_{manufactured\ homes}$ = ($Baseline_{residential\ total}$) x (% population in mobile homes) x (% of mobile homes using natural gas)
= 2.54 tpd (in 2017) x (3.5%) x (70%)
= 0.06 tpd (in 2017)

$Baseline_{residential\ net}$ = Baseline emissions from residential units with emissions from manufactured homes removed
= $Baseline_{residential\ total}$ (from CARB emission inventory)[7] – $Baseline_{manufactured\ homes}$
= 2.54 tpd (in 2017) – 0.06 tpd (in 2017)
= 2.48 tpd (in 2017)

The annual reduction in NOx emissions from residential units was calculated as follows:

$Annual\ Reductions_{residential}$ = ($Baseline_{residential\ net}$) x (5% of units replaced annually) x (reduction in NOx EF)
= (2.48) x (0.05) x [1-(14/40)]
= 0.081 tpd

[7] CEPAM, Norcal, Version 1.04. Retrieved 9/9/14 from <*planning inventory not available to public*>

For commercial units, the net baseline emissions were calculated the same way as they were for 2036 as follows:

$Baseline_{commercial\ net}$ = Baseline emissions from furnaces used in commercial buildings
= (% of heating capacity attributed to gas furnaces in Valley) x ($Baseline_{commercial\ total}$)
= 70.2% x 1.07 tpd (in 2017)
= 0.75 tpd (in 2017)

The annual reduction in NOx emissions from commercial units was calculated as follows:

$Annual\ Reductions_{commercial}$ = ($Baseline_{commercial\ net}$) x (5% of units replaced annually) x (reduction in NOx EF)
= (0.75) x (0.05) x [1-(0.0325 /0.093)]
= 0.024 tpd

The annual reduction in NOx emission from all units was calculated as follows:

$Annual\ Reductions_{total}$ = ($Reductions_{residential}$ + $Reductions_{commercial}$)
= 0.105 tpd total annual NOx emission reductions

## D. Percent Reduction upon Full Turnover of Existing Units at the End of 2036

The percent reduction upon full turnover at the end of 2036 was calculated by dividing the total reductions by the total baseline emission inventory. In this case, the baseline inventory includes manufactured homes. While no reductions are claimed for these units, they are still included in the plan inventory; therefore, the final percent reduced should reflect the percent reduction in emissions from the entire source category. The final percent reduction upon full turnover at the end of 2036 is calculated as follows:

Final reductions = (Total annual reductions) x (20 years turnover period)
= 0.105 tpd/year x 20 years
= 2.10 tpd

Final Percent Reduction = (Final reductions/Baseline emissions in 2036) x 100%
= 2.10 tpd/4.16 tpd x 100%
= 50.5% total percent reduction in NOx emissions upon full turnover in 2036

## IV. CONCLUSION

As a point-of-sale rule, the NOx emission reductions from this proposed rule amendment would occur gradually through attrition as older units are replaced between 2017 and 2036. The total NOx emission reduction of 2.10 tpd would occur upon full turnover at the end of 2036. Table B-2 illustrates the cumulative NOx emission reductions over this 20 year period.

**Table B-2 NOx Emission Reductions for Five-Year Intervals from 2020-2036 (tpd)**

| Year | 2021 | 2026 | 2031 | 2036 |
|---|---|---|---|---|
| **Current Total NOx Emission Inventory** | 3.47 | 3.69 | 3.92 | 4.16 |
| **Total NOx Emission Reductions** | 0.53 | 1.05 | 1.58 | 2.10 |
| **NOx Emission Inventory with Proposed Amendments Implemented** | 2.94 | 2.64 | 2.34 | 2.06 |

# APPENDIX C

## Cost Effectiveness Analysis
## For Proposed Amendments to Rule 4905

**January 22, 2015**

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# COST EFFECTIVENESS ANALYSIS FOR PROPOSED AMENDMENTS TO RULE 4905

## I. SUMMARY

Per California Health and Safety Code (CH&SC) Section 40920.6(a), the San Joaquin Valley Air Pollution Control District (District) conducts absolute and incremental cost effectiveness analyses of available emission control options to evaluate the economic reasonableness of a new rule or rule amendment prior to adoption. A cost effectiveness analysis examines the added cost (in dollars per year) of the control technology or technique, divided by the emission reductions achieved (in tons per year (tpy)).

$$\text{Cost Effectiveness } (\$/ton) = \frac{\text{Compliance Cost } (\$/year)}{\text{Emission Reductions } (ton/year)}$$

This proposed rule amendment would lower the NOx emission limit to 14 nanograms per joule (ng/J) for natural gas-fired, fan-type, residential central furnaces with a rated heat input of less than 175,000 British thermal units per hour (Btu/hr), and for combination heating and cooling units a rated cooling capacity of less than 65,000 Btu/hr (referenced in this document as residential units). Proposed amendments would also expand applicability to include units installed in manufactured homes and units installed in commercial buildings (commercial units).

As Rule 4905 is a point-of-sale rule, the proposed amendments require any units supplied, sold, or installed in the San Joaquin Valley (Valley) to meet the proposed NOx emission limits effective on and after the dates specified in Table 1 in the Proposed Rule (see Staff Report). Manufacturers that are unable to commercialize compliant units, or unable to meet the increased demand for compliant units before the compliance dates would have the option of paying a per unit emissions fee for up to 36 months after the applicable compliance deadline to sell noncompliant units in the Valley.

Based on the analysis in this appendix, the absolute cost effectiveness is summarized in Table C-1. Incremental cost effectiveness is not applicable to this project.

**Table C-1 Cost Effectiveness Analysis Findings for Proposed Rule 4905**

| Number of Units Affected* | Differential Cost for a 0.0325 lb/MMBtu (or 20 ppmv) Compliant Unit | Absolute Cost Effectiveness ($ per ton NOx reduced) |
|---|---|---|
| 1,252,190 | $18.73 to $24.94 | $30,598 to $40,808 |

*Rule 4905 is point-of-sale; therefore, units would not be replaced immediately, but would instead be replaced at the end of the useful life.

## II. ESTIMATED COMPLIANCE COSTS

Estimated compliance costs for a rule project can include, but are not limited to, capital equipment costs, engineering design costs, additional labor or fuel costs, installation costs, and costs incurred from implementing new safety requirements. The District does not expect any additional engineering costs, labor costs, installation costs, or costs from new safety requirements resulting from this proposed rule amendment. Therefore, compliance costs for this rule amendment consist solely of the price differential between 14 ng/J and 40 ng/J compliant units.

Units installed in manufactured homes are already in compliance with the proposed NOx emission limit of 40 ng/J without requiring modifications;[1] therefore, there are no costs associated with these proposed amendments. The final cost effectiveness for weatherized units and units installed in manufactured homes that would comply with the proposed 14 ng/J NOx emission limit is expected to be similar to that of other unit types; therefore a separate cost effectiveness analysis was not performed for these units because cost information is not currently available.

## III. ABSOLUTE COST EFFECTIVENESS ANALYSIS

Absolute cost effectiveness of a control option is additional annual compliance cost, in dollars per year, to meet the amended rule's requirements divided by the emission reductions achieved in tons of pollutant reduced per year. This absolute cost effectiveness analysis examines the differential cost of a 14 ng/J compliant unit and a 40 ng/J compliant unit and the emission reductions anticipated from lowering the NOx emission limit to 14 ng/J for residential units and adding a 14 ng/J NOx emission limit for commercial units.

### A. Assumptions and Formulas

The following assumptions and formulas were used for calculating the absolute cost effectiveness of lowering the NOx emission limit for residential units to 14 ng/J and adding this same limit for commercial units. As these sources are not permitted or registered, and the new compliant units are not yet commercially available, the number of units subject to proposed amendments and the price differential have been estimated using the best available data.

[1] 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.

**1. Price Differential (PD):**

The estimated price differential for 14 ng/J and 40 ng/J compliant units is taken from the SCAQMD Staff Report from the September 2014 amendment to their Rule 1111.[2] The emissions fee option for SCAQMD, $150 for non-condensing units and $200 for condensing units, was set to match the highest estimates of the final price increases to consumers for new compliant units.[3]

Commercially available units currently range from approximately $800 to $2,500, with the largest price difference being between condensing and non-condensing units. It is expected that new units will be more efficient than the units they replace, which will help mitigate the price increase over the life of the unit.

The District calculated a cost effectiveness range based on the SCAQMD emissions fees, where the low estimate for the price differential was set to the fee for non-condensing units and the high estimate was set to the fee for condensing units. The $150 to $200 price differential range would represent scenarios where either all sales are non-condensing units, at $150 increase to each consumer, or all sales are condensing units, at $200 increase to each consumer. Actual sales will be some fraction of each unit type, but accurate estimates were not available for those sales fractions. Because the final price differentials for both non-condensing and condensing units are expected to be significantly lower than $150 and $200, respectively, this cost-effectiveness analysis conservatively represents a worst case scenario.

The SCAQMD emissions fees are assumed to be valued in 2014 dollars. Because 2014 is the latest year available in the BLS *Inflation Calculator*, the average annual inflation rate for years 2010-2014 was calculated by taking the arithmetic mean of the annual differences in adjusted dollar values of the price differential ($PD_{2010}$, $PD_{2011}$, $PD_{2012}$, $PD_{2013}$, $PD_{2014}$). The average annual inflation rate was used to calculate the low and high estimates for the price differential in 2017. The low and high estimates for the price differential (PD) in 2017 were calculated as follows:

$PD_{2014\ Dollars,\ Low\ Estimate}$ = Emissions fee option for non-condensing units sold in SCAQMD
= $150

[2] 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.
[3] 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.

$PD_{\{2010,2011,2012,2013,2014\}}$ = Adjusted value of ($PD_{2014\ Dollars,\ Low\ Estimate}$) in years 2010-2014, based on BLS *Inflation Calculator*
= {$137.52, $141.86, $144.79, $146.91, $150}

Average Annual Inflation Rate = {[($PD_{2011}/PD_{2010}$) + ($PD_{2012}/PD_{2011}$) + ($PD_{2013}/PD_{2012}$) + ($PD_{2014}/PD_{2013}$)]/4} – 1
= {[(141.86/137.52) + (144.79/141.86) + (146.91/144.79) + (150/146.91)]/4} – 1
= 0.022 (or 2.2%)

$PD_{2017\ Dollars,\ Low\ Estimate}$ = ($PD_{2014\ Dollars,\ Low\ Estimate}$) x (1 + Average annual inflation rate)^3
= $150 x $(1 + 0.022)^3$
= $160.12

$PD_{2014\ Dollars,\ High\ Estimate}$ = Emissions fee option for condensing units sold in SCAQMD
= $200

Because the inflation rates in the BLS *Inflation Calculator* are independent of the dollar amount being adjusted, the Average Annual Inflation Rate calculated above is the same for both the high and low price differential estimates.

Average Annual Inflation Rate = 0.022 (or 2.2%) (same as calculated above for the low estimate PD)

$PD_{2017\ Dollars,\ High\ Estimate}$ = ($PD_{2014\ Dollars,\ High\ Estimate}$) x (1 + Average annual inflation rate)^3
= $200 x $(1 + 0.022)^3$
= $213.49

**2. Annualized Compliance Cost (ACC) Formula:**

The annualized compliance cost (ACC) shows the price differential per year of purchasing a new unit over the entire lifespan of the unit. The ACC was calculated as follows:

ACC = Price Differential x Capital Recovery Factor (CRF)

The capital recovery factor (CRF) is used to convert the price differential into equal annual payments over a specified time, at a specified interest rate. The CRF was calculated as follows:

$$\text{CRF} = \frac{i(1+i)^n}{(1+i)^n - 1} = \frac{0.1(1+0.1)^{20}}{(1+0.1)^{20} - 1} = 0.117$$

Where:

i = Interest rate (10%)
n = Equipment life (20 years)[4]

3. **Total Number of Units:** The number of homes in the Valley was obtained from the 2010 Census[5] for the years 2010-2012.

Number of homes in 2010 = 1,332,454
Number of homes in 2011 = 1,336,374
Number of homes in 2012 = 1,338,667

The average rate of increase in number of homes was calculated for that period by taking the arithmetic mean of the annual rates of increase, and used to estimate the number of homes in 2017 as follows:

Average rate of increase$_{2010\text{-}2012}$ = {[(# of Homes$_{2011}$/ # of Homes$_{2010}$) + (# of Homes$_{2012}$/ # of Homes$_{2011}$)]/2} – 1
= {[(1,336,374/1,332,454) + (1,338,667/1,336,374)]/2} – 1
= 0.0023 (or 0.23 %)

Number of homes in 2017 = (number of homes in 2012) x (1 + average rate of increase in number of homes from 2010-2012)^5
= 1,338,667 x (1 + 0.0023)$^5$
= 1,354,133 homes in 2017

The estimated number of homes in 2017 was multiplied by the estimated percent of homes using gas heating[6] to obtain the number of residential units subject to Rule 4905 in the Valley. It was assumed that all homes using gas heating use a natural-gas-fired, fan-type central furnace in the applicable size range. The

[4] SJVAPCD. (2005, October 20). *Adopt Proposed Rule 4905 (Natural Gas-Fired, Fan-type Residential Central Furnaces)*. Retrieved 12/17/13 from http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2005/2005-Oct-20/Item-10/GB_Agenda_2005_Oct_20_Item-10.pdf.

[5] U.C. Census Bureau (2010). *United States Census 2010*. Retrieved 12/17/13 from http://www.census.gov/2010census/.

[6] KEMA, Inc. (Prepared for California Energy Commission). (2010, October). *2009 California Residential Appliance Saturation Study*. Retrieved 9/17/13 from http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF.

number of residential units subject to Proposed Rule 4905 in 2017 was calculated as follows:

| | | |
|---|---|---|
| Residential units in 2017 | = | Number of homes in 2017 x percent of homes using gas heating |
| | = | 1,354,133 x (0.71) |
| | = | 961,434 homes subject to Rule 4905 in 2017 |

The number of commercial units was estimated by multiplying the number of residential units by the ratio of emissions from commercial units to residential units. The emissions were taken from Appendix B of this Final Draft Staff Report. It is assumed that commercial units subject to Rule 4905 are, on average, the same size as residential units, and the usage patterns are similar. The number of commercial units subject to Proposed Rule 4905 in 2017 was calculated as follows:

| | | |
|---|---|---|
| Commercial units in 2017 | = | Number of residential units subject to Proposed Rule 4905 in 2017 x (emissions from commercial units/emissions from residential units) |
| | = | 961,434 x (0.75/2.48) |
| | = | 290,756 |

The total number of residential and commercial units subject to Proposed Rule 4905 in 2017 was calculated as follows:

| | | |
|---|---|---|
| Total number of units | = | Residential units in 2017 + Commercial units in 2017 |
| | = | 961,434 + 290,756 |
| | = | 1,252,190 units subject to Proposed Rule 4905 in 2017 |

**4. Total Annualized Cost (TAC) Formula:**

The total annualized cost (TAC) shows the total annual cost of replacing all applicable units over the lifetime of those units. The TAC was calculated as follows:

| | | |
|---|---|---|
| TAC | = | (ACC) x (Total Number of Units) |

5. **Total Emission Reductions:** The total emission reductions upon full turnover of existing units in 2036 were calculated based on the analysis in Appendix B as follows:

| | | |
|---|---|---|
| Total Reductions$_{tpd}$ | = | 2.10 tons per day in 2036 (from Appendix B) |
| Total Reductions$_{tpy}$ | = | (Total Reductions$_{tpd}$) x 365 days/year |
| | = | 2.10 tpd x 365 days/year |
| | = | 766.5 tons per year |

6. **Absolute Cost Effectiveness (ACE) Formula:**

The absolute cost effectiveness, as defined above, is the total annual cost of replacing all applicable units, in dollars per year, divided by the total annual emission reductions upon full turnover of existing units. The ACE was calculated as follows:

| | | |
|---|---|---|
| ACE | = | (TAC) / (Total Emission Reductions) |

## B. Annualized Compliance Cost Calculations

| | | |
|---|---|---|
| ACC | = | Price Differential x CRF |
| ACC$_{Low\ Estimate}$ | = | \$160.12 x 0.117 |
| | = | \$18.73 (low estimate) |
| ACC$_{High\ Estimate}$ | = | \$213.49 x 0.117 |
| | = | \$24.98 (high estimate) |

## C. Total Annualized Cost (TAC) Calculations

| | | |
|---|---|---|
| TAC | = | (ACC) x (Total Number of Units) |
| TAC$_{Low\ Estimate}$ | = | \$18.73 x 1,252,190 |
| | = | \$23,453,518.70 (low estimate) |
| TAC$_{High\ Estimate}$ | = | \$24.94 x 1,252,190 |
| | = | \$31,229,618.60 (high estimate) |

## D. Absolute Cost Effectiveness (ACE) Calculations

| | | |
|---|---|---|
| ACE | = | (TAC) / (Total Emission Reductions) |

$ACE_{Low\ Estimate}$ = $23,453,518.70 / 766.5 tpy
= $30,598.20 per ton of NOx reduced (low estimate)

$ACE_{High\ Estimate}$ = $31,279,706.20 / 773.8 tpy
= $40,808.49 per ton of NOx reduced (high estimate)

## IV. INCREMENTAL COST EFFECTIVENESS ANALYSIS

The incremental cost effectiveness is the difference in cost between successively more effective controls divided by the additional emission reductions achieved. The proposed NOx emission limit is considered the lowest feasible achievable NOx emission limit. An incremental cost effectiveness analysis is not applicable to this project.

## V. CONCLUSION

The additional cost for a 0.0325 lb/MMBtu (or 20 ppmv) compliant unit is expected to range from $160.12 to $213.49 in 2017. The differential cost is distributed over the 20 year lifetime of the unit, which reduces the financial impact for stakeholders. Also, the absolute cost effectiveness is estimated to range from $30,598.20 to $40,808.49 per ton of NOx reduced. Therefore, lowering the NOx emission limit to 0.0325 lb/MMBtu (or 20 ppmv) for natural gas-fired, fan-type central furnaces in this size range and expanding rule applicability to include commercial units and units installed in manufactured homes is a cost effective and economically reasonable proposed rule amendment.

# APPENDIX D

## Socioeconomic Analysis
## For Proposed Amendments to Rule 4905

**January 22, 2015**

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# SOCIOECONOMIC ANALYSIS FOR PROPOSED AMENDMENTS TO RULE 4905

## I. INTRODUCTION

Pursuant to California Health and Safety Code (CH&SC) Section 40728.5 as well as the *2011 Economic Analysis Process Recommendations*,[1] the San Joaquin Valley Air Pollution Control District (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 San Joaquin Valley (Valley).

The proposed rule amendments would achieve emission reductions by lowering the NOx emission limit for natural gas-fired, fan-type residential central furnaces (residential units) with a rated heat input of less than 175,000 British thermal units per hour (Btu/hr), and for combination heating and cooling units, a rated cooling capacity of less than 65,000 Btu/hr to 14 ng/J. Proposed amendments would also expand applicability to include units installed in commercial buildings (commercial units) and units installed in manufactured homes.

The CH&SC requires discussion of the necessity of adopting, amending, or repealing a rule to attain state and federal ambient air quality standards; this requirement is met through the discussion in the body of the Final Draft Staff Report. The other five CH&SC requirements for a socioeconomic analysis are satisfied through this appendix, which examines the following items:

- Type of industries or businesses affected by the proposed rule amendments
- Range of probable costs for the proposed rule amendments (full discussion contained in Appendix C)
- Emission reduction potential of the proposed rule amendments (full discussion contained in Appendix B)
- Availability and cost effectiveness of alternatives to the proposed rule amendments
- How the proposed rule amendments impact the Valley's employment and economy

The District also evaluated two additional items in this socioeconomic analysis, per the District's *2011 Economic Analysis Process Recommendations*:

[1] San Joaquin Valley Air Pollution Control District (SJVAPCD). (2011, October 20). *Enhancements to District Economic Analysis of Regulations.* Fresno, CA. Retrieved 12/17/13 from http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2011/October/GB_Agenda_Item_13_Oct_20_2011.pdf.

- Costs and socioeconomic impacts from previous versions of the rule
- Impacts of proposed rule amendments to small businesses, municipalities, and at-risk communities

## II. AFFECTED INDUSTRIES AND BUSINESSES

Natural gas-fired, fan-type central furnaces are utilized in a variety of settings, including, but not limited to, the following areas:

- Residential buildings (houses, apartments, etc.)
- Small commercial buildings (offices, manufacturing facilities, hotels, restaurants, hospitals, educational and religious organizations, etc.)
- Manufactured homes (mobile homes, etc.)

End-users of natural gas-fired, fan-type central furnaces would be affected by the proposed rule amendments, as they would not be allowed to purchase 40 ng/J compliant units and could potentially pay more for 14 ng/J compliant units.

Manufacturers of natural gas-fired, fan-type central furnaces would be affected by the rule amendments, but there are currently no furnace manufacturers in the Valley. There are Valley wholesalers, suppliers, and contractors who purchase units from manufacturers to sell in the Valley that would be affected by the rule amendments. These businesses would no longer be allowed to sell, distribute, or install units meeting a NOx emission limit of 40 ng/J, unless the manufacturer has paid a per unit emissions fee for each noncompliant unit sold into the Valley. In that case, the manufacturer would pay the additional cost and Valley businesses would not be affected.

## III. COSTS AND SOCIOECONOMIC IMPACTS FROM PREVIOUS VERSIONS OF RULE 4905

Rule 4905 was adopted in October 2005. These proposed amendments represent the second generation of this rule. In order to account for the cumulative impact of multiple generations of rules on this source category, the *2011 Economic Analysis Process Recommendations* advises that staff reports include descriptions and cost estimates for previous generations of air pollution controls and reference previous socioeconomic analyses as each rule is amended.

The *Final Draft Staff Report* from the October 20, 2005 adoption of Rule 4905 determined that there was no significant cost difference between noncompliant units and compliant units.[2]

[2] SJVAPCD. (2005, October 20). *Adopt Proposed Rule 4905 (Natural Gas-Fired, Fan-type Residential Central Furnaces)*. Retrieved 12/17/13 from

## IV. COSTS AND EMISSION REDUCTION POTENTIAL FROM PROPOSED RULE 4905

The proposed amendments to Rule 4905 are expected to result in 2.10 tons per day (tpd) of NOx emission reductions upon full turnover of existing units(see Appendix B), and the average annual cost of a 14 ng/J compliant unit is expected to range from $18.73 to $24.94 per year (see Appendix C).

## V. ALTERNATIVES TO RULE AMENDMENT

The proposed NOx emission limit is considered the lowest achievable NOx emission limit in practice. Therefore, there are no alternatives to this proposed rule amendment that would be more stringent or achieve additional emissions reductions.

## VI. SOCIOECONOMIC IMPACTS

A socioeconomic impact is an effect on the Valley's employment or economy due to a regulatory action. There are no socioeconomic impacts anticipated for these rule amendments because there are no significant impacts to the following three groups that could potentially be affected by this rule-amending project:

- The end-users of units;
- Manufacturers of units; and
- Wholesalers, suppliers, and/or contractors who supply or install units.

### End-Users

Rule 4905 is a point-of-sale rule that does not require end-users to replace existing units within a certain time frame; rather, as existing units reach the end of their life and the users replace them, they would purchase a unit that meets the proposed 14 ng/J proposed NOx emission limit, thus ensuring that end-users are not forced to incur additional costs when their current units are still operable. The price differential between 40 ng/J and 14 ng/J compliant units is expected to range from $160.12 to $213.49 in 2017. This price increase is relatively minor when compared to the total cost of approximately $800 to $2,500, with most units costing $1,000 to $1,500. New units are also expected to be more efficient than the units they replace, which will help mitigate the price increase over the life of the unit.

### Manufacturers

Manufacturers build natural gas-fired, fan-type central furnaces and sell them to wholesalers, suppliers, or contractors for distribution to the end-users. These rule

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http://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2005/2005-Oct-20/Item-10/GB_Agenda_2005_Oct_20_Item-10.pdf.

amendments would have a minimal impact to furnace manufacturers, because any additional costs to manufacture the 14 ng/J compliant units would be passed on to the consumer. Manufacturers that are unable to commercialize new units before the compliance dates or unable to respond to increased demand would be able to continue selling units in the Valley by paying an emissions fee for each noncompliant unit sold.

District staff has not identified any furnace manufacturers that have manufacturing facilities located in the Valley. During the October 16, 2014 workshop for the draft rule amendment, the District solicited information regarding furnace manufacturers in the Valley.

**Wholesalers, Suppliers, and/or Contractors**

Wholesalers, suppliers, and contractors are the medium between the manufacturing facilities and the end-users, as these parties purchase units from the manufacturers to sell and distribute to users. These businesses would no longer be allowed to sell, distribute, or install units meeting a NOx emission limit of 40 ng/J. The proposed amendments provide these wholesalers and suppliers with a 300-day period after the effective compliance dates to sell through existing inventory. Units meeting the NOx emission limit of 14 ng/J will be commercially available by the end of 2015. Also, as discussed in Appendix C (Cost Effectiveness Analysis), the price differential between a 40 ng/J and 14 ng/J compliant unit is $160.12 to $213.49. Contractors', suppliers', and wholesalers' sales volumes are not expected to be adversely impacted. Profit margins are anticipated to remain the same as the cost would be incorporated into the sales prices of new units.

## VII. IMPACTS TO SMALL BUSINESSES, MUNICIPALITIES, AND AT-RISK COMMUNITIES

Per the *2011 Economic Analysis Process Recommendations* document, District staff is advised to evaluate how new rules or rule amendments may impact small businesses, municipalities, and at-risk communities where the major employer may respond to additional compliance costs by laying off workers. As discussed in Section VI above, these proposed rule amendments are not expected to result in any significant socioeconomic impacts, nor any decreased employment for small businesses and industries in the Valley. As such, municipalities and at-risk communities are not expected to incur any economic or employment effects from these rule amendments.

# APPENDIX E

## Rule Consistency Analysis
## For Proposed Amendments to Rule 4905

**January 22, 2015**

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# RULE CONSISTENCY ANALYSIS FOR PROPOSED AMENDMENTS TO RULE 4905

## I. REQUIREMENTS FOR RULE CONSISTENCY ANALYSIS

Pursuant to Section 40727.2 of the California Health and Safety Code, 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 United States Environmental Protection Agency (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. The analysis is discussed in Section II below.

## II. RESULTS OF ANALYSIS

### A. District Rules

There is no other District prohibitory rule or regulation tailored specifically for natural gas-fired, fan-type central furnaces (4354 applies to glass melting furnaces). Sources could be subject to other District rules including:

- Rule 1020 Definitions
- Rule 1140 Applicability of Emissions Limits
- Rule 4301 Fuel Burning Equipment
- Rule 6150 Enforcement

The requirements of the rules listed above are not in conflict with, nor are they inconsistent with the requirements of Proposed Rule 4905.

### B. 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.

1. Control Technique Guidelines (CTG)

   District review of the EPA CTG list indicates that there is no CTG for natural gas-fired, fan-type central furnaces of this size.

2. EPA Alternative Control Techniques (ACT) Document

   District review of the EPA ACT list indicates that there is no ACT for natural gas-fired, fan-type central furnaces of this size.

3. EPA New Source Performance Standard (NSPS)

   District review of 40 CFR 60 (NSPS) indicates that there is no NSPS for natural gas-fired, fan-type central furnaces of this size.

4. National Emission Standard for Hazardous Air Pollutants (NESHAP) and Maximum Achievable Control Technology (MACT)

   District review of 40 CFR 61 (NESHAP) and 40 CFR 63 (MACT) indicates that there is no NESHAP or MACT for natural gas-fired, fan-type central furnaces of this size.

5. EPA Best Available Control Technology (BACT) Requirements

   District review of EPA BACT requirements indicates that there are no BACT requirements listed for natural gas-fired, fan-type central furnaces of this size.

6. 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.

## III. CONCLUSION

Based on the above 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.