SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

DRAFT STAFF REPORT

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)

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I. SUMMARY

A. The Proposed Amendment to the *2008 PM2.5 Plan*

The California Air Resources Board (ARB) and United Stated Environmental Protection Agency designated the San Joaquin Valley Air Basin (SJVAB) as non-attainment for the national ambient air quality standards (NAAQS) for particulate matter with an aerometric diameter of 2.5 microns or less (PM2.5). The San Joaquin Valley Air Pollution Control District's (District) *2008 PM2.5 Plan* set forth a strategy for bringing the SJVAB into attainment for PM2.5.

As part of the PM2.5 attainment strategy, the District committed to amending Rule 4905 (Natural Gas-Fired, Fan-Type Residential Central Furnaces) in the second quarter of 2010. Rule 4905 reduces emissions of oxides of nitrogen (NOx), which in turn reduces the formation of ammonium nitrate particulates. However, based on information obtained during the rule development process, District staff has determined that additional time is necessary to explore potential for developing an incentive program for furnaces, assist with the development of new low NOx burner (LNB) technologies through the District's Technology Advancement Program (TAP), and benefit from findings of the South Coast's technology assessment for residential furnaces expected April of 2014. These may provide the District an opportunity to achieve more reductions from Amended Rule 4905 than would otherwise be feasible. Therefore, District staff proposes to amend the *2008 PM2.5 Plan* to extend the rule

adoption schedule for this rule to the fourth quarter of 2014. Since the District did not quantify projected emissions reductions from this control measure in the *2008 PM2.5 Plan*, this rule amendment extension would not impact any reasonable further progress demonstrations made for the *2008 PM2.5 Plan.*

B. Reasons for the Rule Adoption Date Extension

Current Rule 4905 applies to fan type residential central furnaces fired by natural gas. These units are less than 175,000 British thermal units (BTU) rated heat input capacity per hour, or a rated cooling capacity of less than 65,000 BTU per hour for combination heating and cooling units.

Rule 4905 requires any new or replacement natural gas-fired, fan-type residential central furnace to have NOx emissions less than or equal to 0.093 pounds per million BTU (lb/MMBtu) heat output, or 55 parts per million (ppm) NOx at 3.00% O2 stack gas by volume (dry). This equates to a heat output of 40 ng/J, the unit of measure commonly used in rulemaking for this category.

Exemptions to Rule 4905 include:

- Units installed in manufactured homes;
- Units using fuels other than natural gas; and
- Nonfan-type residential central furnaces.

Currently several California air districts have adopted natural gas residential furnace rules with emissions standards equal to those in the current District Rule 4905 (40 ng/J), such as:

- Bay Area Air Quality Management District Regulation 9, Rule 4
- San Diego County Air Pollution Control District (APCD) Rule 69.6
- San Luis Obispo County APCD Rule 428
- Ventura APCD Rule 74.22
- Yolo Solano AQMD Rule 2.44.

In November 2009, South Coast amended Rule 1111 for residential, natural gas furnaces, lowering the NOx emission limit to 14 ng/J. The District seeks to lower the rule 4905 threshold to or below 14 ng/J. However, as noted in the South Coast staff report that there is no currently commercially available technology to achieve this limit a 14 ng/J limit. Coast included a provision in their rule adoption to, by April 2013, complete an assessment of applicable NOX control technologies that can meet the emission limit (14 nanograms per joule (ng/J)) and adjust the rule, if necessary.

In lieu of developing a rule based on technology not commercially available, the District proposes to partner with South Coast to fund technology advances such as LNB prototypes for residential furnaces, conduct a separate technology assessment, and explore incentive options to expedite the availability of LNB technology. Upon completion of this, the District will develop a rule based on advanced proven

technology which will incorporate the most stringent limits feasible. Rule adoption is anticipated by fourth quarter 2014.

II. DISCUSSION

A. Affected Source Category

Rule 4905 applies to fan type residential central furnaces fired by natural gas. These units are less than 175,000 British thermal units (BTU) rated heat input capacity per hour, or a rated cooling capacity of less than 65,000 BTU per hour for combination heating and cooling units. The United States Department of Energy regulates the efficiency standards for these units and recently amended the national efficiency standard to 80% Annual Fuel Utilization Efficiency (AFUE, the indicator of percent energy input that is turned into usable heat).

B. Technology Advancement Program

The District's Governing Board recently approved the Technology Advancement Program (TAP) to allocate funding to support research and advancement in low NOx emissions technology, such as those being developed for furnaces. District staff recommends that the Governing Board authorize the District to actively partner with South Coast and to contribute $50,000 to the South Coast technology assessment project for LNB technology research and prototypes. The District's active involvement will help expedite the commercial availability of this control technology and thus the resultant emission reductions that will be achieved from this technology.

C. Incentive Program

Rebates are available for California homeowners installing higher-efficiency furnace units (units with above 90% AFUE). Federal tax credits are currently available for many furnaces with at least a 95% AFUE through the Energy Star program.

In many situations, District incentive programs are necessary to encourage the commercial development and widespread use of new technology, such as LNB in the District. District staff proposes to design a residential furnace incentive program to provide incentives for natural gas-fired, fan-type central furnaces that comply with the 14 ng/J emissions limit before the regulatory compliance date. The District is proposing that the Governing Board authorize staff to allocate up to $500,000 for this incentive program. The District anticipates that funding for the program will come from AERO fees generated by the District's Rule 4320. The incentive amount and distribution dates will be determined based on the regulatory controls and compliance schedules determined during the rule development process.

D. Potential Regulation Controls

Neither the California Air Resources Board (ARB) nor the U.S. Environmental Protection Agency (EPA) has established a best available control technology (BACT) for this source category. Possible controls for this source category could involve adaptations of current boiler technology, including combustion modification and exhaust gas treatment.

Combustion Modification

Combustion modification systems reduce thermal NOx formation by reducing peak flame temperature. Such controls include low excess air operation, staged combustion, overfire air ports, biased firing, and placing selected burners out-of-service. Combustion modification is also achieved through Low NOx and Ultra Low NOx burners, including staged air burners, staged fuel burners, pre-mix burners, internal recirculation, and radiant burners.

Combustion control systems may be used alone or in combination with Flue Gas Recirculation (FGR). FGR recycles a portion of the exhaust stream back into the burner windbox, mixing low oxygen air with combustion air before it enters the combustion chamber. Reducing peak temperature and oxygen in the combustion zone reduces thermal NOx formation.

Exhaust Gas Treatment

Adding an Exhaust Gas Treatment (EGT) system after the boiler firebox reduces NOx to molecular nitrogen. EGT uses Selective Catalytic Reduction (SCR) and Selective Noncatalytic Reduction (SNCR). EGT reduces NOx in the exhaust gas by injecting urea or ammonia into the post-combustion zone of the boiler. SCR systems store ammonia in aqueous form or anhydrous form, generated on demand or released from urea. SCR systems can be prone to operating problems and ammonia emissions if not operated per SCR manufacturer instructions. Therefore, EGT may not be practical for use in residential furnaces due to high capital equipment costs and operations/maintenance costs including technical challenges for homeowners to operate the technology.

Additional control options such as LNB technologies may be identified through the District's technology assessment for boilers, South Coast's technology assessment for boilers, and work funded through the District's TAP program.

III. RULE DEVELOPMENT PROCESS

The District presented the objectives and project milestones for the Rule 4905 rulemaking project at scoping meeting in May 2009. Stakeholder comments, District staff background research, and the South Coast's Rule 1111 technical information indicate that the necessary technology for the planned Rule 4905 amendment is not yet commercially available. Therefore, the rule development completion date in the *2008 PM2.5 Plan* should be amended from the second quarter of 2010 to the fourth quarter of 2014. District staff is asking the District Governing Board to approve this extension at the June 17, 2010 public hearing. A public review period for this staff report is being held from May 18 – June 1, 2010.

Even with the rule adoption rescheduling, District staff will continue to work on this project in several ways:

- Monitor South Coast implementation of Rule 1111 and evaluate their 2013 control technology assessment residential furnace rules.
- Assess new controls as they become available.
- Hold workshops on and proceed with document preparation to adopt the amendment before the new fourth quarter 2014 deadline, if South Coast completes their 2013 technology assessment early or if technology availability allows.
- Evaluate potential emission reductions from this source category in future attainment plans (2011 – 2014).
- With Governing Board authorization, develop an incentive program for those who supply and distribute LNB technology furnaces in advance of the specified rule compliance date (to be determined during the rule development process).

By fourth quarter of 2014 the District will bring an Amended Rule 4905 to the District Governing Board for approval. This rule will incorporate all feasible control measures and take into consideration new technology and incentive programs.

IV. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) PROCESS

District staff does not expect the Rule 4905 deadline extension to adversely impact the attainment goals of the District's *2008 PM2.5 Plan*. Therefore, extending the adoption deadline for Draft Amendments to Rule 4905 is not a "project" under CEQA and an environmental impact analysis is not required.

V. REFERENCES

1. San Joaquin Valley Unified Air Pollution Control District, *2008 PM2.5 Plan,* April 30, 2008. (http://www.valleyair.org/Air_Quality_Plans/PM_Plans.htm)

2. South Coast Air Quality Management District, Rule 1111 (NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces), amended November 6, 2009.

3. South Coast Air Quality Management District, Staff Report for Proposed Amendments to Rule 1111 (NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces), October 28, 2009.

4. Department of Energy, Energy Star Program. (http://www.energystar.gov)

5. Bay Area Air Quality Management District, Regulation 9, Rule 4 (Nitrogen Oxides from Fan Type Residential Furnaces), adopted December 7, 1983.

6. San Diego County Air Pollution Control District, Rule 69.6 (Natural Gas Fired Fan-Type Central Furnaces), *a*dopted June 17, 1998.

7. San Luis Obispo County Air Pollution Control District, Rule 428 (Control of Oxides of Nitrogen from Residential Natural Gas-Fired Water Heaters and Furnaces), adopted July 7, 1995.

8. Ventura Air Pollution Control District, Rule 74.22 (Natural-Gas-Fired, Fan-Type Central Furnaces), adopted November 9, 1993.

9. Yolo Solano Air Quality Management District, Rule 2.44 (Central Furnaces), adopted May 13, 2009.