

**SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT**

STAFF REPORT

RULE 414

WATER HEATERS, BOILERS AND PROCESS HEATERS RATED LESS THAN 1,000,000

BTU PER HOUR

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INTRODUCTION

Staff is proposing to amend Rule 414, Natural Gas Fired Water Heaters, to reduce NOx emissions from water heaters, boilers, and process heaters. Currently, NOx emissions from water heaters, boilers, and process heaters are regulated by two existing rules: Rule 414 (for units with rated heat input capacities of less than 75,000 Btu/hr) and Rule 411, NOx from Boilers, Process Heaters and Steam Generators (for units with rated heat input capacities of 1,000,000 Btu/hr and higher). The Rule 414 amendments will provide emission standards for the previously unregulated units (i.e., between 75,000 and 1,000,000 Btu/hr) and strengthen standards for the smaller units currently regulated by Rule 414. The proposed standards have been shown to be feasible in the South Coast Air Quality Management District (SCAQMD).

BACKGROUND

Ground level ozone is a secondary pollutant formed from photochemical reactions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the presence of sunlight. Ozone is a strong irritant that adversely affects human health and damages crops and other environmental resources. As documented by the U.S. Environmental Protection Agency (EPA) in the most recent Criteria Document for ozone (U.S. EPA 2006), both short-term and long-term exposure to ozone can irritate and damage the human respiratory system, resulting in:

- decreased lung function;
- development and aggravation of asthma;
- increased risk of cardiovascular problems such as heart attacks and strokes;
- increased hospitalizations and emergency room visits; and
- premature deaths.

The District is currently designated as a nonattainment area for both the state and federal ozone standards. Since NOx is a precursor to ozone, one of the strategies to control ozone pollution is to reduce NOx emissions from existing stationary sources.

The District is currently designated as a nonattainment area for the state and federal¹ health standards for PM10 and PM2.5. Since NOx is a precursor to PM10 and PM2.5, one of the strategies to control particulate emissions is to reduce NOx emissions.

According to the U.S. Environmental Protection Agency (EPA), health studies have linked exposure to particulate matter, especially fine particles, to several significant health problems, including:

- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing;
- decreased lung function;

¹ Based on 1998-2000 monitoring data, EPA made a finding (February 15, 2002 Federal Register, Volume 67, Number 32, Page 7082 et seq.) that Sacramento County attained the federal ambient PM10 standard by the applicable December 31, 2000 attainment deadline. Note that this EPA finding did not redesignate the Sacramento District to attainment.

- aggravated asthma;
- development of chronic bronchitis;
- irregular heartbeat;
- nonfatal heart attacks,
- premature death in people with heart or lung disease; and
- increased risk of cardiovascular and cerebrovascular events in post-menopausal women.

In addition, burning oil in water heaters, boilers and process heaters produce emissions of benzene, formaldehyde, acetaldehyde, toluene, xylenes, hydrogen chloride, arsenic, copper, mercury, and nickel². All of these pollutants have been identified by the California Air Resource Board (CARB) as toxic air contaminants based on their potential to cause cancer, premature death, and other health problems.

Adopted August 1, 1996, Rule 414, Natural Gas Fired Water Heaters, established NOx emission limits for natural gas-fired water heaters with rated heat input capacities less than 75,000 Btu/hr. Staff is proposing to amend Rule 414 to further reduce NOx emissions from small water heaters, boilers, and process heaters. In the 2003 Triennial Report, the District committed to adopt more stringent NOx standards for these units to satisfy state plan requirements for "all feasible measures." The recently adopted 8-hour Ozone Attainment Plan also includes a commitment for the District to achieve emission reductions from this category to attain the federal standard. These amendments will fulfill the state and federal plan commitments.

One of the significant sources of NOx emissions is stationary source natural gas combustion. Currently, NOx emissions from natural gas-fired water heaters, boilers, and process heaters are regulated by two existing District rules: Rule 414 (for units with rated heat input capacities of less than 75,000 Btu/hr) and Rule 411 (for units with rated heat input capacities of 1,000,000 Btu/hr and higher). Staff has identified more stringent, feasible NOx limits in two SCAQMD rules: SCAQMD Rule 1121, which sets more stringent NOx limits for water heaters with rated heat input capacities less than 75,000 Btu/hr, and SCAQMD Rule 1146.2, which sets limits for units with rated heat input capacities from 75,000 to 2,000,000 Btu/hr. Several other districts, including San Joaquin Valley Unified APCD (Rule 4308), Bay Area AQMD (Rule 9-6) Yolo Solano AQMD (Rule 2.37), Ventura County APCD (Rule 74.11.1), and Santa Barbara County APCD (Rule 360) have adopted some or all of these standards.

LEGAL MANDATES

Federal Mandates:

The District is designated as a nonattainment area for the federal 8-hour ozone standard. In February 2009, the districts of the Sacramento Federal Nonattainment Area adopted an

² Emissions identified in an AB 2588 document published by the Ventura County Air Pollution Control District except for the metals which were identified through EPA AP-42

attainment plan to achieve the federal 8-hour ozone standard by 2018. The attainment plan includes a commitment for the District to achieve NO_x emission reductions from water heaters, boilers, and process heaters rated at less than 1,000,000 Btu/hr.

The proposed amendments will satisfy the federal plan commitment.

State Mandates:

Serious Nonattainment Plan Requirements: The District is designated as a serious nonattainment area for the state ozone standard. The California Clean Air Act requires areas with this designation to adopt control measures required in sections 40913, 40914, and 40919 of the California HSC:

- HSC Section 40913 requires districts to develop a plan to achieve California's ambient air quality standards by the earliest practicable date.
- HSC Section 40914(b)(2) requires every nonattainment district which cannot achieve a reduction of 5% or more per year in district wide emissions to include in their state attainment plans "every feasible measure" to reduce the emissions of nonattainment pollutants and their precursors. SCAQMD Rules 1121 and 1146.2, which regulate emissions from small water heaters, boilers, and process heaters, qualify as a "feasible measures." The District's 2003 Triennial Plan update included a commitment to achieve NO_x emission reductions from this category. The proposed amendments will satisfy the state plan commitment.
- HSC Section 40919(a)(3) requires districts with serious nonattainment for ozone to adopt BARCT for all existing permitted sources. The sources affected by the proposed Rule 414 are below the District's permitting threshold; therefore, this requirement is not applicable.

Toxic Air Contaminants: California Health and Safety Code (HSC) Section 39659 allows a district board to adopt regulation which are necessary to establish, implement, and enforce programs for the regulations of hazardous air pollutants which have been listed as toxic air contaminants. HSC Section 39666(d) allows for local districts to adopt and enforce equally effective or more stringent measures than the state board.

Transport Mitigation Emission Control Requirements: Title 17, Section 70600 of the California Code of Regulations requires that districts within the areas of origin of transported air pollutants, as identified in section 70500(c), include sufficient emission control measures (including "all feasible measures" and BARCT) in their attainment plans for ozone to mitigate the impact of pollution sources within their jurisdictions on ozone concentrations in downwind areas commensurate with the level of contribution. An upwind district shall comply with the transport mitigation planning and implementation requirements set forth in this section regardless of its attainment status, unless the upwind district complies with the requirements of section 70601.

The proposed amendments are based on all feasible control measures and therefore comply with the state mandates.

SUMMARY OF REQUIREMENTS

This Rule 414 amendment establishes NO_x emission limits for water heaters, boilers, and process heaters that fall between the heat capacity ranges of existing Rule 411 and Rule 414 (i.e., from 75,000 to 1,000,000 Btu/hr). The emission limits are based on limits contained in SCAQMD Rule 1146.2 (Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters). In addition, the current NO_x limits for water heaters with rated capacities of less than 75,000 Btu/hr contained in the existing Rule 414 will be reduced based upon limits established in SCAQMD Rule 1121 (Control of Nitrogen Oxides from Residential-Type, Natural Gas-Fired Water Heaters).

The most stringent limits in SCAQMD Rule 1121 went into effect for all applicable units less than 75,000 Btu/hr between 2006 and 2008. Since that time, compliant water heaters have been readily available to the public in the South Coast District. Currently, a few models that meet the 10 ng/J standard are being sold in Sacramento County while the majority meets the current 40 ng/J standard. Staff has reviewed the list of units certified to be compliant with the 10 ng/J standard that the SCAQMD has compiled. Because manufacturers of these ultra-low NO_x units also sell 40 ng/J units within Sacramento County, Staff finds no reason why the ultra-low NO_x units cannot be made available here; therefore this limit is feasible.

Units between 75,000 and 400,000 Btu/hr were required by SCAQMD Rule 1146.2 to meet a 40 ng/J NO_x limit beginning 2001 and will be required to meet a 14 ng/J limit beginning January 1, 2012. SCAQMD will require units between 400,000 and 2,000,000 Btu/hr to meet a limit of 14 ng/J beginning January 1, 2010. In 2006, when SCAQMD amended Rule 1146.2, they tested several types of water heaters, boilers, and process heaters to determine actual emissions. At that time they found that 46% of units between 400,000 and 2,000,000 Btu per hour and 18% of units between 75,000 and 400,000 Btu/hr had NO_x emissions lower than 20 ppmv (14 ng/J). SCAQMD allowed at least 4 years for manufacturers to produce the ultra low NO_x emitting units in order for them to be readily available to the public by the time the new standards are effective. Staff has reviewed the list of units certified to be compliant with Rule 1146.2, and the units between 75,000 and 400,000 Btu/hr that meet the 40 ng/J NO_x limit are readily available in the SCAQMD and the same manufacturers sell uncertified units in Sacramento County; therefore, this limit is feasible in our District. Because units greater than 75,000 Btu/hr are currently not required to meet the 14 ng/J NO_x limit in SCAQMD, Staff was unable to find any units guaranteed to meet this limit. The SCAQMD showed in 2006 that it is feasible for units to meet the 14 ng/J NO_x limit, and given that manufacturers who sell in the SCAQMD also sell units in Sacramento County Staff finds no reason that compliant units cannot be made available before the proposed limits become effective.

The largest group of units affected by these amendments is residential water heaters. Typically, these units are less than 75,000 Btu/hr and heat water in, on average, a 40 gallon tank to meet the hot water demands of a typical household. The heat input range between 75,000 and 1,000,000 Btu/hr that was not previously regulated by District Rule 414 generally applies to small commercial/industrial boilers and hot water heaters. These units are used in a variety of applications, including in restaurants, retail stores, schools, hotels and office buildings. Some larger residential water heaters are also affected by this rule amendment. The smaller units in this heat input range (i.e., <400,000 Btu/hr) generally use the natural draft created by

combustion of fuel and air to transfer heat to the confined water and do not rely on fans or blowers to transport either air or combustion gases. These combustion units are known as “atmospheric” and are rather simple in their operation. The larger units in this heat input range (i.e., >400,000 Btu/hr) usually resemble small boilers because water circulates through a series of water tubes or water jackets close to the flow of hot gases which are heated as the gases flow around them. Burners on these units can be either atmospheric or forced draft.

The proposed amendment will change the applicability of the rule to apply to water heaters, boilers, and process heaters fired by fuels other than natural gas. An exemption for units fired on liquid petroleum gas (LPG) is also proposed. LPG-fired water heaters are generally in use in remote parts of the county where natural gas is not available. Because there are currently no NOx standards for LPG-fired units in this size category in other districts or states, Staff has been unable to find data for units to show whether they meet the proposed limits. The 2018 planning inventory³ does not have a specific category for LPG-fired water heaters but lists all LPG residential combustion as 0.005 tpd of NOx and all LPG service and commercial combustion as 0.007 tpd of NOx. Staff contends that because of the lack of available compliant units and the low potential NOx reductions, LPG-fired units should be exempt from this rule. Units fired on other types of fuels such as wood, coal, or fuel oil, would be subject to the rule and emission standards. Staff believes there are currently very few or no units of these types currently operating in the District. The 2004 American Housing Survey for the Sacramento Metropolitan Area shows that approximately 200 households use fuel oil and 200 households use kerosene or another liquid fuel to heat water. The metropolitan area defined in this survey also includes Placer and El Dorado Counties. Both Placer and El Dorado counties are more rural than Sacramento County and Staff believes that the majority of the oil fired units operate in these areas⁴. Staff contacted Ramos Oil Company and found that they only sell kerosene and not fuel oil #2. Staff also contacted industry associations for information on whether these units are operating but received no additional information. Additionally, no comments were brought forward during the public workshop addressing this assumption. Liquid and solid fuels, because of the nitrogen and sulfur content and other fuel combustion characteristics, emit more than gaseous fuels⁵ and would not be likely to meet the proposed limits. Additionally, units fired on oil produce diesel particulates which CARB has identified as a toxic air contaminant and would add an extra health risk to the operators and near by residences. Making those fuels subject to this rule will effectively prohibit future installations of new devices using those fuels.

The proposed amendment requires that units distributed, offered for sale, sold, or installed within the District have certified NOx and CO emissions less than or equal to the limits shown in Table 1. To become certified, natural gas-fired units shall be tested in accordance with the South Coast Air Quality Management District Protocol: “Nitrogen Oxides Emission Compliance Testing for Natural Gas-Fired Water Heaters and Small Boilers” (included as Appendix E). Units fired by fuels other than natural gas seeking certification must do so using standard source testing procedures. The CO limits for the largest units ensure that efficient combustion is maintained while achieving the NOx limits.

³ CARB Ozone SIP Planning Inventory.

⁴ Even if all 400 units operated in Sacramento County, that represents less than 0.1% of the total number of units within Sacramento County.

⁵ EPA, AP-42 Emission Factors

Table 1. Proposed Emission Limits

Heat Input Range and Type	NOx Limit Nanograms per Joule of Heat Output (ppmv @ 3% O ₂)*			CO Limit ppmv @ 3% O ₂
	Effective 3/1/1997	Effective 1/1/2011	Effective 1/1/2013	Effective 1/1/2011
<u>< 75,000 Btu/hr</u> Mobile Home All others	50 40	40 (55) 10 (15)		No Limit No Limit
<u>75,000 to < 400,000 Btu/hr</u> Pool/Spa All others	No Limit No Limit	40 (55) 40 (55)	14 (20)	No Limit No Limit
<u>400,000 to < 1million Btu/hr</u> All Types	No Limit	14 (20)		400

* Where limits are shown in units of both nanograms per joule of heat output and ppmv at 3% oxygen, compliance can be demonstrated using either limit.

The proposed amendments also allow for a 6 month sell through period after the January 1, 2011 and January 1, 2013 effective dates for non-compliant units to be distributed, offered for sale, or sold. These amendments also allow for end users to install non-compliant units at any time as long as the unit met the rule requirements at the time of purchase.

EMISSIONS IMPACT

Emission Inventory

The Sacramento planning emission inventory for NOx⁶ from water heaters and small boilers with capacities less than 1,000,000 Btu/hr is presented in Table 2 for the three milestone years (2011, 2014, and 2017), the attainment year (2018) and the first year that all existing units are expected to have been replaced by the units that comply to the proposed amended limit (2029).

Table 2. Sacramento Planning Emission Inventory for Natural Gas Water Heaters and Small Boilers

EIC Code	EIC Description	NOx Emission Inventory (tpd)				
		2011	2014	2017	2018	2029
610-608-0110-0000	Residential Natural Gas Water Heating	0.9253	0.9503	0.9758	0.9847	1.0820
060-030-0110-0000	Service and Commercial Natural Gas Water Heating	0.3049	0.3092	0.3105	0.3105	0.3097
Total		1.2302	1.2595	1.2863	1.2952	1.3917

⁶ Errata Sheet to Sacramento Regional 8-Hour Ozone Plan

SCAQMD conducted surveys of water heaters and small boilers within the South Coast air basin, and documented those survey results in their staff reports for Rules 1121 and 1146.2. The results of these surveys are expected to be applicable to Sacramento County, because the ratios of residential applications to service/commercial facilities such as restaurants, retail stores, schools, hotels, and office buildings are similar as shown in Table 3. Although the District includes much less heavy industry than SCAQMD, units in industrial applications are generally larger in rated capacity than the units affected by this rule. The following information was obtained from the SCAQMD staff reports:

- 98.7 % of the affected units have capacities less than 75,000 Btu/hr
- 1.06 % of the affected units have capacities between 75,000 and 400,000 Btu/hr
- 0.215% of the affected units have capacities between 400,000 and 1,000,000 Btu/hr
- The capacity factors (the ratio of fuel actually burned to the maximum capacity) are 0.061 for units less than 75,000 Btu/hr and 0.215 for units greater than 75,000 Btu/hr
- The uncontrolled emission factors for NOx are 0.14 lb/mmBtu of heat input for units between 75,000 and 400,000 Btu/hr, and 0.17 lb/mmBtu of heat input for units between 400,000 and 1,000,000 Btu/hr (The District already limits the emissions of units less than 75,000 Btu/hr to an emission factor of approximately 0.07 lb/mmBtu of heat input)

Table 3. Commercial Industry of Los Angeles and Sacramento Counties⁷

NAICS Code	Industry Description	Establishments in Los Angeles County (2000)	Establishments in Sacramento County (2000)
42xxxx	Wholesale trade	22,105	1,263
44xxxx, 45xxxx	Retail trade	28,126	3,632
531120	Lessors of nonresidential buildings (except miniwarehouses)	1,298	99
61xxxx	Educational services	2,583	300
622xxx	Hospitals	141	16
623xxx	Nursing and residential care facilities	1,654	360
721110	Hotels (except for casino hotels) and motels	939	93
722110	Full service restaurants	5,893	795
722211	Limited-service restaurants	5,765	801
722212	Cafeterias	162	31
Total Service/Commercial		68,666	7,390
Total Housing Units		3,270,909	474,814
Total Establishments		3,441,042	482,204
% of total establishments that are residential		98.0%	98.4%

Using this information, Staff allocated the NOx emissions to the three size ranges as shown in Table 4, and to the combinations of EIC Code and size range as shown in Table 5. Sample calculations of these allocations are presented in Appendix B.

⁷ County Business Patterns: 2000, U.S. Census Bureau

Table 4. Planning Emissions Inventory Allocated to Size Ranges

Unit Size (Btu/hr)	NOx Emission Inventory (tpd)				
	2011	2014	2017	2018	2029
< 75,000	0.6923	0.7088	0.7239	0.7289	0.7832
75,000 to < 400,000	0.3126	0.3200	0.3268	0.3291	0.3536
400,000 to < 1,000,000	0.2253	0.2307	0.2356	0.2372	0.2549
Total	1.2302	1.2595	1.2863	1.2952	1.3917

Table 5. Planning Emissions Inventory Allocated to EIC Code/Size Range

EIC Code/Description	Unit Size (Btu/hr)	NOx Emission Inventory (tpd)				
		2011	2014	2017	2018	2029
610-608-0110-0000, Residential Natural Gas Water Heating	< 75,000	0.6923	0.7088	0.7239	0.7289	0.7832
610-608-0110-0000, Residential Natural Gas Water Heating	75,000 to < 400,000	0.2330	0.2415	0.2519	0.2558	0.2988
060-030-0110-0000, Service and Commercial Natural Gas Water Heating	75,000 to < 400,000	0.0796	0.0785	0.0749	0.0733	0.0548
060-030-0110-0000, Service and Commercial Natural Gas Water Heating	400,000 to < 1,000,000	0.2253	0.2307	0.2356	0.2372	0.2549
Total		1.2302	1.2595	1.2863	1.2952	1.3917

Emission Reductions

In order to estimate emission reductions, Staff assumed useful lives of affected units to be: 10 years for units less than 75,000 Btu/hr; 15 years for units between 75,000 and 400,000 Btu/hr; and 20 years for units between 400,000 and 1,000,000 Btu/hr. These lifetimes are typical for units affected by Rule 414. Table 6 shows the useful lives of units by size range and the controlled and uncontrolled emission factors each year as the rule's emission limits are implemented.

Table 6. Emission Factors and Useful Lives by Size Ranges

Unit Size (Btu/hr)	Lifetime	Emission Factor (ppm at 3% O ₂) ^a				
		2009	2010	2011	2012	2013
<75,000	10	55	15	15	15	15
75,000 to < 400,000	15	115 ^b	55	55	55	20
400,000 to < 1,000,000	20	143 ^b	20	20	20	20

^a Based on implementation dates of emission limits

^b Uncontrolled emission factors

Based on the useful lives, it was assumed that the number of units replaced each year will be: 10% of the units <75,000 Btu/hr, 6.7% of the units between 75,000 and 400,000 Btu/hr; and 5% of the units between 400,000 and 1,000,000 Btu/hr. Using these assumptions together with the

implementation schedule shown in Table 1, the percent reductions for each size range were calculated, as shown in Table 7.

Table 7. NOx Emission Reduction Percentages by Size Ranges

Unit Size (Btu/hr)	NOx Emission Reduction Percentage				
	2011	2014	2017	2018	2029
< 75,000	15%	36%	58%	65%	73%
75,000 to < 400,000	7.0%	21%	38%	43%	83%
400,000 to < 1,000,000	8.6%	21%	34%	39%	86%

Applying the emission reduction percentage to the emission inventory, the emission reductions were calculated for each size range, as shown in Table 8, and for each combination of EIC Code and Size range, as shown in Table 9. Sample calculations for the data presented in these tables are in Appendix B.

Table 8. NOx Emission Reductions by Size Range

Unit Size (Btu/hr)	NOx Emission Reductions (tpd)				
	2011	2014	2017	2018	2029
< 75,000	0.10	0.26	0.42	0.48	0.57
75,000 to < 400,000	0.02	0.07	0.12	0.14	0.29
400,000 to < 1,000,000	0.02	0.05	0.08	0.09	0.22
Total	0.14	0.38	0.63	0.71	1.08

Table 9. NOx Emission Reductions by EIC Code/Size Range

EIC Code/Description	Unit Size (Btu/hr)	NOx Emission Reductions (tpd)				
		2011	2014	2017	2018	2029
610-608-0110-0000, Residential Natural Gas Water Heating	< 75,000	0.10	0.26	0.42	0.48	0.57
610-608-0110-0000, Residential Natural Gas Water Heating	75,000 to < 400,000	0.02	0.05	0.10	0.11	0.25
060-030-0110-0000, Service and Commercial Natural Gas Water Heating	75,000 to < 400,000	0.01	0.02	0.03	0.03	0.05
060-030-0110-0000, Service and Commercial Natural Gas Water Heating	400,000 to < 1,000,000	0.02	0.05	0.08	0.09	0.22
Total		0.14	0.38	0.63	0.71	1.08

Despite the fact that staff has been unable to find evidence of non-gaseous fuel fired units operating in the District and the emissions inventory does not show any emissions from this category, Staff compared the annual NOx and PM emission output of different types of residential water heaters as shown in Table 10. Because Staff was unable to identify any retailers supplying heating oil #2 to the District we have assumed that the operator would be

firing the unit on diesel. As stated previously in the background section of this staff report burning diesel oil in water heaters, boilers and process heaters produce several air toxic contaminants adding an extra health risk to the operators and nearby residents.

Fuel	Capacity (gallons)	Input Rating (Btu/hour)	NOx Emissions (lb/year)	PM Emissions (lb/year)
Natural Gas	40	40,000	2.7	0.04
Propane	36	36,000	2.7	0.04
Diesel (Heating Oil)	40	40,000	0.50	0.06

COST IMPACT

Cost and Cost Effectiveness

Section 40703 of the California Health and Safety Code requires that districts consider and make public findings relating to the cost effectiveness of implementing an emission control measure. Section 401.1 of the proposed amendments to Rule 414 would require a manufacture to pay a Source Test Observation and Report Evaluation fee of \$1,268 if a model is certified by submitting a compliance report for a representative unit, including test results, to the District. This fee is based on Section 311 of Rule 301, Permit Fees – Stationary Source. However, based on past experience, manufacturers of natural gas-fired units have chosen to comply by submitting SCAQMD certifications. Therefore, it is unlikely that manufacturers would incur this additional cost. In addition, it is unlikely that manufacturers of liquid or solid fueled units would incur this fee because these units are not expected to achieve the proposed emission limits.

Staff contacted manufacturers of water heaters and small boilers to determine the additional costs of units meeting the proposed emission limits compared to the costs of uncontrolled units, or in the case of water heaters less than 75,000 Btu/hr, units meeting the current limit. All of the compliant units used low NOx burners to meet the proposed NOx emission standards. The additional costs of the compliant units are shown in Table 11 (see Appendix C for detailed cost information).

Table 11. Additional Costs of Compliant Units

Unit Size (Btu/hr)	Average Additional Cost of Unit (\$)
< 75,000	\$86
75,000 to < 400,000	\$1,941
400,000 to < 1,000,000	\$7,359

The cost effectiveness was calculated by dividing the annualized additional cost (using 7% interest over the useful life) of new units purchased by the annual emission reduction achieved by those units. The overall cost effectiveness of the proposed amendments is \$9.04 per pound of NOx reduced. The total cost is \$503,000 per year.

The proposed amendments will subject new oil, wood, coal, and other non-gaseous fuel fired units to the proposed standards (excluding LPG fired units). Staff has not been able to find any evidence that would show there are these types of units operating within the District. Because these types units would likely be unable to meet the proposed standards, making them applicable to this regulation would prevent these types of to be installed within the District. Oil fired units are the next most prevalent type of water heating fuel besides gas, LPG, or electric⁸. Staff has conducted an economic analysis of replacement options for an oil fired water heater with a 40 gallon capacity listed for residential use, as shown, as in Table 12. This analysis assumes a worst case scenario where the owner of the oil fired water heater owns his fuel tank and is required to have it removed. Staff was unable to find any dealers in the area that provide heating oil #2, and therefore it is assumed that anyone with an oil fired water heater in the District might be using diesel oil instead. Staff confirmed an oil fired water heater manufacturer that diesel oil can be used as an alternative fuel. Also, for these calculations Staff used the assumption that hot water use would be uniform across households despite the type of water heater in use. Because oil fired water heaters typically have a much higher input rating than natural gas, propane or electric water heaters, there is more hot water readily available. Therefore, there is the potential for families with oil fired water heaters to use more hot water than a family that has a water heater that is fueled by another fuel, which would drive up annual fuel costs and total emission output.

Table 12. Costs for Replacement of an Oil Fired Residential Water Heater

Fuel Type	Natural Gas	Propane	Electricity	Heating Oil (Diesel)
Capacity	40 gal	36 gal	40 gal	40 gal
Rated Input	40,000 Btu/hr	36,000 Btu/hr	4,500 Watts	125,000 Btu/hr
Capitol Cost	\$1,325	\$1,174	\$1,012	\$2,028
Oil Tank Removal	\$500	\$500	\$500	N/A
Annual Tank Rental	N/A	\$70	N/A	N/A
Avg. Annual Fixed Cost	\$260	\$238	\$215	\$340
Annual Fuel Cost	\$197	\$565	\$755	\$439
Total Annual Cost	\$457	\$873	\$970	\$779

This analysis shows that natural gas fired units are the least expensive alternative. If a resident is using an oil fired water heater, natural gas may be unavailable and therefore, propane or electricity may be the compliance option for new replacement of water heaters. Propane has the lowest annual cost of these options. These added costs were not added to the overall cost effectiveness calculation of this rule due because we do not have information about how many of these units are operated within Sacramento County and available information (see page 6) suggests that the number is very small or zero.

⁸ American Housing Survey for the US 2007

Incremental Cost Effectiveness

Pursuant to Health and Safety Code Section 40920.6(a)(3), the District is required to perform an incremental cost effectiveness analysis prior to adopting requirements for Best Available Retrofit Control Technology (BARCT) or a “feasible measure” requirement pursuant to HSC Section 40914. The District is required to identify one or more potential control options that achieve the emission reduction objective for the regulation. The incremental cost effectiveness of control option is the difference in cost divided by the difference in emission reduction potential compared to the next less expensive control option.

The proposed emission limits are readily achievable through the use of low NO_x burners. Two additional technologies that have been explored for larger sized boilers are flue gas recirculation (FGR) and selective catalytic reduction (SCR). Neither of these technologies is currently being applied on commercially available units less than 1,000,000 Btu/hr in capacity.

Currently, more research is being done in modifying the burners to produce less NO_x than in post-combustion control and FGR. Based on conversations with boiler manufacturers (Parker Boiler and Raypack), adding FGR to a smaller unit would result in minimal additional reductions when paired with a low NO_x burner, and would cost more than a low NO_x burner alone. SCR is not feasible in applications where units less than 1,000,000 Btu/hr are being used. SCR requires ammonia or urea for NO_x reduction and units applicable to this rule are typically used in residences and service/commercial applications where storage of these materials is impractical and could pose a health risk. Additionally, SCR is designed for industrial units that run full time and can maintain a temperature that the catalyst requires for NO_x reduction, whereas smaller units are turned on and off throughout the day and cannot maintain the required temperatures. Finally, both FGR and SCR systems require frequent maintenance for operation which may not be practical in a residential or small service/commercial setting.

SCAQMD Rule 1146.2 requires units with rated capacities between 400,000 and 1,000,000 Btu/hr and more than 15 years old to meet the same emission standards as new units. Meeting these standards requires the retrofit, or more likely, replacement of the older units. The incremental cost effectiveness of requiring this type of early replacement is \$12 per pound of NO_x reduced.

SOCIOECONOMIC IMPACT

CHSC Section 40728.5 requires a district to perform an assessment of the socioeconomic impacts before adopting, amending, or repealing a rule that will significantly affect air quality or emission limitations. The District Board is required to actively consider the socioeconomic impacts of the proposal and make a good faith effort to minimize adverse socioeconomic impacts.

CHSC Section 40728.5 defines “socioeconomic impact” to mean the following:

1. The type of industry or business, including small business, affected by the proposed rule or rule amendments.
2. The impact of the proposed rule or rule amendments on employment and the economy of the region.
3. The range of probable costs, including costs to industry or business, including small business.
4. The availability and cost-effectiveness of alternatives to the proposed rule or rule amendments.
5. The emission reduction potential of the rule or regulation.
6. The necessity of adopting, amending, or repealing the rule or regulation to attain state and federal ambient air standards.

Types of Affected Business and Industry Including Small Business

Rule 414 is a “point of sale” type rule and the source categories affected include water heater manufacturers, distributors, plumbing wholesalers, retail home supply stores, plumbers and contractors, and homeowners in the District. Since the water heaters and boilers affected by the proposed amendments are found throughout the residential and commercial sectors, a wide range of businesses and industries may be affected. There are an estimated 7,800 business establishments that may be equipped with affected units. As many as 97% of these may be small business⁹.

In the District there are approximately 550,000 residential housing units¹⁰. Not all housing units are equipped with small natural gas-fired water heaters; some may be electric or liquid petroleum gas-fired.

Employment and Economy Impacts

Based upon online searches of yellow pages, there are at least 94 retailers and 6 wholesalers/distributors of water heaters and boilers in Sacramento County. No manufacturers were identified. The proposed NOx limits will increase the cost of new units that are subject to Rule 414. There are no water heater or boiler manufacturers that are subject to this rule located in Sacramento County. Therefore, to determine the maximum impact in Sacramento County, we assume these costs are passed on to consumers in the commercial and residential sectors.

The increased costs for residents represent approximately 0.02% of the median household income. In the commercial sector, the increased cost is less than 0.003% of earnings. Using many conservative assumptions, our contractor estimated that 4.23 jobs could be lost annually due to this regulation for the entire commercial sector, which contains over 160,000 jobs. The detailed analysis can be found in Appendix D of this staff report.

⁹ U.S. Census, 2004

¹⁰ U.S. Census, 2005

Range of Probable Costs

Rule 414 is a “point of sale” type rule that will require the purchase of compliant water heaters and boilers when the existing units are replaced or when new units are added. For a typical single family dwelling, the added cost for purchasing a compliant unit is approximately \$86. Businesses in the service and commercial sector typically have larger units. The additional cost for the largest units (950,000 Btu/hr) is approximately \$9,400. For more detail on the range of probable costs see the “Cost and Cost Effectiveness” section of this staff report.

Availability and Cost Effectiveness of Alternatives

As discussed earlier in the Incremental Cost Effectiveness section, low NOx burners was the only NOx reduction technology available for water heaters, boilers, and process heaters applicable to this rule. Currently, there are no commercially available units less than 1,000,000 Btu/hr in capacity that incorporate post-combustion NOx reduction technology.

One option is to include a provision for units rated 400,000 Btu/hr and greater but less than 1,000,000 to meet the new 14 ng/J standards if it is more than 15 years old, as discussed previously in the Incremental Cost Effectiveness section of this report. Staff does not recommend this alternative at this time for two reasons:

- the additional emission reductions are small (0.03 tpd in 2018, see Appendix B) because units would be nearing the end of their useful lives and would be replaced through natural turnover; and
- units in this size range do not require District permits to operate, making existing units difficult to find and enforcement problematic.

Finally, there is the alternative to not amend the rule. This would result in no cost impacts, but would not achieve the NOx emission reductions necessary to satisfy state and federal ozone plan commitments. In addition, HSC Section 40914(b)(2) requires the District to adopt “all feasible measures”. If the rule is not amended, it would not include measures demonstrated to be feasible in the South Coast and Bay Area districts.

Emission Reduction Potential

The proposed rule will achieve a reduction of 0.71 tons per day of NOx in 2018, the federal ozone attainment year, with a reduction of 1.08 tons per day of NOx in 2029, the first year that all existing units are expected to be replaced by the lower emitting units (see discussion under the Emissions Impact section).

Necessity of Adopting the Rule

The proposed amendments to Rule 414 reduce emissions of NOx from a size range of small water heaters and boilers (75,000 – 1,000,000 Btu/hr) that is not currently controlled by District rules. The rule will also achieve further NOx reductions from water heaters with capacities less

than 75,000 Btu/hr. The amendments are necessary to meet state and federal ozone plan commitments.

OTHER FACTORS

Technological Feasibility

The proposed standards are technically feasible. The low NO_x technology is commercially available and widely used. Additionally, these standards have already been adopted by the South Coast AQMD and the Bay Area AQMD, and except for the limits proposed for 2013 (which take effect for the SCAQMD in 2012), are already in effect in SCAQMD. As documented in the SCAQMD staff report for Rule 1146.2, as of 2006, 18% of the certification tests for units between 75,000 – 400,000 Btu/hr and 44% of the certification tests for units between 400,000 and 2,000,000 Btu/hr were already meeting the 14 ng/J (20 ppmv) standard. SCAQMD currently keeps a list of well over 100 certified models that are compliant with the standards in Rules 1146.2 and 1121¹¹. Liquid and solid fuels, because of the nitrogen and sulfur content and other fuel combustion characteristics, emit more than gaseous fuels and would not be likely to meet the proposed limits. Making those fuels subject to this rule will effectively prohibit future installations of new devices using those fuels.

Enforceability

Any applicable water heater distributed, offered for sale, sold, or installed within the District must be certified in accordance with the SCAQMD Protocol (*Nitrogen Oxides Emission Compliance Testing for Natural Gas-Fired Water Heaters and Small Boilers*, January 1998) or through standard source testing procedures and in compliance with the applicable standard. Manufacturers are required to submit a compliance report to the APCO showing certification prior to sale or distribution for sale. The certification and labeling requirements ensure proper identification of compliant units at the point of sale.

Public Acceptability

The proposed standards have been adopted and implemented by the South Coast and Bay Area districts. The standards have future compliance dates to allow time for the distribution of compliant units within the Sacramento County market.

The rule will not require the replacement or retrofit of existing units. Incremental costs will be incurred when new units are purchased to replace failed units or to add new units. The majority of the affected parties will be homeowners, who will incur relatively small increases in cost. Additionally, commercial/service establishments affected by this rule will also have a relatively small increase in cost when replacing an older unit. Staff expects the rule and the associated costs to be acceptable to the public.

¹¹ SCAQMD certified equipment lists.

PUBLIC COMMENTS

Staff held a public workshop to discuss the proposed Rule 414 amendments on December 16, 2009. A public notice regarding the workshop was mailed to interested and affected parties including all permitted stationary sources, industry associations, retailers, plumbers identified through the yellow pages, and all persons who have requested to receive rulemaking notices. The notice was also published in the newspaper and posted on the District web site. The draft rule and staff report will be available for public review at that time.

Staff received several comments and questions at the workshop, as well as written comments from industry and the EPA. All comments and responses are included in Appendix E. In response to public comments, Staff has extended the effective date of the first set of standards from 6 months after adoption to January 1, 2011. Additionally, because of the current economic climate staff added a provision to allow non-compliant units to be distributed, offered for sale, or sold up to 6 months after the January 1, 2011 and January 1, 2013 effective dates in order for the industry to deplete their non-compliant stock. This section also allows for end users to install non-compliant units at any time as long as the unit complied with the rule regulations at the time of purchase.

ENVIRONMENTAL REVIEW AND COMPLIANCE

Staff finds that the proposed rules are exempt from the California Environmental Quality Act as an action by a regulatory agency for protection of the environment (Class 8 Categorical Exemption, Section 15308 State CEQA Guidelines) and because it can be seen with certainty that there is no possibility that the activity in question may have a significant adverse effect on the environment (Section 15061(b)(3), State CEQA Guidelines).

California Public Resources Code (Section 21159) requires an environmental analysis of the reasonably foreseeable methods of compliance. Compliance is expected to be achieved by the purchase of compliant equipment when new units are needed or when existing units need to be replaced at the end of their normal useful life. The proposed rules will not increase emissions and will not cause any other significant adverse effects on the environment; therefore Staff has concluded that no environmental impacts will be caused by compliance with the proposed rules.

FINDINGS

The California Health and Safety Code, Division 26, Air Resources, require local Districts to comply with a rule adoption protocol as set forth in Section 40727 of the Code. This section has been revised through legislative mandate to contain six findings that the District must make when developing, amending, or repealing a rule. These findings, effective January 1, 1992, and their definitions are listed in the table below.

Rule 414

FINDING	FINDING DETERMINATION
Authority: The District must find that a provision of law or of a state or federal regulation permits or requires the District to adopt, amend, or repeal the rule.	The District is authorized to adopt rules and regulations by the California Health and Safety Code, Sections 39659, 35666(d), 40001, 40702, 40716, 41010 and 41013. [CHSC Section 40727(b)(2)]
Necessity: The District must find that the rulemaking demonstrates that a need exists for the rule, or for its amendment or repeal.	The NOx emission reductions from the proposed amendments to Rule 414 are necessary to meet the commitment in the federal 8-hour ozone demonstration plan, submitted pursuant to Section 182(c)(2)(A) of the federal Clean Air Act and 40 CFR 51.908. In addition, the proposed amendments are necessary to satisfy the state commitment in the District's 2003 Triennial Report, and to comply with state requirements including "all feasible measures" (CHSC Section 40914), and Transport Mitigation Emission Control Requirements (17 CCR 70600). [CHSC Section 40727(b)(1)]
Clarity: The District must find that the rule is written or displayed so that its meaning can be easily understood by the persons directly affected by it.	Staff has reviewed the proposed rule amendments and determined that they can be easily understood by the affected parties. In addition, the record contains no evidence that the persons directly affected by the rule can not understand it. [CHSC Section 40727(b)(3)]
Consistency: The rule is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations.	The proposed rule amendments do not conflict with and are not contradictory to, existing statutes, court decisions, or state or federal regulations. [CHSC Section 40727(b)(4)]
Non-Duplication: The District must find that either: 1) The rule does not impose the same requirements as an existing state or federal regulation; or 2) that the duplicative requirements are necessary or proper to execute the powers and duties granted to, and imposed upon the District.	The proposed rule does not duplicate any existing state or federal laws or regulations. [CHSC Section 40727(b)(5)]
Reference: The District must refer to any statute, court decision, or other provision of law that the District implements, interprets, or makes specific by adopting, amending or repealing the rule.	Section 182(c)(2)(A) of the federal Clean Air Act, 40 CFR 51.908, and CHSC Section 40914. [CHSC Section 40727(b)(6)]
Additional Informational Requirements (CHSC Section 40727.2): In complying with CHSC Section 40727.2, the District must identify all federal requirements and District rules that apply to the same equipment or source type as the proposed rule or amendments.	There are no federal requirements or other District rules that apply to water heaters, boilers or process heaters with rated heat input capacities less than 1,000,000 Btu/hr. (CHSC Section 40727.2)

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5. Magic Yellow Pages, www.magicyellow.com, Accessed October 2009
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Appendix A
Summary of Changes
Rule 414

Existing Section Number	New Section Number	Proposed Change
Title	Same	Revised title from “Natural Gas-Fired Water Heaters” to “Water Heaters, Boilers, and Process Heaters Rated Less Than 1,000,000 Btu Per Hour” to be consistent with the expanded applicability of the rule.
101	Same	Revised purpose to reflect rule expanded applicability to water heaters, boilers, and process heaters less than 1,000,000 Btu/hr.
102	Same	Expanded applicability to include all gaseous and nongaseous fired water heaters, boilers and process heaters less than 1,000,000 Btu/hr.
110	N/A	Removed the exemption for units \geq 1,000,000 Btu/hr due to redundancy with the applicability.
111	110	Section renumbered.
112	111	Revised to maintain exemption for pool and spa heaters less than 75,000 Btu/hr. Units greater than 75,000 Btu/hr will be subject to emission standards, consistent with SCAQMD Rule 1146.2.
113	112	Limited the exemption to only apply to liquefied petroleum gas fired water heaters, boilers, and process heaters.
N/A	201	Added definition of “boiler” consistent with definition in Rule 411, NOx from Boilers, Process Heaters and Steam Generators.
201	202	Revised to define Btu as British Thermal Unit, consistent with SCAQMD Rule 1121 and BAAQMD Rule 9-6.
202	203	Revised definition of heat input, consistent with SCAQMD Rule 1121 and BAAQMD Rule 9-6.
203	204	Revised definition of heat output to reference the testing protocol, consistent with SCAQMD Rule 1121.
N/A	205	Added definition of “liquefied petroleum gas” consistent with BAAQMD Rule 8-6.
204	206	Removed “natural gas-fired” because rule is no longer applicable to only natural gas-fired units.
205	207	Section renumbered.
206	N/A	Definition of natural gas-fired water heater deleted and replaced with more general definition of water heater (Section 212).
N/A	208	Added definition of “pool/spa heater,” consistent with BAAQMD Rule 9-6.
N/A	209	Added definition of “process heater,” consistent with Rule 411, NOx from Boilers, Process Heaters and Steam Generators.

Existing Section Number	New Section Number	Proposed Change
207	210	Section renumbered.
208	211	Revised definition of “recreational vehicle” to refer to Section 18010 of the California Health and Safety Code, consistent with SCAQMD Rule 1121. This revision keeps the definition the same but now includes “a park trailer, as defined in Section 18009.3” of the California Health and Safety Code.
N/A	212	Added definition of “waste heat recovery boiler,” consistent with Rule 411, NOx from Boilers, Process Heaters and Steam Generators.
N/A	213	Reworded to define “water heater” instead of “natural gas fired water heater,” consistent with SCAQMD Rule 1121.
301	Same	Added table of NOx and CO emission standards for each type of unit subject to the rule. Limits are based on SCAQMD Rules 1121 and 1146.2. For limits that have already been implemented in SCAQMD, the limits take effect on 1/1/2011 to allow time for compliance with the new standards. The 1/1/2003 effective date for the 20 ppm limit on units between 75,000 and 400,000 Btu/hr is consistent with the date in SCAQMD Rule 1146.2.
N/A	302	Given the current economic climate, added section to allow 6 months after the 1/1/2011 and 1/1/2013 effective dates for non-compliant units to be distributed, offered for sale, or sold. End users may install the old units at any time as long as the unit complied with the rule requirements at the time of purchase. This section is similar to the sell through provision of Rule 442, Architectural Coatings.
401	N/A	Deleted section because the effective date has since passed, and because the rest of the statement duplicates Section 301.
402	401	Added more specific details regarding the required content of compliance statements. Included an option to submit an approved South Coast AQMD certification. Removed references to natural gas-fired units to reflect the rule’s expanded applicability. Added a requirement to pay a Source Test Observation and Report Evaluation fee pursuant to Section 311 of Rule 301 if a manufacturer chooses to certify a model by submitting test results to the District as opposed to submitting a SCAQMD certification.
403	402	Added a requirement to have manufactures include the manufactured year on the rating plate and shipping carton of each unit. Revised to include boilers and process heaters, consistent with rule applicability.
404	N/A	Deleted section because this calculation applies only to tank type water heaters < 75,000 Btu/hr, is included in the emissions testing protocol, and does not need to be duplicated in the rule.
405	N/A	Deleted section because this calculation is included in the emissions testing protocol and does not need to be duplicated in the rule.

Existing Section Number	New Section Number	Proposed Change
501	Same	Expanded test procedure section to include boilers and process heaters, consistent with rule applicability. Updated the protocol amendment date. Added a procedure to test applicable units not fired on natural gas.
502	Same	Expanded duration of records section to include boilers and process heaters, consistent with rule applicability.

APPENDIX B

EMISSION INVENTORY AND REDUCTION CALCULATIONS

SCAQMD conducted surveys of water heaters and small boilers within the South Coast air basin, and documented those survey results in their staff reports for Rules 1121 and 1146.2. The results of these surveys are expected to be applicable to Sacramento County, since the demand for hot water is not very sensitive to ambient temperatures, unlike other natural gas categories (such as space heating). The following information was obtained from the SCAQMD staff reports:

- 98.7 % of the affected units have capacities less than 75,000 Btu/hr
- 1.06 % of the affected units have capacities between 75,000 and 400,000 Btu/hr
- 0.215% of the affected units have capacities between 400,000 and 1,000,000 Btu/hr
- The capacity factors (the ratio of fuel actually burned to the maximum capacity) are 0.061 for units less than 75,000 Btu/hr and 0.215 for units greater than 75,000 Btu/hr
- The uncontrolled emission factors for NO_x are 0.14 lb/mmBtu for units between 75,000 and 400,000 Btu/hr, and 0.17 lb/mmBtu for units between 400,000 and 1,000,000 Btu/hr (The District already limits the emissions of units less than 75,000 Btu/hr to an emission factor of 0.07 lb/mmBtu)

EMISSION INVENTORY CALCULATIONS

Calculation of % of emissions due to each size range

Basis: 100,000 affected units

of units < 75,000 Btu/hr = $0.987 \times 100,000 = 98,700$
of units 75,000 – 400,000 Btu/hr = $.0106 \times 100,000 = 1,060$
of units 400,000 – 1,000,000 Btu/hr = $0.00215 \times 100,000 = 215$

Typical unit input ratings assumed for each size range

<75,000 Btu/hr: 40,000 Btu/hr typical
75,000 – 400,000 Btu/hr: 237,500 Btu/hr typical
400,000 – 1,000,000 Btu/hr: 700,000 Btu/hr typical

Fuel Consumed = (# of units) x (typical input rating) x (capacity factor) x (24 hrs/day)

<75,000 Btu/hr: $98,700 \times 0.04 \text{ mmBtu/hr} \times 0.061 \times 24 \text{ hrs/day} = 5,780 \text{ mmBtu/day}$
75,000 – 400,000 Btu/hr: $1,060 \times 0.2375 \text{ mmBtu/hr} \times 0.215 \times 24 \text{ hrs/day} = 1,299 \text{ mmBtu/day}$
400,000 – 1,000,000 Btu/hr: $215 \times 0.7 \text{ mmBtu/hr} \times 0.215 \times 24 \text{ hrs/day} = 777 \text{ mmBtu/day}$

Emissions = (fuel consumed) x (emission factor)

<75,000 Btu/hr: $5,780 \text{ mmBtu/day} \times 0.07 \text{ lb/mmBtu} = 405 \text{ lb/day}$
75,000 – 400,000 Btu/hr: $1,299 \text{ mmBtu/day} \times 0.14 \text{ lb/mmBtu} = 182 \text{ lb/day}$
400,000 – 1,000,000 Btu/hr: $777 \text{ mmBtu/day} \times 0.17 \text{ lb/mmBtu} = 132 \text{ lb/day}$
Total: 719 lb/day

Percentage of Emissions for Each Size Range

<75,000 Btu/hr: $100\% \times 405 \text{ lb}/719 \text{ lb} = 56.3\%$
75,000 – 400,000 Btu/hr: $100\% \times 182 \text{ lb}/719 \text{ lb} = 25.3\%$
400,000 – 1,000,000 Btu/hr: $100\% \times 132 \text{ lb}/719 \text{ lb} = 18.4\%$

Inventory allocation: sample calculation for 2018 emission inventory

Total inventory

Residential Natural Gas Water Heating: 0.985 tpd
Service/Commercial Natural Gas Water Heating: 0.311 tpd
Total: 1.296 tpd

Emission inventory allocation to each size range = (fraction of emissions) x (total emissions)

<75,000 Btu/hr: $0.563 \times 1.296 \text{ tpd} = 0.729 \text{ tpd}$
75,000 – 400,000 Btu/hr: $0.253 \times 1.296 \text{ tpd} = 0.329 \text{ tpd}$
400,000 – 1,000,000 Btu/hr: $0.184 \times 1.296 \text{ tpd} = 0.237 \text{ tpd}$

Emission inventory allocation to size range/EIC code

Assume:

- All emissions from < 75,000 Btu/hr are residential; balance of residential emissions are from 75,000 – 400,000 Btu/hr units;
- Emissions from 75,000 – 400,000 Btu/hr units that are not allocated to residential are allocated to service/commercial; and
- Emissions from units 400,000 – 1,000,000 Btu/hr are allocated to service/commercial

For 2018

Residential, < 75,000 Btu/hr: 0.729 tpd
Residential, 75,000 – 400,000 Btu/hr: $0.985 \text{ tpd} - 0.729 \text{ tpd} = 0.256 \text{ tpd}$
Service/Commercial, 75,000 – 400,000 Btu/hr: $0.329 \text{ tpd} - 0.256 \text{ tpd} = 0.073 \text{ tpd}$
Service/Commercial, 400,000 – 1,000,000 Btu/hr: 0.237 tpd

EMISSION REDUCTIONS

Emission reduction percentages are calculated using the following assumptions:

- Current emission factor for units < 75,000 Btu/hr is 55 ppm (equivalent to 40 ng/J) based on current rule limit.
- Current uncontrolled emission factor for units 75,000 – 400,000 Btu/hr is 115 ppm based on SCAQMD estimates
- Current uncontrolled emission factor for units 400,000 – 1,000,000 Btu/hr is 143 ppm based on SCAQMD estimates
- The average lifetimes of units are 10 year for units < 75,000 Btu/hr , 15 years for units 75,000 Btu/hr, and 20 years for units 400,000 – 1,000,000 Btu/hr

- Based on the average lifetimes, each year the following percentages of units get replaced: 10% for units <75,000 Btu/hr, 6.67% for units 75,000 – 400,000 Btu/hr and 5% for units 400,000 – 1,000,000 Btu/hr.

The following table shows the emission factors used for each implementation year:

Size	Lifetime	Emission Factor (ppm at 3% O ₂)				
		2009	2010	2011	2012	2013
<75,000	10	55	15	15	15	15
75,000-400,000	15	115	55	55	55	20
>400,000-<1,000,000	20	143	20	20	20	20

Weighted average emission factors

Unit lifetimes and emission factors were used to calculate the weighted average emissions factors for each year, as described below.

Sample calculations for 2018

For units < 75,000 Btu/hr, 9 years x 10% = 90% of the units have been replaced with units having an emission factor of 15 ppm. The remaining 10% have an emission factor of 55 ppm.

Weighted average emission factor = $(0.9 \times 15 \text{ ppm}) + (0.1 \times 55 \text{ ppm}) = 19 \text{ ppm}$

Note: By 2019, all of the older units will have been replaced by newer units having an emission factor of 15 ppm so the weighted average emission factor will be 15 ppm for 2019 and beyond.

For units 75,000 – 400,000 Btu/hr, 3 years x 6.67% = 20% of the units have been replaced with units having an emission factor of 55 ppm, and 6 years x 6.67% = 40% of the units have been replaced with units having an emission factor of 20 ppm. The remaining 40% have an emission factor of 115 ppm.

Weighted average emission factor = $(0.2 \times 55 \text{ ppm}) + (0.4 \times 20 \text{ ppm}) + (0.4 \times 115 \text{ ppm}) = 65 \text{ ppm}$

Note: By 2028, all of the older units will have been replaced by newer units with an emission factor of 20 and the weighted average emission factor will be 15 ppm for 2019 and beyond.

For units 400,000 – 1,000,000 Btu/hr, 9 years x 5% = 45% of the units have been replaced with units having an emission factor of 20 ppm. The remaining 55% have an emission factor of 143 ppm.

Weighted average emission factor = $(0.45 \times 20 \text{ ppm}) + (0.55 \times 143 \text{ ppm}) = 87.65 \text{ ppm}$

Note: By 2029, all of the older units will have been replaced by newer units having an emission factor of 20 ppm so the weighted average emission factor will be 20 ppm for 2029 and beyond.

The weighted average emission factors for 2009 (before implementation), the three milestone years, the attainment year, and the first full year of implementation are shown in the table below.

Size	Weighted Avg Emission Factor (ppm at 3% O ₂)					
	2009	2011	2014	2017	2018	2029
<75,000	55.00	47.00	35.00	23.00	19.00	15.00
75,000-400,000	115.00	107.00	90.33	71.33	65.00	20.00
>400,000-<1,000,000	143.00	130.70	112.25	93.80	87.65	20.00

Emission reduction percentages

Emission reduction percentages for each year were calculated using the weighted average emission factor for that year and the emission factor for 2009 (i.e., before the amended limits take effect).

$$\text{Emission reduction \%} = 100\% \times [1 - (\text{weighted average emission factor}) / (\text{2009 emission factor})]$$

Sample calculation for 2018

$$<75,000 \text{ Btu/hr: } 100\% \times (1 - 19/55) = 65.5\%$$

$$75,000 - 400,000 \text{ Btu/hr: } 100\% \times (1 - 65/115) = 43.5\%$$

$$400,000 - 1,000,000 \text{ Btu/hr: } 100\% \times (1 - 87.65/143) = 38.7\%$$

The emission reduction percentages for the three milestone years, the attainment year, and the first full year of implementation are shown in the table below.

Size	Emission Reduction Percentages				
	2011	2014	2017	2018	2029
<75,000	14.55%	36.36%	58.18%	65.45%	72.73%
75,000-400,000	6.96%	21.45%	37.97%	43.48%	82.61%
>400,000-<1,000,000	8.60%	21.50%	34.41%	38.71%	86.01%

Emission Reductions

Emission reductions for each year were calculated by multiplying the emission inventory for that year by its corresponding emission reduction fraction.

Sample calculation for 2018

$$<75,000 \text{ Btu/hr: } 0.6545 \times 0.729 \text{ tpd} = 0.477 \text{ tpd}$$

$$75,000 - 400,000 \text{ Btu/hr: } 0.4348 \times 0.329 \text{ tpd} = 0.143 \text{ tpd}$$

$$400,000 - 1,000,000 \text{ Btu/hr: } 0.3871 \times 0.237 \text{ tpd} = 0.092 \text{ tpd}$$

$$\text{Total: } 0.683 \text{ tpd}$$

The emission reductions for the three milestone years, the attainment year, and the first full year of implementation are shown in the following table.

Size	Emission Reductions (tpd)				
	2011	2014	2017	2018	2029
<75,000	0.1007	0.2578	0.4212	0.4771	0.5696
75,000-400,000	0.0217	0.0686	0.1241	0.1431	0.2921
>400,000-<1,000,000	0.0194	0.0496	0.0810	0.0918	0.2192
Total	0.1418	0.3760	0.6263	0.7120	1.0810

Potential Emission Reductions from Early Mandatory Replacement

Using the assumption that a unit rated at > 400,000 Btu/hr has a 20 year life span, then approximately 1/20 (5%) of the total units should would replaced each year. Under the early replacement scenario, units more than 15 years old would be required to meet the new emission standards, with a turnover rate of 1/15 (6.7%).

Units > 400,000 Btu/hr have an uncontrolled emission rate of 143 ppmv at 3% O₂ and new units will be required to have an emission rate of 20 ppmv at 3% O₂.

By 2018 (the attainment year), there will have been 9 years of turnover to units that comply with the new emission limit. With a natural rate of turnover, there will still be 11 years of turnover left until all units meet the new standard. However, under the early replacement scenario, there will be 6 years left until all units are meeting the new standard. The difference in the percent emission reduction in 2018 is:

$$[(\text{Average EF, 20 year scenario}) - (\text{Average EF, 15 year scenario})]/(\text{Uncontrolled EF})$$

$$100\% \times [(9 \times 20 \times 1/20 + 11 \times 143 \times 1/20) - (9 \times 20 \times 1/15 + 6 \times 143 \times 1/15)]/143 = 12.9\%$$

As shown in Table 4 of the Emission Inventory section, the 2018 emission inventory for units rated >400,000 Btu/hr but less than 1,000,000 Btu/hr is 0.2372 tpd of NO_x. Therefore the additional NO_x reduction from early replacement is 12.9% of 0.2372 tpd or 0.03 tpd of NO_x.

APPENDIX C

COST INFORMATION AND CALCULATIONS

Staff estimated increased costs for waters heaters and boilers that comply with the proposed limits. Such units are currently being sold within the South Coast Air Quality Management District.

Units Between 75,000 and 1,000,000 Btu/hr

Currently, the District has no NOx standards for units between 75,000 and 1,000,000 Btu/hr; therefore, uncontrolled units can be purchased and installed instead of their more expensive low NOx counterparts. Staff contacted the following manufacturers in December 2008 to obtain cost quotes for standard and low NOx units, with otherwise comparable features, in varying size ranges:

- Parker Boiler – Contact: Greg Danehauer, (323) 727-9800
- Raypack – Contact: Richard Nash, (805) 278-5335
- Rite Boilers – Contact: Jack Coe (502) 862-2135

The cost quotes are shown below.

Parker

Parker Hot Water Boiler, 970,000 Btu/hr	
	Initial Cost
Standard	\$10,100
Low NOx	\$19,000
Difference	\$8,900

Parker Hot Water Boiler, 600,000 Btu/hr	
	Initial Cost
Standard	\$6,700
Low NOx	\$12,500
Difference	\$5,800

Parker Hot Water Boiler, 400,000 Btu/hr	
	Initial Cost
Standard	\$6,100
Low NOx	\$12,000
Difference	\$5,900

Raypak

Raypak Hot Water Boiler, 999,000 Btu/hr	
	Initial Cost
Standard	\$11,729
Low NOx	\$21,211
Difference	\$9,482

Raypak Hot Water Boiler, 750,000 Btu/hr	
	Initial Cost
Standard	\$10,388
Low NOx	\$17,316
Difference	\$6,928

Raypak Hot Water Boiler, 500,000 Btu/hr	
	Initial Cost
Standard	\$9,047
Low NOx	\$14,066
Difference	\$5,019

Raypak Hot Water Boiler, 181,000 Btu/hr	
	Initial Cost
Standard	\$4,692
Low NOx	\$5,173
Difference	\$481

Rite

Rite Hot Water Boiler, 900,000 Btu/hr	
	Initial Cost
Standard	\$8,500
Low NOx	\$18,250
Difference	\$9,750

Rite Hot Water Boiler, 760,000 Btu/hr	
	Initial Cost
Standard	\$7,500
Low NOx	\$16,850
Difference	\$9,350

Rite Hot Water Boiler, 480,000 Btu/hr	
	Initial Cost
Standard	\$6,650
Low NOx	\$11,100
Difference	\$4,450

The cost quotes were grouped into narrow size ranges and averaged, as shown below:

Cost Difference, 900,000 - 1,000,000 Btu/hr				
	Btu/hr	Standard Cost	Low NOx Cost	Difference
Parker	970,000	\$10,100	\$19,000	\$8,900
Raypak	999,000	\$11,729	\$21,211	\$9,482
Rite	900,000	\$8,500	\$18,250	\$9,750
Average	956,333	\$10,110	\$19,487	\$9,377

Cost Difference, 600,000 - 760,000 Btu/hr				
	Btu/hr	Standard Cost	Low NOx Cost	Difference
Parker	600,000	\$6,700	\$12,500	\$5,800
Raypak	750,000	\$10,388	\$17,316	\$6,928
Rite	760,000	\$7,500	\$16,850	\$9,350
Average	703,333	\$8,196	\$15,555	\$7,359

Cost Difference, 400,000 - 500,000 Btu/hr				
	Btu/hr	Standard Cost	Low NOx Cost	Difference
Parker	400,000	\$6,100	\$12,000	\$5,900
Raypak	500,000	\$9,047	\$14,066	\$5,019
Rite	480,000	\$6,650	\$11,100	\$4,450
Average	460,000	\$7,266	\$12,389	\$5,123

The cost difference of \$7,359 was chosen as representative of the midpoint (700,000 Btu/hr) of the 400,000 – 1,000,000 Btu/hr units

To estimate the cost difference at the midpoint (240,000 BTU/hr) of the 75,000 – 400,000 units, the data were interpolated between the values for a 181,000 Btu/hr unit and a 400,000 Btu/hr unit.

Cost Difference, 75,000 - 400,000 Btu/hr (240,000 Interpolated)				
	Btu/hr	Standard Cost	Low NOx Cost	Difference
Parker	400,000	\$6,100	\$12,000	\$5,900
Raypak	181,000	\$4,692	\$5,173	\$481
Interpolated	240,000	\$5,071	\$7,012	\$1,941

Units < 75,000 Btu/hr

There are hundreds of different models of residential water heaters < 75,000 Btu/hr sold within the District. These models must comply with the current Rule 414 NOx limit of 40 ng/J of heat output. Similarly, there are hundreds of models of such residential water heaters sold within the South Coast AQMD that must comply with a NOx limit of 10 ng/J of heat output. To estimate the additional cost of residential water heaters within the District due to adoption of the 10 ng/J NOx limit, Staff compared vendor quotes in SMAQMD and compared them to vendor quotes for

the same manufacturers in SCAQMD. Such a comparison can be complicated by possible differences in quality and features of the units being compared, as well as differences in market conditions between the two areas. Nevertheless, Staff considered this analysis as the most reasonable method to estimate the cost difference.

Residential water heaters are typically 40,000 Btu/hr with a water storage capacity of 40 – 50 gallons. The vendor quotes for three brands of water heaters – American, A.O. Smith, and Bradford White – are shown below.

A.O. Smith – SMAQMD

Model	Btu/hr	Cost
GVR – 40 gallon	40,000	\$717
GVR – 50 gallon	40,000	\$756
Mean		\$737

A.O. Smith – SCAQMD

Model	Btu/hr	Cost
GCNH – 40 gallon	40,000	\$811
GCHH – 50 gallon	40,000	\$851
GNR – 40 gallon	40,000	\$879
GNR – 50 gallon	40,000	\$920
Mean		\$865

American Water Heaters – SMAQMD

Model	Btu/hr	Cost
BFG62-40T0-NOV	40,000	\$526

American Water Heaters – SCAQMD

Model	Btu/hr	Cost
Ultra low NOx	40,000	\$555
UG Series	40,000	\$479
Mean		\$517

Bradford White – SMAQMD

Model	Btu/hr	Cost
M-1 Series	40,000	\$354
M-4 Series	40,000	\$382
Mean		\$368

Bradford White – SCAQMD

Model	Btu/hr	Cost
U440T6FRN	40,000	\$505

Based on the quotes above, the increased cost for units in SCAQMD vs. SMAQMD, per manufacturer, are as follows:

- A.O. Smith: \$129
- American: -\$9

– Bradford White: \$137

The mean cost difference for all three manufacturers is \$86.

Total Cost and Cost Effectiveness

Uncontrolled Emissions per Unit

Size Range (Btu/hr)	Midpoint Size (mmBtu/hr)	NOx Emission Factor (lb/mmBtu)	Capacity Factor	NOx Emissions (lb/day)
<75,000 Btu/hr	0.04	0.067	0.061	0.00393
≥75,000 and <400,000	0.24	0.140	0.215	0.174
≥400,000 and <1,000,000	0.7	0.174	0.215	0.63

Controlled Emissions per Unit

Size Range (Btu/hr)	Midpoint Size (mmBtu/hr)	NOx Emission Factor (lb/mmBtu)	Capacity Factor	NOx Emissions (lb/day)
<75,000 Btu/hr	0.04	0.0182	0.061	0.00107
≥75,000 and <400,000	0.24	0.0243	0.215	0.0301
≥400,000 and <1,000,000	0.7	0.0243	0.215	0.0878

Total Cost and Cost Effectiveness

Size Range and Type	NOx reduction per unit (lb/year)	Annualized Cost per Unit (\$/year)	Number of Units Replaced per Year	Total Emission Reductions (lb/year)	Total Cost per year	Cost Effectiveness per lb of NOx Reduced
Residential <75,000 Btu/hr	1.04	\$12.19	35,240	36,650	\$429,576	
Residential ≥75,000 and <400,000 Btu/hr	52.5	\$213.10	179	9,398	\$38,145	
Service and Commercial ≥75,000 and <400,000 Btu/hr	52.5	\$213.10	46	2,415	\$9,803	
Service and Commercial ≥400,000 and <1,000,000 Btu/hr	198	\$694.67	36	7,128	\$25,008	
Total				55,591	\$502,532	\$9.04

Appendix D

Socioeconomic Impacts

The following table shows the industries and associated NAICS codes that Staff has determined are associated with the service and commercial industry that would purchase units subject to this regulation. The table also shows the number of establishments and the percent of those establishments that would qualify as small businesses according to the 2004 U.S. Census.

NAICS code	Industry Description	Number of Estab. (2004)	Number of Employees (2004)		Percent Small	
			10 or fewer	100 or fewer	10 or fewer	100 or fewer
42----	Wholesale Trade	1,312	834	1,284	64%	98%
44---- and 45----	Retail Trade	3,802	2,432	3,667	64%	96%
531120	Lessors of Nonresidential Buildings (except Miniwarehouses)	100	89	100	89%	100%
61----	Educational Services	356	212	343	60%	96%
662---	Hospitals	16	1	1	6%	6%
623---	Nursing and Residential Care Facilities	390	229	363	59%	93%
721110	Hotels (except Casino Hotels) and Motels	98	30	84	31%	86%
722110	Full Service Restaurants	831	446	814	54%	98%
722211	Limited Service-Restaurants	879	375	872	43%	99%
722212	Limited Service-Cafeterias	44	27	43	61%	98%
Sum		7,828	4,675	7,571	60%	97%

Eastern Research Group, under contract with the District, requested from the Bureau of Economic Analysis a special run of the regional input output modeling system to analyze the socioeconomic effects of the proposed amendments to Rule 414. The analysis looked at three different types of economic effects as a result of the amendments. First, direct effects are associated with the change in on-site jobs and new purchases needed to build and operate the project. Next, indirect effects occur as local businesses spend their new revenue to re-stock and pay their employees. Finally, induced effects result when employees spend their income. Induced effects are shown in the following tables as “residential”. The losses shown here are associated with the entire economy because an additional portion of residents income must be spent on compliant water heaters manufactured outside of Sacramento County instead of being spent in the on other goods and services within the County.

Industry Description	Annual Loss in Output	Annual Loss in Earnings	Annual Employment Loss
Residential	\$584,470	\$122,672	3.63
Wholesale Trade	\$9,838	\$2,385	0.05
Retail Trade	\$30,358	\$7,594	0.26
Lessors of Nonresidential Buildings	\$690	\$92	0.00
Educational Services	\$3,235	\$991	0.03
Hospitals	\$133	\$39	0.00
Nursing and Residential Care Facilities	\$3,395	\$1,168	0.04
Hotels (except Casino Hotels) and Motels	\$853	\$294	0.01
Full Service Restaurants	\$6,785	\$1,882	0.10
Limited Service-Restaurants	\$7,177	\$1,991	0.10
Limited Service-Cafeterias	\$359	\$100	0.01
SUM	\$647,293	\$139,209	4.23

In order to put these numbers into perspective, we can compare the losses with the overall totals for each category. First, the 2004 U.S. Census reports that there are over 160,000 jobs in the commercial sector for Sacramento County. The job loss estimated as a result of these proposed amendments represents only 0.003% of the total commercial sector jobs. Loss in output can be compared to the gross domestic product (GDP) for the commercial sector in the Metropolitan area. The GDP is not required to be reported and therefore there is only information for certain commercial sectors which include retail trade, educational services, accommodation, and food services and drinking places. The total GDP for these sectors is \$9.27 billion. Because not all sectors were included in the GDP total, this is a conservative estimate. The estimated loss in output represents only 0.01% of the total output of these commercial sectors. Finally, annual loss in earnings is compared to total earnings. Because total earnings are not required to be reported, these data are not available. As a proxy for total earnings, we will use the annual payroll data from the 2004 U.S. Census. Because payroll is less than the earnings, this will result in an overestimate of the total impact. The total payroll for the commercial sector in Sacramento County is \$4.8 billion; therefore the total loss in earnings is less than 0.003% of the total earnings.

The median household income for Sacramento County is \$57,779 (U.S. Census Bureau, 2006-2008 American Community Survey). The average increase in cost of a compliant residential water heater, \$86, amortized over the estimated 10-year life of the unit (7% interest rate), represents approximately 0.02% of the median household income.

Appendix E

Public Comments

EPA Comments (December 7, 2009)

Comment #1: We recommend that the exemption for pool/spa heaters with a heat input less than 75,000 Btu/hr found in Section 111 be eliminated. For example, SJV Rule 4902 eliminates this exemption effective 1/1/2010.

Response: Three districts – Bay Area, Yolo-Solano, and San Joaquin – have recently amended their rules pertaining to water heaters rated less than 75,000 Btu/hr to be essentially consistent with the standards first adopted by the South Coast AQMD. However, there has been no consensus on whether pool/spa heaters with a heat input less than 75,000 Btu/hr should be exempt from the standards. In the South Coast district, and now in the San Joaquin district, these units are not exempt. In the Yolo-Solano and Bay Area districts, these units are exempt. We reviewed the web sites of 5 major manufacturers of pool/spa heaters (Hayward, Laars, Pentair, Raypak, and Jandy) and one large retailer of pool and spa supplies (Best Buy Pool Supply) to determine the number of models/sizes of pool/spa heaters being manufactured or offered for sale. Of the 92 models and sizes identified, only 4 had an input rating of 75,000 Btu/hr or less. In addition, 4 of the web sites had heater sizing charts for various sizes of pools and spas, with none recommending heaters smaller than 100,000 Btu/hr for even the smallest pools and spas.

After consideration of this information, while we have proposed to subject all pool/spa heaters rated 75,000 Btu/hr or greater to NO_x emission limits, we are proposing to exempt pool/spa heaters rated less than 75,000 Btu/hr. This exemption will have a minimal effect on the emission reductions that will be achieved by the rule amendments.

Comment #2: The District should consider changing the compliance deadline of 1/1/2013 to an earlier date similar to SJV Proposed Rule 4308 (November 5, 2009) which has a compliance deadline of 1/1/2011. The extended compliance deadline for Sacramento seems unnecessary since compliant equipment should be available sooner nearby to adhere with SJV 4308.

Response: The standard in question is the 14 ng/J NO_x limit for units rated greater than or equal to 75,000 Btu/hr and less than 400,000 Btu/hr. This standard was originally developed by the South Coast AQMD, and they have set a compliance date of January 1, 2012. We have proposed a compliance date of January 1, 2013 so that we can evaluate whether there are any early problems with manufacture, certification, or availability of units meeting this standard in the South Coast district. Our proposed compliance date is the same as that established by the Bay Area district, and one year earlier than the date established by the Yolo-Solano district.

Manufacturers typically certify their units in the South Coast district. In our past experience with Rule 414, manufacturers have certified their units in our district by submitting the appropriate South Coast AQMD certifications, as opposed to submitting test results directly to us. Other districts, including Bay Area and Yolo-Solano, also accept the South Coast certifications. Setting a compliance date earlier than the date required by the South Coast district would put an additional burden on manufacturers to first undergo the certification process in our district. For these reasons, we continue to propose a compliance date of January 1, 2013.

Air-Conditioning, Heating, And Refrigeration Institute (AHRI) Comments (December 15, 2009)

Comment #1: We are concerned that the expansion of this rule to include equipment fired by nongaseous fuels has not been adequately analyzed or justified. The staff report expresses the belief that there are currently no units fired by wood, coal or fuel oil operating in the District. If that is correct then what is the need to regulate products not being used in the District. There are no emission reductions to be achieved by such a regulation. Conversely, if the staff report is in error and, for example, there are some oil-fired water heaters or boilers operating in the District then applying a rule developed for gas-fired products without further analysis of the differences between oil-fired and gas-fired products is inappropriate.

Response: Staff was unable to find any additional evidence that would show there are units that fire on non-gaseous fuels operating in the District. This rule only applies to new units and therefore having the emission standards apply to units fired on non-gaseous fuel will prevent any of these high emitting units from being installed within the District in the future. Staff has done an economic analysis of converting to a natural gas, LPG, or electric powered unit from an oil fired unit, which can be found in the cost impact section of this staff report.

Comment #2: The proposed 6 month delay in the effective date of the revised NOx emissions limits is too short for the expanded scope of this amended rule. While it is more likely that residential gas storage water heaters can clear through the distribution chain and clear inventory in six months, the other types of water heaters and boilers proposed to be added to this rule are not sold and installed anywhere near the frequency as that of residential storage water heaters. The staff report estimates that less than 2% of the units affected by this rule will be those with inputs in the range of 75,000 to 1,000,000 Btu/hr. Distributors and wholesalers will still have to stock some of these units, but with significantly less demand, some of these units will sit in inventory for more than 6 months. If this rule continues to be implemented at “point of sale,” we recommend a 12 month sell through period. The better solution would be to apply the rule to the date of manufacture, then to make the revised rule effective six months after it is

adopted. This is the implementation process that has been successfully used in the SCAQMD.

Response: Staff has extended the effective date from 6 months after adoption to January 1, 2011. Additionally, because of the current economic climate Staff has added a sell through provision that allows retailers and distributors to distribute, offer for sale, or sell non-compliant units for up to 6 months after the January 1, 2011 and January 1, 2013 effective dates. This will allow distributors and retailers a little over 16 months from the proposed adoption date of February 18, 2010. Based on comments at the public workshop, Staff feels this is adequate time for the retailers and distributors to sell through their non-compliant stock.

Public Workshop (December 16, 2009)

Participants:

George Contos	June Livingston	Don Thomas
Laura King	Elaine Wong	Josh Slade
Harry Moos	Jeff Alkire	Jeff Uhler
Lionel Wade	A. Saracen	Kevin Weddle
S. Wendy		

Comment #1: Is the certification testing something that plumbers need to perform?

Response: No, the certification testing is performed by the manufacturer in order to verify the emission rates of new units.

Comment #2: If a unit meets SCAQMD standards will it meet the proposed standards for this rule?

Response: Yes. Additionally, the District accepts SCAQMD certification for emission verification of new units.

Comment #3: The additional cost for units <75,000 Btu/hr to meet the proposed standards is higher than \$86 as stated in the staff report.

Response: Staff used the best information available to calculate the additional costs of units to meet the proposed standards. If you would like to provide more cost information please send it to the District so we can reevaluate the cost calculations. (As of January 14, 2010 Staff has not received any additional information.)

Comment #4: Based on what I have seen on the market District Staff is accurate in the cost differentials between current units and units that would meet the proposed standards.

Response: Thank you for your comment.

Comment #5: Direct vent and power vent units should be excluded from this rule. There are no units available that can meet the proposed standards. You should

examine how the Bay Area Air Quality Management District (BAAQMD) rule handles direct vent and power vent units.

Response: BAAQMD Rule 9-6 requires direct vent, power vent, and direct power vent units rated < 75,000 Btu/hr to meet a standard of 10 ng/J on January 1, 2011. Based on comments received during the public process, Staff has delayed the first effective date from 6 months after adoption to January 1, 2011 (about 10 months after the proposed adoption date). This would match the BAAQMD requirement for units rated < 75,000 Btu/hr. Staff talked with a manufacturer of water heaters and they confirmed that a power vent water heater that meets the 10 ng/J would be available by March 2010. Power vent, direct vent, and power direct vent units \geq 75,000 Btu/hr and < 400,000 Btu/hr currently have to meet a 40 ng/J standard in the BAAQMD and will have to meet a 14 ng/J standard on January 1, 2013 which is consistent with the proposed amendments to Rule 414. Finally, power vent, direct vent, and power direct vent units must currently meet a standard of 20 ng/J in the BAAQMD and a standard of 14 ng/J in 2013. In the SCAQMD these units must currently meet a standard of 14 ng/J. Staff feels the technology for emission reduction is or will be available for power vent, direct vent, and power direct vent in time to have compliant units available by the effective dates proposed in the rule.

Comment #6: We would like a minimum 6 month sell through period where retailers, distributors, and dealers can sell through their non-compliant stock.

Response: Staff has added a sell through period of 6 months after the January 1, 2011 and the January 1, 2013 effective dates for non-compliant units to be distributed, offered for sale, and sold.

Comment #7: If a unit that is under warranty must be replaced, does it have to be replaced with a compliant unit? If it does have to be replaced with a compliant unit, who will be responsible for the additional costs?

Response: A replacement unit is considered a new unit. If the new unit is purchased or distributed after the effective dates in Section 301 of this rule, it must meet the corresponding standard based on size and type. The issue of who pays the additional cost is determined by the terms of the warranty.

Plumbing-Heating-Cooling Contractors of California (PHCC) Comments (December 22, 2009)

Comment #1: Power vent, power direct vent and direct vent water heaters should be excluded. No manufacturers currently produce these models.

Response: See response to public workshop comment #5.

Comment #2: Timing is everything. Please allow 6 months after the effective date of Rule 414 and the date on the plate for inventories to be depleted. This is

not much time, but it reduces some concerns with a model or two that does not move. Typically, it takes 10 or 11 months to flush out complete inventories.

Response: See response to public workshop comment #6.

Comment #3: Remember that major manufacturers such as Bradford White, State, AO Smith, and Rheem need time to implement production, as California is the only one state that requires this, to my knowledge. I would suggest at least 10 months.

Response: Staff changed the effective date of the first set of standards to January 1, 2011 instead of 6 months after the adoption date. If the proposed amendments are adopted at the February board meeting the effective date will be a little over 10 months.

Appendix F
South Coast AQMD Emission Testing Protocol