

# **FINAL STAFF REPORT**

## **Rule 3.17- Wood Heating Devices**

Date of Release: September 5, 2009

### **Schedule of Meetings**

Rule 3.17 Workshop: August 26, 2009

Public Hearing: October 5, 2009

**STAFF REPORT**

***Wood Burning Appliances***

Date of Release: July 21, 2009

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## **EXECUTIVE SUMMARY**

The District first adopted Rule 3.17 in June of 1996 to reduce emissions from residential wood heating devices. The provisions of Rule 3.17 as adopted exclude fireplaces from the emission standards. Traditional uncontrolled fireplaces are usually one of two types: site installed masonry fireplaces and factory built fireplaces. These units are used primarily for aesthetic purposes or to provide space heating. The main source of emissions from these units is from incomplete combustion. Traditional uncontrolled fireplaces are less efficient at space heating than certified wood stoves, pellet stoves, masonry heaters, fireplace inserts, or an alternative fuel fireplace such as natural gas or electric.

According to the U.S. Environmental Protection Agency (EPA), particulate matter has been proven to cause significant health problems including respiratory symptoms, aggravated asthma, irregular heartbeat, and premature death. The District is not attaining National and State Ambient Air Quality Standards (AAQS) for particulate matter. The majority of wintertime particulate matter emissions can be attributed to residential wood combustion. Therefore, it is necessary to reduce emissions from wood heating appliances to attain the AAQS and ensure healthy air in Yuba and Sutter Counties.

The proposed amendments to Rule 3.17 would require newly installed fireplaces to comply with the same emission standards as other wood heating appliances. The proposed amendments would also define unseasoned wood and prohibit the burning of unseasoned wood. The proposed amendments would also modernize several sections of the Rule that are no longer valid and align the format and sections of the Rule to be consistent with other District rules.

The adopted Rule 3.17 included a provision to allow the Air Pollution Control Officer (APCO) to curtail wood burning in the District when the PM10 ambient air quality was forecasted to exceed the AAQS. The proposed amendments seek to modify that provision to allow the APCO to recommend actions to the public based on the forecasted ambient air quality. These recommended actions vary from those which allow wood burning, to recommending residents that are able use another fuel for space heating do so. The District believes that issuing the wood burning advisory as a regular occurrence during the wintertime months, like the ozone forecast is issued during summer, would increase the public's awareness of the impacts of wood combustion.

## **PURPOSE**

The purposes of the proposed amendments to Rule 3.17 are: to reduce inhalable coarse particle (PM10) and fine particle (PM2.5) emissions from residential wood heating devices; require fireplaces to achieve the same emission limits as other wood burning appliances; increase public awareness regarding the issue of particle pollution; and align Rule 3.17 with other District Rules to increase understanding and readability.

## **BACKGROUND**

### **Health Impacts of PM10 and PM2.5**

Particulate matter (PM), generated from wood combustion, is composed of very small droplets of condensed organic vapors of wood and tar gasses. These particles are so small it allows them to be inhaled deep into the lungs. Adverse health effects are linked to particles that are less than 10 microns in diameter (PM10), and the subset of fine particles that are less than 2.5 microns in diameter (PM2.5). According to the U.S. Environmental Protection Agency (EPA), health studies have linked exposure to PM, 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
- Aggravated asthma
- Development of chronic bronchitis
- Irregular heartbeat
- Nonfatal heart attacks; and
- Premature death in people with heart or lung disease

Exposure to PM pollution can cause coughing, wheezing, and decreased lung function even in otherwise healthy children and adults. EPA estimates that thousands of elderly people die prematurely each year from exposure to fine particles. In addition, a recent study (Dominici et. al, 2006) of the correlation between PM2.5 concentrations and hospital admission rates concluded that short-term exposure to PM2.5 increases the risk of hospitalization for cardiovascular and respiratory diseases.

### State and National Ambient Air Quality Standards (AAQS)

The Feather River Air Quality Management District (District) is currently designated nonattainment for the State AAQS for PM<sub>10</sub>. The standard is 50 micrograms per cubic meter (µg/m<sup>3</sup>) averaged over a 24 hour period, and 20 µg/m<sup>3</sup> as an annual arithmetic mean. Table 1 below lists the 1<sup>st</sup> and 2<sup>nd</sup> highest daily PM<sub>10</sub> measurements from the Yuba City monitoring site for years 2005, 2006, and 2007.

Table 1: PM<sub>10</sub> 1<sup>st</sup> and 2<sup>nd</sup> Highest Readings 2005-2007

	2005	µg/m <sup>3</sup>	2006	µg/m <sup>3</sup>	2007	µg/m <sup>3</sup>
1 <sup>st</sup> High	Oct 13 <sup>th</sup>	60.0	Nov 1 <sup>st</sup>	66.0	Jan 24 <sup>th</sup>	54.0
2 <sup>nd</sup> High	Dec 12 <sup>th</sup>	54.0	Sept 26 <sup>th</sup>	54.0	Dec 14 <sup>th</sup>	45.6

Note: 2008 data was not included due to the June/July wildfires. The District is currently working with ARB and EPA to have this data flagged as exceptional events.

The District has been proposed nonattainment for the National PM<sub>2.5</sub> AAQS. The 24 hour standard was lowered in 2006 from 60 µg/m<sup>3</sup> to 35 µg/m<sup>3</sup>. Table 2 lists the 1<sup>st</sup> and 2<sup>nd</sup> highest PM<sub>2.5</sub> measurements from the Yuba City monitoring site for years 2005, 2006, and 2007.

Table 2: PM<sub>2.5</sub> 1<sup>st</sup> and 2<sup>nd</sup> Highest Readings 2005-2007

	2005	µg/m <sup>3</sup>	2006	µg/m <sup>3</sup>	2007	µg/m <sup>3</sup>
1 <sup>st</sup> High	Dec 12 <sup>th</sup>	45.0	Nov 1 <sup>st</sup>	42.0	Jan 27 <sup>th</sup>	45.0
2 <sup>nd</sup> High	Dec 6 <sup>th</sup>	42.0	Dec 25 <sup>th</sup>	41.0	Dec 15 <sup>th</sup>	42.0

Note: 2008 data was not included due to the June/July wildfires. The District is currently working with ARB and EPA to have this data flagged as exceptional events.

### Emission Inventory

The 2005 emission inventory for the District shows that residential wood combustion makes a total of 28% of the wintertime PM<sub>2.5</sub> emissions inventory and 12% of the wintertime PM<sub>10</sub> inventory.

Table 3: Wintertime PM<sub>2.5</sub> Emission Inventory in Tons Per Day (tpd)

Source	PM <sub>10</sub> Emissions	% of Total	PM <sub>2.5</sub> Emissions	% of Total
All sources except natural	19.083 tpd		7.860 tpd	
Res Wood Comb	2.315 tpd	12%	2.229 tpd	28%

The majority of the wintertime PM<sub>2.5</sub> emissions are generated from areawide sources. Areawide sources include residential fuel combustion, managed burning and disposal, paved road dust, unpaved road dust, farming operations, solvent evaporation, and construction and demolition. Of the wintertime areawide emissions, residential wood combustion is the largest source with 37% of the total.

Chart 1: Wintertime Emission of PM<sub>2.5</sub>

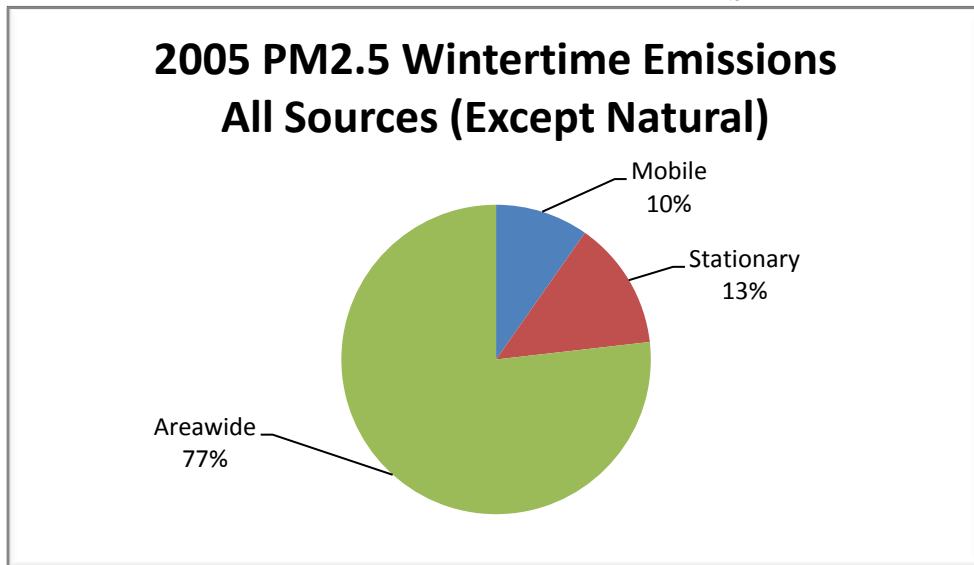
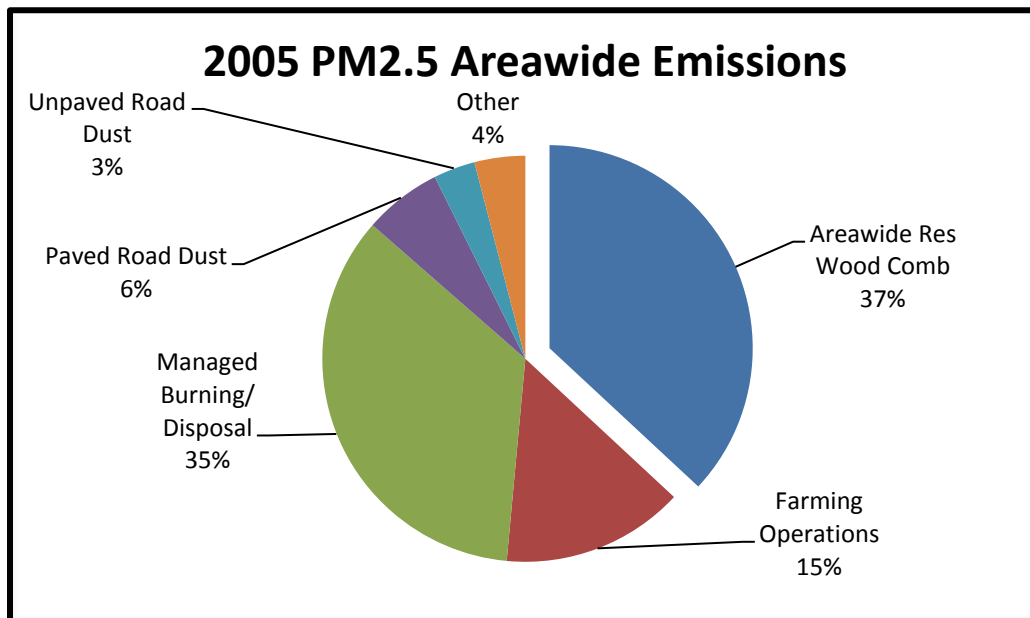


Chart 2: 2005 Areawide PM<sub>2.5</sub>Emissions



The following emission inventory categories apply to residential wood combustion that would be affected by this rule revision:

EIC Code	Category Name	PM <sub>10</sub> Emissions Tons Per Day (tpd)	PM <sub>10</sub> Emissions Tons Per Year (tpy)	PM <sub>2.5</sub> Emissions tpd	PM <sub>2.5</sub> Emissions tpd
610-602-0230-0000	WOOD COMBUSTION - FIREPLACES	0.620	226	0.597	218
610-600-0230-0000	WOOD COMBUSTION - WOOD STOVES	1.695	619	1.632	596
	Total	2.315	845	2.229	814

### Monthly and Hourly Comparisons

PM<sub>2.5</sub> is primarily a wintertime occurrence. Chart 3 shows how PM<sub>2.5</sub> levels during the wintertime are highest during the early morning and late evening, with levels dropping during the day. Chart 4 displays PM<sub>2.5</sub> levels during the summer, which are more uniform and typically rise during the morning and evening commute hours and drop off during the nighttime hours. These emissions trends support the inventory which shows the highest levels of PM<sub>2.5</sub> coming from residential wood combustion during the winter months.

Chart 3: Hourly Comparison of PM<sub>2.5</sub> Levels-Winter

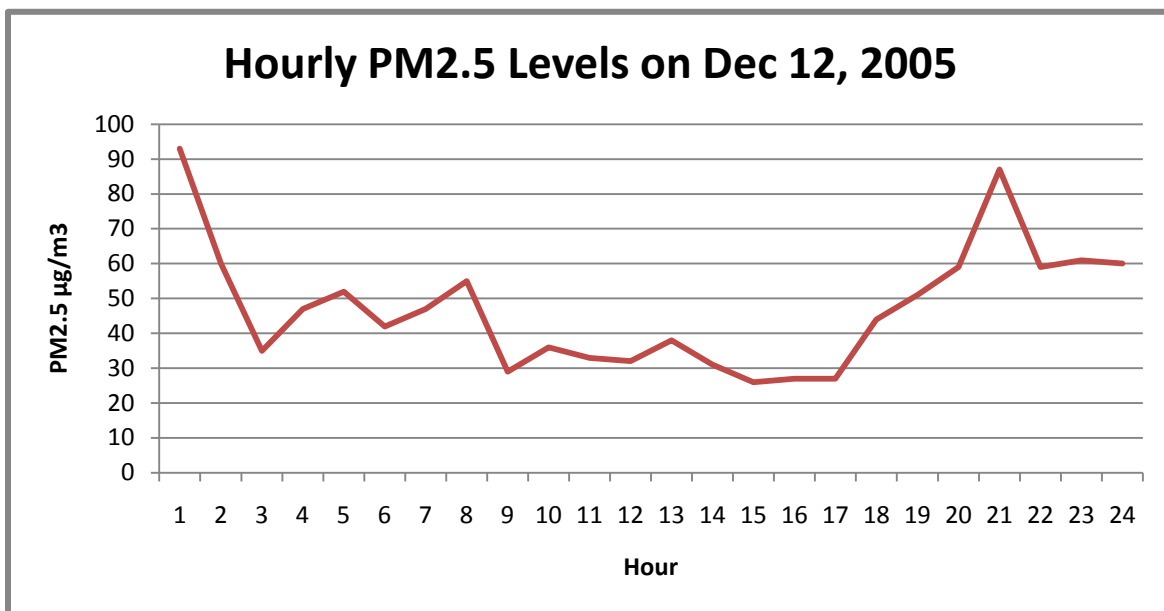
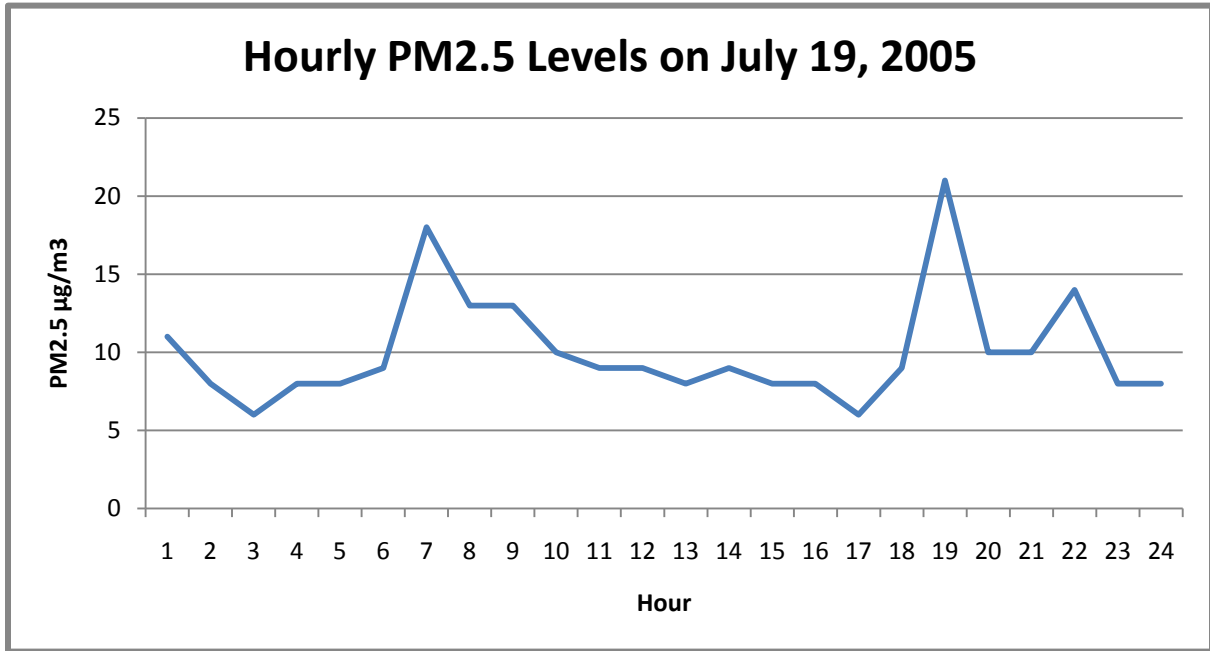


Chart 4: Hourly Comparison of PM<sub>2.5</sub> Levels- Summer



**LEGAL MANDATES**

Federal Mandates-

In 2006, the EPA lowered the Federal AAQS for PM<sub>2.5</sub> concentrations averaged over a 24 hour period from 65 µg/m<sup>3</sup> to 35 µg/m<sup>3</sup>. The District has been recommended as nonattainment for the 2006 PM<sub>2.5</sub> AAQS by ARB and EPA. The designation is expected to be finalized in 2009 and attainment plans due to the EPA by 2012. Residential wood combustion consists of 37% of the wintertime areawide PM<sub>2.5</sub> emissions. The District must reduce emissions to attain the 2006 PM<sub>2.5</sub> AAQS.

The following table lists the Federal Design Value for the monitor at the Almond Street location in Yuba City for the years 2004 through 2007. The Design Value is the 98<sup>th</sup> percentile of daily concentrations averaged over a three year period.

Table 4: Federal Design Value for PM<sub>2.5</sub>

	2004	2005	2006	2007
Design Value (in µg/m <sup>3</sup> )	34	36	40	39

Note: To attain the Federal AAQS for PM<sub>2.5</sub>, the Design Value must be equal to or less than 35 µg/m<sup>3</sup>.

State Mandates-

The District is currently designated nonattainment for the state PM<sub>10</sub> AAQS. SB 656 (Sher, 2003) required ARB to adopt a list of the most readily available, feasible, and cost-effective control measures for PM<sub>10</sub> reductions. The bill also required air districts to adopt a schedule of implementation for the most cost-effective measures after prioritizing each measure based on several factors. The District adopted a schedule for implementing control measures at the August 1, 2005, board meeting. A summary of the control measures applicable to residential fuel combustion are presented below in Table 5.

Table 5: SB 656 Control Measures Applicable to Residential Wood Combustion

Control Measure	Further Study Completed By	Consideration by the Board	Implementation Date
Limit the number of fireplaces in new residential and nonresidential development	2007	2008	2009
Require replacement of non-certified units upon sale of property	2007	2008	2009
Control wood moisture content	2007	2008	2009

The first two measures, limiting the number of fireplaces in new residential and nonresidential development and requiring replacement of non-certified units upon sale of property, were evaluated by District staff and determined not to be considered at this time. The third measure, control wood moisture content, has been incorporated into this Rule Revision.

**AMENDED RULE REQUIREMENTS**

The amendments proposed to Rule 3.17 applies to any person who sells, offers for sale, supplies, installs, or transfers a new or used wood heating device within all elevations of the District. The provisions of Sections F.4 and F.5 also apply to residential wood appliance owners/operators. The amendments would:

- Require new fireplaces to be EPA Phase II certified
- Amend the curtailment advisory provision to allow for the issuance of a recommended action
- Prohibit residential wood appliances from burning unseasoned wood, and any other prohibited material listed in Rule 2.0 Section B.15
- Remove outdated references
- Align rule format to be consistent with other District rules
- Add Severability clause
- Replace the exemption for masonry fireplaces with masonry heaters and include a definition of a masonry heater

Rule 3.17 exempted fireplaces from meeting the emission limits of the Rule. As amended, Rule 3.17 would remove this exemption, and require all new and used fireplaces installed from the date of Rule adoption to meet the EPA Phase II emission standard. Methods for compliance with this measure would include installing a fireplace with an EPA Phase II certified insert, installing a gas or electric fireplace, or not installing a fireplace.

The advisory portion of Rule 3.17 (Section B.4) allowed the APCO to issue an advisory to curtail residential burning when the PM<sub>10</sub> ambient air quality was forecasted to exceed 60 µg/m<sup>3</sup>. At the time the District adopted Rule 3.17, the District was attaining the National AAQS for PM<sub>10</sub> and PM<sub>2.5</sub>. The District has now been proposed nonattainment for PM<sub>2.5</sub>, necessitating the amendment of the advisory curtailment to a level consistent with the National AAQS, at which concentrations exceeding this level have been determined to be unhealthy for sensitive groups. The proposed amendments would allow the APCO to issue a voluntary advisory with specific recommended actions for residential wood combustions. The recommended actions are: allow, reduce, curtail, limit specific areas, or request to cease. If the recommended action is allow, wood burning conditions would not be conducive to an exceedence of an AAQS. When the recommended action is to reduce, curtail, or limit specific areas, the conditions for wood burning may lead to an exceedence of an AAQS, and residents are

informed of the conditions and the recommended actions. When the recommended action is request to cease, conditions are very poor and residences are asked to prevent the degradation of ambient air quality by not burning wood. The advisory is voluntary, and residents that have a financial hardship, or situations where wood heating is the only source of heating available in the home, would not be asked to comply with the recommended actions.

The amendment would also prohibit the burning of unseasoned wood. Unseasoned wood is defined in the Rule as “wood of any species that has not been sufficiently dried or contains 20 percent or more moisture by weight.” The definition also includes a test method, ASTM test method D4442-92, or other method approved by the Air Pollution Control Officer (APCO). The amendment would also prohibit the burning of prohibited materials as defined in Rule 2.0.

Rule 3.17, as adopted in June, 1996, requires that all wood burning appliances be either EPA Phase I or Phase II certified as defined in Part 60, Title 40, Subpart AAA Code of Federal Regulations (CFR). The emission limit portions of this regulation were amended in 2000, removing the Phase I certification. The amendment to District Rule 3.17 removes the reference to the Phase I certification, as well as the reference to the Oregon Department of Environmental Quality Administrative Rule Sections 100 through 190 of Chapter 340 of Division 21, as this Division no longer exists. The Oregon Administrative Rules now reference the 40 CFR Part 60 Subpart AAA.

The Rule amendment aligns the format of Rule 3.17 to be consistent with other District Rules, by adding Section A. Purpose, moving Applicability to the beginning of the Rule as Section B, and moving Effective Date to Section C. The amendment also removes the Enforcement Section (C). It is the intent of the District to enforce this Rule consistent with District Policy and Health and Safety Code requirements.

The amendment also adds a new Section, Severability, consistent with District counsel’s legal advice.

The amendment also replaces the exemption for masonry fireplaces with an exemption for masonry heaters. This change is due to public comments received during the workshop. After review, the District has determined that exempting masonry heaters from the emission standards of Rule 3.17 is appropriate due to the low emission factors of masonry heaters. For more information on the public comments received, and District response to those comments, please see Attachment D.

## **SOCIOECONMIC IMPACTS**

California Health and Safety Code Section 40728.5 requires Districts with populations exceeding 500,000 persons to perform an assessment of the socioeconomic impacts of the amendment of a rule. This requirement does not apply to this District with a population of approximately 125,000 persons.

## **ESTIMATED COST IMPACTS**

Cost impacts for compliance with sections F.1-3 of the amendments would be based on compliance method. The District predicts three compliance options:

- Option 1 would be to not install a fireplace.
- Option 2 would be to install a fireplace with an EPA Phase II certified insert.
- Option 3 would be to install a gas or electric fireplace.

The cost impacts of Option 1 are estimated to be a net savings. Not installing a fireplace in new residential units would be a cost savings for the builders as they would not be purchasing and installing the appliance.

The cost impacts of Option 2 are the incremental cost between an uncontrolled fireplace and an EPA certified insert. The cost of installing a certified insert ranges from about \$1,500 to \$2,500 (Staff Survey, July 2009). If all new residential units installed certified fireplace inserts, the cost impacts are estimated to be \$2,500 per residence. The average price of a new home in Yuba County based on sold price January 2009 through June 2009 is \$152,854. The average price of sold homes in Sutter County during the same time is \$172,985 ([www.realtor.com](http://www.realtor.com)). The additional cost of installing a fireplace insert represents 1.64% of the price of a home in Yuba County and 1.45% of the price of a home in Sutter County.

The cost impacts of Option 3 are the incremental cost between an uncontrolled fireplace and a gas or electric fireplace. The incremental cost of installing a gas insert is estimated at \$2,500. The incremental cost to install an electric fireplace is estimated at \$400 (SMAQMD Rule 417 Staff Report). The cost impacts of installing a gas insert would be similar to installing a certified wood burning insert. The cost impacts of installing an electric fireplace represents approximately 0.26% of the cost of a home in Yuba County, and 0.23% of the cost of a home in Sutter County.

Cost impacts for compliance with section F.4 of the proposed amendments is expected to be minimal. The advisory would be issued based on forecasted ambient air quality. Based on the historical exceedence data in Table 6, the average number of days where the PM<sub>2.5</sub> ambient air quality exceeded the Federal AAQS in the past four years was 12 days. The most restrictive advisory, requesting that residents cease to use their wood heating appliances, would apply only to residential units that have both wood and electric/gas heating. For these residents, if they choose to comply with the advisory, there may be a cost increase due to the increase of use of electricity or gas heating for an average of 12 days per year.

The cost impact for prohibiting the burning of unseasoned wood in section G.2 is also expected to be minimal. This is because unseasoned wood is less efficient at heating than seasoned wood, so the cost of heating the home could go down. For residents that purchase wood, if they have previously been purchasing unseasoned wood and immediately burning it without allowing sufficient time for drying, then purchasing seasoned wood may be more expensive. For residents that collect their own wood supplies to season and store, the cost is the same. Therefore, the cost impact is greatest for residents that are not able to collect their own wood or purchase unseasoned wood and let it season prior to burning; however it should still remain minimal.

## **ESTIMATED EMISSION REDUCTIONS**

Emission reductions from requiring new fireplaces to be EPA Phase II certified depend on number of new homes built, percent of new homes that are expected to install wood burning fireplaces, annual use of fireplace for heating and aesthetic purposes, and the compliance option selected. This District used data from several sources to estimate emission reductions from the three possible compliance options for this part of the Rule Revision. Emission Reduction Calculations are included in Appendix C.

The number of housing units in Yuba County as of 1/1/2009 is 28,016 (DOF). The number of housing units in Sutter County as of 1/1/2009 is 33,681. Sacramento Area Council of Governments (SACOG) projections estimate that by 2035, the number of households in Yuba County will increase to 50,915 and Sutter County will increase to 46,589. This equals an increase of 22,899 units for Yuba County and 12,908 for Sutter County (projections do not include the Sutter Pointe Specific Plan, which has not been approved by Sutter County as of the development of this Staff Report).

Option 1 would be that each of these new homes built would have installed a wood burning fireplace, and to comply with the proposed Rule, will now install no device. It is estimated that each home with a wood burning fireplace emits 0.005 tons of PM2.5 per year. Therefore, emissions reductions in 2035 under this Option would be approximately 114 tons/PM2.5/year in Yuba County and 65 tons/PM2.5/year in Sutter County.

Option 2 would be that each of these new homes would install a fireplace with a EPA-Certified Insert Device. The emission reduction would be resultant of the difference between the emission factor of a fireplace and the emission factors of a Phase II Catalytic or Non-Catalytic insert. If all new homes installed Catalytic inserts, the emission reductions in 2035 in Yuba County would be 41 tons/year and in Sutter County 23 tons/PM2.5/year. If all new homes installed Non-Catalytic inserts, emission reductions in 2035 would be 51 tons/PM2.5/year in Yuba County and 29 tons/PM2.5/year in Sutter County.

Option 3 would be that each of these new homes would install a gas or electric fireplace. Emission reductions for this Option would be similar to Option 1 as gas and electric fireplaces are assumed to have zero PM2.5 emissions.

Emission reductions from section F.4 in which the APCO issues an advisory for recommended actions are dependent upon which recommended action is issued, the number of days a recommended action is issued, and the number of people complying with the advisory. The greatest emission reductions would be realized from the scenario where the recommended action is to request to cease residential wood burning and 100% of residential homes that have alternate forms of space heating comply with the advisory.

Table 6 lists the number of days the ambient air quality in Yuba City exceeded the PM2.5 NAAQS. Using the average number of days of exceedences, the number of homes that have a wood burning appliance but it is not their only source of space heating, and the average emissions per home, the District calculated the emission reductions for PM2.5 at several compliance rates which are listed in Table 7. Detailed calculations are included in Attachment C.

Table 6: Days PM2.5 Exceeded 2006 NAAQS at Yuba City Monitor

	2004	2005	2006	2007	4 Year Average
Days Estimated Concentration Exceeded 2006 NAAQS	12.2	11.5	16.2	8.1	12

Table 7: PM2.5 Emission Reductions for Advisory Request to Cease

Compliance Rate	Emission Reductions- Pounds Per Year	Emission Reductions- Tons Per Year
100%	15,192	7.60
50%	7,596	3.80
10%	1,519	0.76

Emission reductions from section G.2 prohibiting unseasoned wood are estimated to be minimal as most residents are aware of the reduced heating potential of unseasoned wood and do not burn wood that is not seasoned.

**ENVIRONMENTAL REVIEW AND COMPLIANCE**

The proposed amendments to Rule 3.17 do not create any new requirements that may have an adverse effect on the environment. Pursuant to state CEQA Guidelines, the District staff find that the adoption of the proposed amendments is exempt from CEQA (Class 8 Categorical Exemption, Action by Regulatory Agencies for Protection of the Environment, §15308 State CEQA Guidelines).

California Public Resources Code (Section 21159) requires an environmental analysis of the reasonably foreseeable methods of compliance. The proposed amendments to Rule 3.17 will not increase emissions and will not cause any significant adverse effects on the environment; therefore the District staff have concluded that no environmental impacts will be caused by compliance with the proposed amendments.

### **REQUIRED FINDINGS**

The California Health and Safety Code, Division 26, Air Resources, requires 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.

<b>FINDING</b>	<b>DEFINITION</b>	<b>REFERENCE</b>
Authority	A district shall adopt rules and regulations and do such acts as may be necessary or proper to execute the powers and duties granted to, and imposed upon, the district by this division and other statutory provisions	California Health and Safety Code, Sections 40000, 40001, and 40702 are provisions of law that provide air districts with the authority to adopt these proposed rules.
Necessity	The District has demonstrated that a need for the rule, or for rule amendment or repeal.	The District is required by HSC 39614 (SB 656) to adopt the most cost-effective measures for controlling particulate matter pollution from the list developed by the CARB. The amendments to Rule 3.17 implements some of those measures.
Clarity	The rule is written or displayed so that its meaning can easily be understood by the persons directly affected by it	There is no indication, at this time, that the proposed rules are written in such a manner that it cannot be easily understood by persons affected by the rule.
Consistency	This rule is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or State or federal regulations.	The District has found that the proposed rule does not conflict with, and is not contradictory to, existing statutes, court decisions, or state or federal regulations.
Non-Duplication	The rule does not impose the same requirements as an existing State or federal regulation, unless the District finds that the requirements are necessary and proper to execute the powers and duties granted to, and imposed upon, the district	Subpart AAA of 40CFR Part 60 (Standards of Performance for New Residential Wood Heaters) sets standards for new wood heaters but does not apply to traditional fireplaces. The amendment to Rule 3.17 does not duplicate the federal requirement because it requires any new wood burning appliance, including fireplaces, to conform to the federal emission standards.
Reference	Any statute, court decision, or other provision of law that the district implements, interprets, or makes specific by adopting, amending, or repealing a regulation.	In adopting these amendments to Rule 3.17, the District is implementing the requirements of HSC 39614 (SB 656).

## **References**

DOF, 2008. State of California, Department of Finance; E-5 Population and Housing Estimates for Cities, Counties, and the State, 2001-2008, with 2000 Benchmark; May 2008.

Results of Wood Burning Survey-Sacramento, San Joaquin, and San Francisco Areas, University of Berkeley/California Air Resources Board-GIS Study, Broderick, et al., 2003.

Sacramento Metropolitan Air Quality Management District Staff Report Rule 417, August 2006.

Placer County Air Pollution Control District Staff Report, December 2007.

United States Environmental Protection Agency; AP-42, 5<sup>th</sup> Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Sections 1.9 and 1.10; October 1996