

PROPOSED

**BEST AVAILABLE CONTROL
MEASURES/TECHNOLOGY
AND
REASONABLY AVAILABLE CONTROL
MEASURES/TECHNOLOGY
DEMONSTRATION FOR SOURCES OF
PM10 AND PM10 PRECURSORS IN THE
SAN JOAQUIN VALLEY AIR BASIN**

Prepared for the 2003 PM10 Plan

**San Joaquin Valley
Unified Air Pollution Control District**

April 28, 2003



VII. BACM Demonstration for Residential Wood Combustion

Significant Source Discussion

Residential wood combustion is a significant source of PM10 emissions during the winter in the San Joaquin Valley; therefore, the District must implement Best Available Control Measures (BACM) for this source category. PM10 monitoring sites in the Valley urban areas record the largest amounts of PM10 attributed to wood combustion in areas with high development density and a large concentration of wood burning devices. The chemical mass balance (CMB) analysis attributed 50.2 µg/m³ to wood combustion at the worst site (Fresno), most of which can be attributed to residential wood combustion since the episode occurred after a series of agricultural no-burn days. The annual emission inventory for this source category is 12.3 tons per day.

Table G-18. Emission Inventory for Residential Wood Combustion PM10 in 2001			
	No. of Units Installed	Annual Inventory Tons/day	Winter Inventory Tons/day
Conventional fireplaces	280,978	3.89	7.40
Fireplace inserts	84,294	5.10	9.70
Wood stoves	41,843	3.23	6.15
Pellet stoves	5,437	.09	.16
Total	328,866	12.31	23.42

Based on the CMB analysis and the de minimis methodology provided in Section II, wood smoke from residential wood combustion exceeds the significant source criteria. Therefore, the District is required to implement BACM to reduce, minimize or eliminate PM10 from wood burning.

Background Information on EPA Action on Rule 4901

The District adopted Rule 4901 (Residential Wood Combustion) on July 15, 1993. On February 7, 2002, EPA published in the Federal Register a final simultaneous “limited approval/limited disapproval” of the previously adopted version of Rule 4901 for inclusion into the State Implementation Plan (SIP). EPA proposed a “limited approval” because they determined that Rule 4901 improves the SIP and is “largely consistent” with relevant Federal Clean Air Act (CAA) requirements. The EPA based its “limited disapproval” on several rule

deficiencies that they believe are not consistent with the requirements of the CAA with regards to best available control measures (BACM) standards for the control of PM10 from residential wood combustion sources.

EPA specifically noted that Rule 4901 is deficient in three areas, 1) the lack of mandatory curtailment on high pollution days (also called “episodic” days); 2) the lack of a requirement to limit the number of fireplaces and wood burning devices per acre in new residential developments; and 3) the lack of a requirement for fireplaces or woodstoves to have EPA-certified Phase II standards upon property sale or transfer. The EPA “limited disapproval” started a sanction clock that will expire September 11, 2003.

District staff began the process of strengthening Rule 4901 with a scoping meeting in April 2002. District staff held public workshops on the proposed amendments to Rule 4901 (Residential Wood Burning) on December 3,4,and 5, 2002. Approximately 180 people attended the meetings and over 80 people provided testimony. The comment period for the first round of workshops closed on December 20, 2002. A second draft of the rule, and the socio-economic impact analysis will be released in late March with a second round of workshops in April 2003. Staff anticipates that the rule will be brought before the Governing Board for action at the June 2003 meeting.

The draft amendments to Rule 4901 build on the current requirements, satisfy the deficiencies that EPA identified, and expand the public education program. The following is a summary of draft amendments to Rule 4901:

- Change the title of Rule 4901 to “Wood Burning Fireplaces and Heaters” replacing the old title “Residential Wood Burning.”
- Change from voluntary curtailment to a two-tiered curtailment program. Level I would entail “limited” curtailment and Level II entail curtailment for all wood burning devices.
- Incorporate density limits (devices installed per acre) on the number of wood stoves, wood heaters and fireplaces in new construction and require EPA-Certified Phase-II standards on those being installed.
- Require removal or rendering inoperable of non-EPA-Certified woodstoves or fireplace inserts or replacement with EPA-Certified Phase II standards upon sale or transfer of property. This requirement does not apply to open-hearth fireplaces.

BACM Demonstration

Although EPA has indicated that correcting the three deficiencies listed above will bring Rule 4901 up to BACM level, the District conducted additional analysis to further document that BACM has been achieved. Table G-19 summarizes the results of the analysis of technical and economic feasibility for residential wood combustion control measures.

The EPA Guidance Document for Residential Wood Combustion Emission Control Measures (1989), served as the starting point for developing the list of candidate control measures. The document lists measures ranging in stringency from reasonably available control measures to most stringent control measures. The District's analysis concentrated on the most stringent measures, since measures less stringent than the current version of Rule 4901 would not be pursued. Economical and technological feasibility were determined for each candidate BACM measure. The investigation of BACM technologies concluded that only two of the candidate BACM measures were technologically infeasible. One candidate measure was eliminated from further consideration due to excessively high cost-effectiveness.

The cost-effectiveness of each candidate measure was calculated by dividing the cost of measure implementation by the potential emission reduction achieved. Implementation costs included equipment, installation, and maintenance costs borne by the source owner or operator. Details regarding the cost-effectiveness calculations are provided in Table G-20.

Measures that reduce emissions from residential wood combustion may be divided into two categories - integral measures and those that improve burning performance. Integral measures include public education programs, curtailment programs, and regulations on new installations of woodburning devices. Measures that improve burning performance include such things as wood moisture content requirements on the sale of wood, changeout of old devices to new EPA Phase II certified or natural gas burning devices, and density limits on new installations.

A wide variety of programs to reduce residential wood combustion emissions have been adopted around the country. None are exactly the same. They are designed to meet local conditions. Programs that are in place have all gone through a public process to identify what is acceptable in that city or region. The San Joaquin Valley is by far the largest region required to implement BACM on this source category and it has several important differences that must be considered when comparing measures. First, the San Joaquin Valley has a mild climate. Temperatures seldom drop below freezing and the wood burning season is short. This means that measures adopted in areas with colder

climates such as Denver and Reno may be cost-effective there, but not cost-effective here due to lower rates of burning. Some of the most stringent measures are adopted in mountain resort areas like Mammoth Lakes, California. Comparison with this type of area should also be considered carefully. The San Joaquin Valley is an urbanized area primarily developed with tract homes on 6,000-10,000 square foot suburban lots. Most houses built during the last decade include a zero clearance fireplace intended for ambience and not heat. A small fraction of the homes rely on wood combustion for heat as was shown in Table G-1. Communities like Mammoth Lakes, on the other hand, rely extensively on wood combustion and are also much colder than the San Joaquin Valley.

Rule 4901 contains an exemption for areas above 3,000 feet in elevation. The San Joaquin Valley has a large flat floor near sea level where the urban areas are located and is surrounded on three sides by mountains between 4,000 feet and 14,000 feet high. The Valley experiences its highest PM10 pollution levels during periods dominated by high pressure and subsidence inversions. The top of the inversion layer during these mid-winter periods is nearly always below 3,000 feet. Locations above the inversion layer experience favorable dispersion characteristics that prevent wood smoke from building to unhealthy levels. In addition, there are no significant concentrations of development above 3,000 feet in the San Joaquin Valley Air Basin. This leads to the conclusion that there is no need to implement controls above 3,000 feet.

Table G-2 provides the results of the technical and economic feasibility analysis for the candidate BACM measures. The analysis provides justification for retaining the District's current rule provisions when those measures have been found to meet the BACM level of stringency. In some cases, the analysis compares exemption levels for measures in the District's existing rule and proposed rule amendments with those adopted in other areas.

**Table G-19.
Technical and Economic Feasibility Analysis for Residential Wood Combustion Candidate BACM**

Candidate Control Measures	What it does	Technological Feasibility	Economical Feasibility (\$/ton reduced) ¹	Accept /Reject	Discussion/ Justification	Description of other areas most stringent measures
INTEGRAL MEASURES						
1a. Public awareness program	Informs the public about the RWC control program, including operational details and public responsibility. The program must cover three areas: Program effectiveness and tracking; key program elements; and communication strategy. The goals of a Public Education program is to inform the public of the potential health hazards of wood smoke and to encourage better wood burning practices or use of heating devices.	Y	Y/\$0	Accept	The District's current program is essentially equivalent to those found in other areas. Cannot claim emissions reductions, but essential to RWC program. The District currently has a voluntary curtailment program, Please don't light tonight. With Please Don't Light Tonight, the Valley Air District asks the public to refrain from burning wood on nights when air quality is unhealthy. The District intends to retain the basic structure of the public awareness program, but increase various aspects that have proven successful.	Maricopa established a Public Information Program and brochure to inform the public about pollution from RWC
2a. Mandatory curtailment during predicted periods of high PM10 concentrations	Restrict wood burning during periods when atmospheric conditions and the level of wood burning activity are predicted to result in exceeding the PM10 NAAQS.	Y	Y/\$0	Accept	The District proposes to implement a mandatory curtailment program. Economically feasible. Reduction est. at 16% per year. Includes exemptions for sole source of heat and above 3,000ft. AQI based on PM2.5.	Washoe County, SEC.050.005 has a two-stage curtailment program. The first stage is a green light day, meaning it is OK to light. On days when the AQI is between 80 and 100, a yellow light voluntary day is called. When the AQI exceeds 100, a red light day is called. AQI based on PM10.
2b. Mandatory curtailment: Exemption curtailment at 3,000 ft.	Areas above 3,000 ft. would be exempt from mandatory curtailment.	N	Y/\$0	Reject	This exemption is retained by the District because it has little or no impact in areas of the SJVAB with wood smoke problems. The size of the	N/A

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					District is much larger than other nonattainment areas and covers lightly developed mountain areas. Due to unavailability of natural gas service to rural areas above 3,000 ft., eliminating this exemption would be technologically infeasible.	
2c. Mandatory curtailment for individuals who depend on wood burning as sole source of heat.	Exempts households that use wood as their primary sole source of heat and are economically unable to convert to an alternative fuel.	N/A	Y/\$0	Reject	This exemption is retained by the District. There are a small number of homes in the valley that are heated exclusively by wood burning devices; therefore, retaining this exemption has an insignificant impact on emission reductions. Some of these households are low income and are economically unable to convert to an alternative fuel and do not have access to natural gas service.	Most agencies with curtailment programs include exemption for those who rely on wood burning as their primary source and due to financial hardship cannot afford to change over to alternative fuel.
Potential Control Measure	What it does	Technological Feasibility	Economical Feasibility (\$/ton reduced) ¹	Accept /Reject	Discussion/ Justification	Description of other areas most stringent measures
3a. All new stove installations EPA-certified, Phase II stoves or equivalent	This measure prevents the installation of wood stove that are not EPA-certified or equivalent. Phase II devices are designed to achieve more efficient combustion and lower particulate emissions than conventional devices.	Y	Y/\$0	Accept	The District will maintain its current rule provision. Under the current rule no wood stove or fireplace inserts can be installed unless it is EPA-certified. This includes new and used wood burning devices. The District's enforcement program will be expanded to ensure that	Oregon has a state rule making it illegal to sell an uncertified stove at a retail establishment. Jackson County, Oregon has a complementary ordinance that restricts the installation of an uncertified wood stove in a residence. This rule restricts the sale of used Wood

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					sellers are complying.	burning devices in the county, as well as the sale or installation of used, uncertified residential wood burning devices from out of state.
<u>MEASURES TO IMPROVE WOOD-BURNING PERFORMANCE</u>						
4a. Control of wood moisture content	Burning dry wood increased heating performance	Y	Y/\$0	Accept	The District will maintain its current rule provision. The current rule includes advertising requirements, prohibiting the advertisement of "seasoned wood" unless the wood has a moisture content of 20% or less by weight. This, in combination with a public education program, will promote the use of more efficient and cleaner burning wood. There is no data that demonstrates that an alternative approach would result in lower emissions than the current rule.	The King County, Wa. Board of Health's woodstove program requires proper storage of firewood. It requires firewood be allowed to season and be protected from moisture. Firewood dealers are required to obtain annual license from the King County Department of Public Health and must alert buyers if the moisture content of the wood exceeds 20%. Additionally, fuel for all woodstoves shall be only untreated wood or lumber with a moisture content of 20%.

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5a. Weatherization of homes with woodstoves	Reduces the quantity of fuel used in the wood-burning device by reducing the heating requirement for the home.	Y	Y/\$0	Reject	<p>The District rejects this measure based on potential for environmental issues related to implementation of this type of program and due to the implementation of alternative measures that reduce the same emissions. Weatherization has the potential to aggravate indoor air quality problems in the residence. If the home is weatherized to the point that ventilation is overly restricted, the residents may be subject to chronic exposure to indoor air pollutants. The District's rule revision will require change out at time of sale, which will remove most non-EPA wood heaters and fireplaces inserts in approximately ten years. The District's Public Education program will make the public aware of steps they can take to reduce the amount of fuel used in their wood-burning device. Weatherization programs operated by the electric and gas utilities can be used by homeowners with wood stoves.</p>	Oregon communities have incentive programs to replace uncertified woodstoves. The Klamath County Department of Health Services runs a home weatherization and uncertified woodstove replacement program called PURE.

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6a. Opacity program	Opacity standards allow agency staff to recognize devices that are out of compliance. Opacity standards are measurable indicators of PM10 emissions that can be used to determine a violation of an emission standard or permit level. High opacity levels also indicate when there may be a malfunction or problem, with the wood-burning device.	N	Y/\$0	Reject	The District rejects this measure based on technical feasibility. A survey conducted for the District by JB Franz Research concluded that the majority of wood burning fireplace and woodstove usage takes place between 6:00pm and 10:00pm. During the late evening hours, opacity readings would not be accurate or impossible to conduct. The District will be enforcing mandatory curtailments based on visible emissions, and not on opacity.	Mammoth Lakes has a 20% opacity limit for wood burning emissions. No person shall cause or permit emissions from a solid fuel device to be readily visible, for a period or periods aggregating more than three minutes in any one-hour period, excluding a 15-minute startup period.
EXISTING INSTALLATIONS						
7a. Conversion of existing wood-burning fireplace to gas logs	Eliminates wood smoke emissions from existing fireplaces by requiring conversion to gas logs.	Y	N/\$363,200.	Reject	This measure is rejected to due to high cost-effectiveness. The cost to retrofit the wood burning fireplace to a gas fireplace would be very significant considering fireplaces are used only occasionally and primarily for aesthetic purposes.	This measure is listed in EPA Guidance Document as suggested BACM. No area is currently requiring this measure.
7b. Change over to EPA-certified, Phase II woodstoves.	This measure reduces emissions from existing woodstoves by accelerating the replacement of conventional stoves with EPA-certified Phase II stoves or RWC devices that emit lower emissions.	Y	Y/\$8,680-\$12,060.	Accept	The District accepts this measure and will include it in Rule 4901 amendments. Through change out at time of sale, the District will remove most conventional wood burning devices in approximately 10.5 years.	The Telluride, County RWC change over program applies to existing devices as well as new devices.

<p align="center">Table G-19. Technical and Economic Feasibility Analysis for Residential Wood Combustion Candidate BACM</p>						
Candidate Control Measures	What it does	Technological Feasibility	Economical Feasibility (\$/ton reduced) ¹	Accept /Reject	Discussion/ Justification	Description of other areas most stringent measures
NEW INSTALLATIONS						
8a. Restriction on number and density of new wood burning stoves and/or fireplace installations.	Limit RWC emissions growth by restricting the number and density of new RWC installations in new and existing homes.	Y	Y/\$0-\$1,719.	Accept	The District accepts this measure and will include it in Rule 4901 amendments.	Washoe County, sec 040.0514 limits the number of certified wood burning devices in single family and multifamily or commercial dwellings.
8b. Require gas fireplaces or gas logs in new wood burning fireplace installations.	To eliminate wood smoke emissions from new wood burning fireplace installations by requiring an alternate fuel.	Y	Y/\$1,719.	Accept	The District accepts this measure and will include it in Rule 4901 amendments. The District will implement a program that limits the installation of woodstoves or fireplaces in new residential dwellings with a density greater than two dwellings per acre. Natural gas and electric devices would be exempt from any density limits. Residential wood smoke is primarily an urban problem. Limits in rural areas would not be effective	This measure is listed in EPA Guidance Document as suggested BACM
NEW AND EXISTING INSTALLATIONS						

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Technical and Economic Feasibility Analysis for Residential Wood Combustion Candidate BACM**

Candidate Control Measures	What it does	Technological Feasibility	Economical Feasibility (\$/ton reduced) ¹	Accept /Reject	Discussion/ Justification	Description of other areas most stringent measures
9a. Require device offset and upgrade offsets.	Device offsets are intended to result in an emission reduction due to retiring conventional stoves that are greater than the emissions increase caused by new stove installations. Upgrades are intended to achieve emission reduction from new stove installations by upgrading enough stoves to adequately offset any increase in emissions resulting from the installation of a new EPA-certified Phase II stove.	Y	Y/NA	Reject	The District rejects this measure based on lack of a funding source to pay for the offsets. The District would consider offsets if funding were to become available. A potential source of funding is the Indirect Source Review Program; however, the cost-effectiveness of upgrades may not be competitive with other measures, depending on the amount of incentive required.	A.R.S 43-107 allows for a total reduction of up to \$500 for the conversion of an existing wood burning fireplace to a clean burning wood stove or gas fireplace.

1. Calculations for economical feasibility were done using EPA's Technical Information Document for Residential Wood Combustion Best Available control measures. EPA September 1992.

Table G-20. Candidate BACM Cost-Effectiveness		
Measure	Cost-Effectiveness \$/ton PM10	Cost-Effectiveness Calculations
Integral measures		
1a. Public Awareness	\$0	No cost is estimated to the user to establish a Public Awareness program.
2a. Mandatory Curtailment	\$0	<p>No cost to fireplace users are estimated, since fireplaces are not intended to be used as a source of heat.</p> <p>L_o=Average annual cost to each nonexempt stove user for the curtailment period. \$/year M=Average cost to stove user per curtailment day. \$/day K= estimated number of curtailment days $M=(DHR \times AEC)-FCD$ DHR= Daily heating requirement for alternative heat source, BTU/day AEC= Alternative energy cost, \$/day FCD= Fuel cost per curtailment day, \$/day $M=(.92-2.24)-2.23=-1.31$ $L_o=M \times K=-1.31 \times 25=-\\32.75 No cost to woodstove and insert users.</p>
2b. Mandatory curtailment: Exemption curtailment at 3,000 ft.	\$0	No cost to user
2c. Mandatory curtailment for individuals who depend on wood burning as sole source of heat.	\$0	No cost to user

Table G-20. Candidate BACM Cost-Effectiveness		
Measure	Cost-Effectiveness \$/ton PM10	Cost-Effectiveness Calculations
3a. All new Stoves installation EPA-certified, phase II stoves or equivalent.	\$0	All new stoves must meet EPA Phase II standards according to the 40 CFR 60 subpart AAA. This measure will accrue no new cost to the consumer.
MEASURES TO IMPROVE WOOD-BURNING PERFORMANCE		
4a. Control of moisture content	\$0	A version of this measure was included in our original Rule 4901. No new cost would be imposed to the district or the wood burning device user.
5a. Weatherization of homes with woodstoves	\$0	There is no user cost assumed for this measure since it is intended to target low- income households.
6a. Opacity limits.	\$0	No cost would be imposed to the public to implement this measure.
EXISTING INSTALLATIONS		
7a. Conversion of existing wood burning fireplace to gas logs. Accelerated change over.	\$318,791.92	<p>The cost to the fireplace user is based on two components. First component is the conversion cost of a conventional fireplace to gas logs, and the second component is the difference in annual energy cost between wood and natural gas. The annual cost of the user is then the difference of these two costs. The cost is then converted to dollars per ton.</p> <p>B=Annual number of fireplaces converting to gas logs in accelerated change out. $B=141542.817/2 \text{ years}=70771 \text{ fireplaces per year.}$ $70771*17.3*.28*1400/(454.*2000)=528.569$ G= annual emission reduction, tons/year=528.569 L=Fireplace usage, hours/year=94.00 $L*M= N.$ M=natural gas fireplace consumption rate BTU/hour. N= energy consumption of</p>

Table G-20. Candidate BACM Cost-Effectiveness		
Measure	Cost-Effectiveness \$/ton PM10	Cost-Effectiveness Calculations
		natural gas fireplace, BTU's /year. $N=27000*94.00=2,538\text{BTU'S per year.}$ Q= annual cost difference between natural gas and wood,\$, year. $(E*O)-(N*P)=Q.$ $(.28*200)-(2538130*.89/100000)=56-22..59=33.41$ $R-Q=Co$ Co=Annual user cost \$/year. $2000-33.41=1,966.59$ per unit $70,771\text{units}*\$7966.59/\text{unit}=139,177,540.9$ $\$1,966.59/\text{year} / 94.00 \text{ hr/year}=\$20.92/\text{hr}$ $\$20.92\text{hr}/59.6\text{g/hr}=\$.35/\text{gram}$ $59.6\text{g/hr}*94.00\text{hrs}=5602.4\text{g}$ $\$.35/\text{gram} *454=\$159.36/\text{lb}$ $159.36*2000=\$318791.92/\text{ton.}$
7b. Change over to EPA-certified Phase II woodstoves or equivalent.	\$8,680-\$12,060	Calculating change out at time of sale. $C/E = (\text{Annualized Installed Equipment Cost of Certified Wood Heater}-\text{Annual Fuel Cost for Conventional Wood Heaters}-\text{Annual Maintenance})$ Wood stove to EPA certified catalytic= $C/E = \left(\frac{678}{\text{yr}} - \frac{270}{\text{yr}} - \frac{179}{\text{yr}} \right) / \frac{37.96 \text{ lb}}{\text{yr}} = \frac{\$}{\text{Lb}} \underline{\underline{\$6.03}}$ $6.033 \times 2000 = 12060./\text{ton}$

EPA-certified wood stove non catalytic=

Table G-20. Candidate BACM Cost-Effectiveness		
Measure	Cost-Effectiveness \$/ton PM10	Cost-Effectiveness Calculations
		$C/E = \left(\frac{678}{\text{yr}} - \frac{270}{\text{yr}} - \frac{179}{\text{yr}} \right) / \frac{40.50 \text{ lb}}{\text{yr}} = \frac{\$ \quad \$5.65}{\text{lb}}$ <p style="text-align: right;">5.65 X 2000 11300./ton</p> <p>Non-certified fireplace insert to EPA-certified insert</p> $C/E = \left(\frac{629}{\text{yr}} - \frac{270}{\text{yr}} - \frac{179}{\text{yr}} \right) / \frac{40.50 \text{ lb}}{\text{yr}} = \frac{\$ \quad \$4.45}{\text{lb}}$ <p style="text-align: right;">4.45 X 2000 8900./ton</p>
New installations		
8a. Gas fireplaces or gas logs in new wood burning fireplace installations.	\$22,423.	<p>Cost difference between wood fireplace and gas fireplace=1100-500=600. CFR=capital recovery cost=.00632068</p> <p>600*.00632068=2.792408=monthly payment \$/year. Monthly payment *12=annual cost differential between gas and wood fireplace, \$/year.</p> <p>Energy cost difference on annual Basis. E=Ave. wood used in fireplace, cords/year. T=cost of a cord of wood. S= natural gas fireplace consumption rate, BTU's/ hour. Cost of natural gas, \$/BTU. (E*T)-(S*U)=V</p> <p>V= (.28*200)-(2538000*.89/100000)=33.41</p> <p>O-V=Co=user cost per year 12.09 annual cost \$/year.</p> <p>12.09/4,8914g/device=12.09/10.781lbs=\$12.09/.0054tons/device=185.5 devices/ton=12.09*185.5=\$2,242.695. per ton</p>

Table G-20. Candidate BACM Cost-Effectiveness		
Measure	Cost-Effectiveness \$/ton PM10	Cost-Effectiveness Calculations
8b. Restriction on number and density of new wood-burning stove and/or fireplace installation.	\$0-\$2,242.	<p>No cost to homes that are built without a wood-burning device. Those who choose to build a gas burning fireplace the following cost could apply: Cost difference between wood fireplace and gas fireplace=1100-500=600. CFR=capital recovery cost=. 00632068 600*. 00632068=2.792408=monthly payment \$/year. Monthly payment *12=annual cost differential between gas and wood fireplace, \$/year.</p> <p>Energy cost difference on annual Basis. E=Ave. wood used in fireplace, cords/year. T=cost of a cord of wood. S= natural gas fireplace consumption rate, BTU's/ hour. Cost of natural gas, \$/BTU. $(E*T)-(S*U)=V$. $V= (.28*200)-(2538000*.89/100000)=33.41$</p> <p>$O-V=Co$=user cost per year 12.09 annual cost \$/year.</p> <p>$12.09/4,8914g/device=12.09/10.781lbs=\\$12.09/$. $0054tons/device=185.5$ devices/ton=$12.09*185.5=\\$2,242.695$. Per ton</p>
Require that new stove installations be low emitting.	\$3,983.18	Purchase and installation cost of device*capital recovery factor*12=2500*.01322*12=\$396.6/device=annual cost to user.
New and Existing Installations		
9a. Device offsets and upgrade offsets	N/A	It is not possible to accurately quantify this cost before a program has been adopted.

RACM Demonstration for Residential Wood Combustion

The District was required to implement RACM on residential wood combustion sources to comply with the requirements of its previous classification as a moderate PM10 nonattainment area. The District adopted Rule 4901 – Residential Wood Combustion on July 15, 1993 to meet the RACM requirement. As was mentioned in the previous section’s discussion of EPA actions on Rule 4901, on February 7, 2002 EPA identified three deficiencies that needed to be corrected to meet the BACM requirement of the District’s current serious area classification. Therefore, the District concluded that all other provisions of the rule must meet the BACM requirement and also the previous RACM requirement.

Although EPA specified that three provisions were deficient for BACM, it left the question unanswered whether these provisions met RACM. EPA had never acted on the Moderate Area Plan designed to meet RACM nor Rule 4901 to determine if it met RACM. This led to a citizen lawsuit demanding EPA prepare a Federal Implementation Plan (FIP) to ensure that RACM was implemented. Ordinarily, at this late date RACM would not be of concern because a District would not be required to upgrade a rule to RACM when they must also simultaneously upgrade the same rule to the more stringent BACM level. The amount of time needed to implement a RACM change, if one were needed, is no longer than a BACM change. To satisfy the parties of the lawsuit, the District prepared the following analysis to demonstrate that the existing provisions of Rule 4901 meet RACM.

Comparative Analysis of EPA RACM and Rule 4901 Provisions

The District conducted a comparative analysis of the measures recommended by the General Preamble to the Clean Air Act and EPA guidance documents for RACM with Rule 4901. The measures listed by EPA are intended to: 1) reduce emissions from current stoves through inspection, education and shifting to cleaner stoves or fuel; 2) curtail the use of woodstoves or fireplaces during adverse meteorological conditions; and 3) limit future growth in emissions. RACM include the following:

- An Episode Curtailment Program, including: a curtailment plan; a communication strategy to implement the plan; and a surveillance plan (e.g., windshield survey, opacity trigger; and enforcement provisions including procedures, penalties, and exemptions).
- A Public Information Program to inform and educate citizens about stove sizing installation, proper operation and maintenance, general health risks of woodsmoke, new technology stoves, and alternatives to wood heating.
- Improved performance of wood burning devices by:
 - Establishing a program to identify, through opacity observation, deficiencies in stove operation and maintenance. (Under such a

program, advice and assistance should be provided to the identified households to help reduce visible emissions from their devices).

-Providing voluntary dryness certification programs for dealers and / or making free or inexpensive wood moisture checks available to burners.

-Evaluating and encouraging, as appropriate, the accelerated changeover of existing devices to new source performance standards or other new technology stoves (e.g., hybrid design, pellet stoves) by such approaches as subsidized stove purchases tax credits or other incentives.

- Inducements that would lead to reduction in the stove and fireplace population (or use) by:
 - Slowing the growth of wood burning devices in new housing units by taxes, installations permit fees, or other disincentives.
 - Encouraging a reduction in the number of wood burning devices (i.e., removing or disabling the devices) through tax credits or other incentives.
 - Discouraging the resale of used stoves through taxes, fees, or other disincentives.
 - Discouraging the availability of free (or very inexpensive) firewood by increasing cutting fees or limiting the cutting season.

The following summarizes the provisions of District Rule 4901. It describes the current measures and provides justification for considering them RACM:

1. The District's episodic curtailment program contains all of the basic provisions EPA recommends for consideration as RACM. The District's existing program has the following components:

-A public notification program which notifies the public of curtailment periods through the written, oral, recorded messages or any other media the District determines appropriate.

-A curtailment program; the District has established a two-tiered (Level I and Level II) program. Thresholds are determined for each level, through meteorological forecasting and real-time data.

-Exemptions provisions, which include sole source of heat, no natural gas service, and residents above 3000 feet, mean sea level for level

one and level two. An exemption for EPA-phase II wood burning devices for Level I episodic curtailment.

The District curtailment program contains all required elements to meet the qualifications of RACM. Public notification is a key component of this measure. The District has obtained excellent cooperation with local media outlets. This has allowed the District to reach most people living in the Valley. The District's Please Don't Light Tonight program developed innovative and persuasive advertising spots that educated and informed the public on effects from wood smoke. Surveys conducted to determine effectiveness of the program found high levels of public recognition of this program and willingness to follow the curtailment recommendations. Other aspects of the Public Education Program encourage people to reduce or restrict the use of wood burning devices and suggest alternative heating devices. The District proposed rule amendments for Rule 4901 propose a mandatory curtailment program as BACM.

2. The District's public education program covers the full range of wood burning issues. It is designed to educate and inform the public on general health risks associated with wood smoke, the availability of new technology and alternative heating devices and the proper operation of a wood-burning device. Retailers selling or offering for sale new solid fuel burning devices are required to supply public awareness information with each sale of a solid fuel burning device in the form of pamphlets, brochures, or fact sheets on the following topics:

- Proper installation
- Operation and maintenance of solid fuel burning devices,
- Proper fuel selection and use,
- Health effects from wood smoke,
- Weatherization methods for the home,
- Proper sizing of wood heaters.

The District offers informational material to the public to promote good burning habits and alternatives to wood burning. The District's Public Education staff also conducts annual media events to reach the public and educate them on various issues regarding wood burning and wood burning devices. The District's Public Education Program is a crucial part of comprehensive emissions reduction effort. The District has concluded in the previous BACM analysis that our public education program qualifies as BACM; therefore it meets and exceeds RACM requirements.

3. The District has implemented the following measures to improve performance of wood burning devices:

-The District prohibits the sale, offer of sale, or supply of wood through oral or written advertisement that is described or in represented to be

“seasoned wood” unless the wood has a moisture content of 20 percent or less. This measure is intended to discourage the sale of unseasoned wood. The District may delegate to another person or agency the authority to test wood for moisture content and determine compliance. Moisture content of wood shall be determined by ASTM test method D 2016-74, or by such other method as the District shall specify.

-Prohibition of fuel types. The following measure prohibits the burning of the following fuels in solid fuel burning devices: Garbage, treated wood, plastic products, rubber products, waste petroleum products, paints and paint solvents, coal or any other material not intended by the manufacturer for use as fuel in a solid fuel burning device. This measure in conjunction with public education efforts is intended to accustom the public to burning dry wood and to explicitly prohibit the burning of potentially hazardous and toxic materials.

-The District participated in a program called the Great Stove change out. It was designed to encourage the change out of older model conventional wood stoves to newer EPA-approved clean-burning wood stoves, pellet stoves or gas units. The District provided a substantial rebate on the purchase price on EPA-certified wood burning devices. At the time of exchanging an old stove or fireplace insert, the consumer would be granted a discount of between 5 percent and 25 percent on the purchase price of a new, approved unit. The amount of the discount depended upon the model and brand purchased and on the degree of dealer participation. Because the District anticipated the adoption of change-out at time of sale program to meet BACM, the District ended its participation in the program. The District believes that the proposed change-out provision will capture most of those who would be willing to voluntarily participate in the change out to EPA-certified or equivalent devices over time.

Reasoned Justification for Measures not Included in Rule 4901

Episode Curtailment Provisions. EPA recommends voluntary curtailment programs such as the District’s as a RACM option. Rule 4901 does not contain an opacity limit for excessive smoke. A survey conducted for the District by JB Franz Research concluded that the majority of wood burning fireplace and woodstove usage takes place between 6:00 pm and 10:00 pm. During the late evening hours, opacity readings would not be accurate or would be impossible to conduct. The proposed BACM amendments to Rule 4901 will rely on visible emissions and not opacity as evidence of violating burning restrictions, so the opacity issue is moot.

Public Education Provisions. The District’s extensive program contains all provisions recommended by the EPA for RACM.

Improved Wood Burning Performance. The District’s program contains several provisions to encourage improved wood burning performance. The Public Education Program informs burners of appropriate fuel and maintenance considerations. The mandatory provisions regarding wood dryness promote cleaner burning practices.

Inducements to Encourage Changeout of Old Stoves and Less Burning. The District has adopted the following measures that would lead to the reduction of stove and fireplace emissions:

The District participated in the Great Stove Change Out, a program designed to encourage the retirement of older conventional stoves and replace them with newer EPA-certified stoves.

To halt the resale of used conventional woodstoves, after January 15, 1994 no person shall advertise, sell, offer for sale, supply, install, or transfer a used wood heater unless it has been rendered permanently inoperable, or unless it is either; EPA-phase II certified or Oregon-certified or a Pellet-fueled wood heater.

-The Districts Public Education Program has provided information through pamphlets brochures, public meetings, media events on the types of wood best to use for wood burning purposes. Partnering with local retailers the District will inform the public on wood species with the best overall quality, proper storage of wood and best moisture content.

Conclusion

Based on the analysis provided above, the current RWC Rule (1993 version) meets or exceeds RACM requirement. In summary, the Rule:

- Addresses a need for public education,
- Includes a curtailment program,
- Encourages improved performance of wood burning devices and
- Provides inducements that would lead to the reduction of wood burning devices.

In order to provide the “best fit” for the needs of the San Joaquin Valley, the District, adopted and implemented the measures with input from the public.