SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT

STAFF REPORT

Rule 421, Mandatory Episodic Curtailment of Wood and Other Solid Fuel Burning

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BACKGROUND

Particulate matter (PM) is a mixture of very small liquid droplets and solid particles that are suspended in the air. 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). Consequently, the California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (EPA) established ambient air quality standards for PM10 and PM2.5.

Sacramento County does not meet the state ambient air quality standards for PM10 and PM2.5. Sacramento County does not meet the federal 24-hour ambient air quality standards for PM2.5 established in 2006 and is expected to be designated nonattainment. State and federal laws require actions to reduce emissions to meet the standards.

HEALTH IMPACTS

According to the 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.

CARB has estimated both the public health and economic impacts caused by exposure to PM2.5. For the Sacramento Metropolitan Area, CARB estimates that each year:

- 90 people die prematurely;
- 20 people are admitted to hospitals;
- there are 1,200 asthma and lower respiratory symptom cases;
- there are 110 acute bronchitis cases;
- there are 7,900 lost work days;
- there are 42,000 minor restricted activity days; and
- the total economic impact of PM2.5 exposure is over $700,000,000 per year.

LEGAL MANDATES

Federal Mandate: Sacramento County meets the federal PM10 and 1997 federal PM2.5 standards. EPA issued new federal PM2.5 standards, which reduced the allowed 24-hour PM2.5 concentration by almost half, effective December 2006. Staff expects Sacramento to be designated nonattainment for the new federal 24-hour PM2.5 standards. Federal nonattainment designations are expected to be made by EPA in December 2008.

Attainment status is determined by calculating the annual 98th percentile PM2.5 concentration, averaged over a three-year period. States must submit designation recommendations to EPA by December 18, 2007, based on 2004-2006 data. The table below shows that the PM2.5 concentrations measured at Sacramento County monitoring stations from 2004-2006 exceeded the federal standard.

98th Percentile 24-hour PM2.5 Concentration[1] 2004-2006	
Monitoring Station	**µg/m3**
13th and T Street	41.3
UCD Med. Center - Stockton Blvd.	38.7
Del Paso Manor	48.7
2006 Federal Standard	**35**
1997 Federal Standard	**65**

If designated nonattainment, an attainment plan must be submitted not later than 3 years after the effective date of the designation (EPA estimates this to be April 2012[2]). The plan must include transportation conformity budgets and control measures. Transportation conformity budgets will require that future transportation projects stay within specified emission levels that meet attainment and progress goals. Failure to do so can result in withholding federal transportation project approvals and funding.

Because of the potentially significant benefits from this rule, staff evaluated whether this rule might provide additional options to minimize or avoid impacts from federal nonattainment, through; 1) an Early Action Compact or 2) reduced requirements due to early attainment.

Early Action Compacts

EPA approved Early Action Compacts for 33 new federal ozone nonattainment areas in 2002. Those early action compacts required a signed agreement with EPA to 1) approve and submit local strategies designed to attain the federal standards before deadlines in the Clean Air Act and 2) to attain federal standards by prescribed dates. In exchange for these local commitments, EPA agreed to defer for a few years the formal nonattainment designation. The advantage to locals was early health benefits from local strategies and potentially avoiding the following nonattainment

[1] This data was acquired at the three stations located in Sacramento County that have federal reference method monitors. The data is from 2004, 2005, and 2006. The average value is calculated according to procedures specified in Appendix N of Title 40, Code of Federal Regulations Part 50. The procedures require selection of the 98th percentile monitored concentration. For example, in 2006 the top seven readings were excluded from the calculation.

[2] EPA Workshop, PM2.5 Implementation Rule, Chicago, Illinois, June 20, 2007

consequences: 1) the requirement to meet a minimum level of emission reduction to demonstrate Reasonable Further Progress, 2) imposition of RACM - Reasonably Available Control Measures (local controls would still be required but additional flexibility in selection is provided), 3) additional requirements for locating new and modifying existing industrial and commercial sources, and 4) the need for PM2.5 motor vehicle emission budgets and associated Transportation Conformity demonstrations.

EPA rules for the 1997 PM2.5 standards do not allow Early Action Compacts. Staff initiated discussions to request EPA staff establish this opportunity for the 2006 PM2.5 standards. Those 2006 standards affected 38 new nonattainment areas throughout the United States including smaller cities and a few non-urban areas. After consulting with EPA headquarters staff, EPA Region 9 staff recently indicated that they would not consider this option.

Early Attainment

EPA's PM2.5 implementation rule incentivizes early attainment by suspending certain planning requirements (referred to as a "clean data policy") for areas that attain before their plans are due. The suspended requirements include some control measures and an attainment demonstration plan. The Clean Data Policy has been challenged[3] in court and there is no guarantee that we can rely on this provision when the time comes.

Even if the "clean data policy" is overturned, early attainment will provide health benefits and could give the regional additional flexibility in determining which additional measures, if any, must be included in the PM2.5 plan. If the rule does not result in Sacramento attaining the standards before April 2012, then control measures that were excluded from our original SB 656 list would need to be reconsidered, and the threshold for dismissing a measure will be higher. Additional controls that would need to be reconsidered include:

- Controls for non-agricultural open burning, including residential burning of vegetative waste
- Controls for fugitive dust from bulk materials storage and handling
- Design restrictions to reduce fugitive dust from new and modified paved roads
- Control of fugitive dust from agricultural sources such as tilling, off-field operations, paved and unpaved roads, and livestock operations
- Control of chipping and grinding operations, and co-composting with biosolids and/or manure

Other measures adopted in control plans by other nonattainment areas such as the San Joaquin Valley APCD and South Coast AQMD but not yet implemented would need to be considered. These measures include:

- Emission reductions from school bus fleets
- More stringent control efficiency requirements for PM control devices such as baghouses, wet scrubbers, and electrostatic precipitators
- Controls of agricultural and prescribed burning
- Control of emissions from green waste composting

[3] American Lung Association's Nonbinding Statement of Issues, No. 07-1227 et al., National Cattlemen's Beef Association v. Environmental Protection Agency (D.C. Circuit), July 26, 2007

- More efficient residential furnaces

State Mandates: The District is currently designated as a nonattainment area for the state PM10 and PM2.5 standards. SB 656 required ARB to adopt a list of the most feasible and cost effective control measures to make progress towards state and federal PM10 and PM2.5 standards. Districts were then required to adopt an implementation schedule for measures by July 31, 2005. The District analyzed the particulate matter problems and adopted a schedule of control measures to help attain the state ambient air quality standards in July 2005. The following table lists scheduled control measures for wood burning fireplaces and wood burning heaters.

PM Control Measure		Further Study Completed	If Cost-effective Emission Benefit Determined	
			Consideration by the Board	If adopted, Full Implementation Date
1	Require use of USEPA-Certified Phase II or equivalent devices	2006	2007	2008
2	Public Awareness Program with either a voluntary curtailment or mandatory curtailment	2006	2007, if mandatory curtailment needed	2007
3	Require replacement of non-certified units upon sale of property	2006	2007	2008
4	Restrict number of wood burning fireplaces allowed in new residential developments	2006	2007	2008
5	Control of wood moisture content. Prohibit burning materials that are not intended for use in fireplace/heater.	2006	2007	2008

District Rule 417, adopted on October 26, 2006, implemented control measures 1 and 5, and partially implemented control measure 4 by prohibiting the installation of new uncontrolled wood burning fireplaces. Proposed Rule 421 implements control measure 2, Mandatory Curtailment. Control measures 3 and 4, which address replacement of noncertified units upon sale of property as well as density restrictions for new certified wood burning units, will be studied further after the effectiveness of Rule 421 is evaluated. Staff may recommend postponing consideration of these two measures if Rule 421 is adopted.

SUMMARY OF REQUIREMENTS

Rule 421 applies to any person who operates a fire or solid fuel burning device. Rule 421 will:

1. Prohibit wood and other solid fuel fires and the operation of a wood or other solid fuel burning fireplace, stove or insert when a mandatory curtailment is in effect;
2. Require the Air Pollution Control Officer to declare a mandatory curtailment whenever he/she predicts the 24-hour average PM2.5 concentration will exceed 35 $\mu g/m^3$; and

3. Specify the methods by which the Air Pollution Control Officer will notify the public of each mandatory curtailment.

The rule only applies during the months of November through February. The rule does not apply to cookstoves, gaseous fueled fires, fireplaces, stoves or inserts, wood or other solid fuel burning conducted as part of a religious ceremony, or homes where the wood or other solid fuel burning device is the sole source of heat.

Violations of the rule would result in penalties. First-time violators would pay an administrative civil penalty[4] of $50, with the option to attend a wood smoke awareness course in lieu of paying the penalty fee. Penalties for subsequent violations would be determined according to the District's Mutual Settlement Program. The proposed rule includes a provision for the District's Board of Directors to approve an adjustment to the penalty fee for first-time violations as part of the annual budget process.

The second version of the rule, Version B, allows the Air Pollution Control Officer to grant hardship exemptions to households where prohibiting wood or other solid fuel burning would cause economic hardship and the granting of the exemption would not have an adverse impact. In granting or denying the request for the exemption, the Air Pollution Control Officer would consider factors such as the location of the household, the monthly income and number of persons in the household, the types of fuels and heating devices in use, the monthly utility bills, the estimated wood (solid fuel) to be used on a Mandatory No Burn day, and any other relevant factors. The exemption would only be valid for one season and the Air Pollution Control Officer could rescind the exemption at any time if an adverse impact is identified or if he/she finds the information that was relied upon in granting the exemption is incorrect.

2007 WOOD BURNING SURVEY

In an effort to gauge public awareness of fine particulate matter air quality problems and health impacts, and to gauge support and likely compliance with a curtailment program, a random telephone survey of Sacramento County residents was conducted by an independent research firm in April 2007[5]. The survey received responses from 499 county residents, including a subset of 139 who would be classified as low-income residents based on federal guidelines. The margin of error for this survey was +/- 4.9%. Among the key findings are:

- 71% of all respondents would support the adoption of mandatory curtailment restrictions. Among low-income residents, the percentage was nearly identical (73%).
- 78% of respondents who burn wood indicated that they would be likely to comply with a mandatory curtailment.
- 91% of respondents who burn wood indicated that they would be likely to comply with a voluntary curtailment request. However, of those wood-burning respondents who heard this past winter's Spare The Air message, only 46% actually curtailed their wood burning.

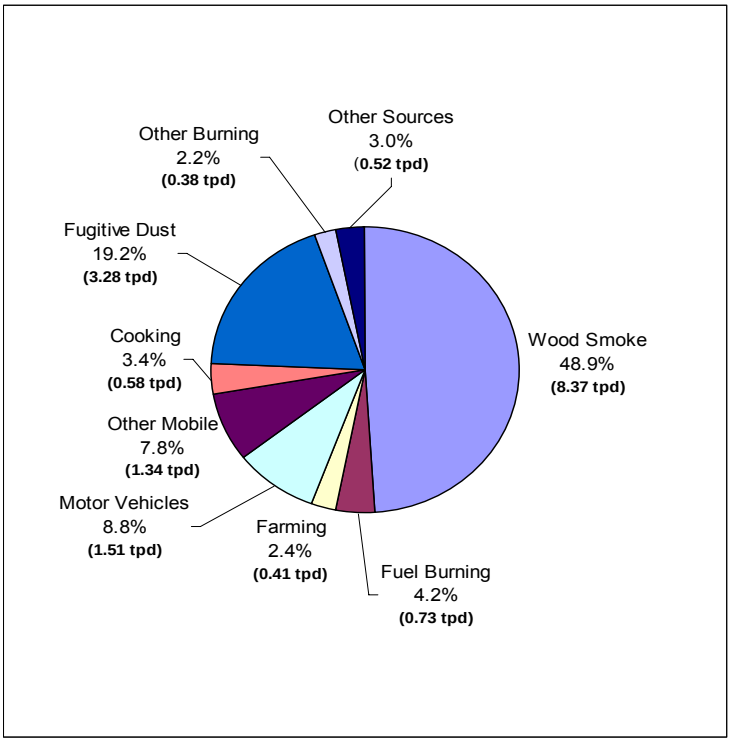
[4] Imposed under authority of California Health and Safety Code Section 42402.5.
[5] The Final Report for the 2007 Wood Burn Research Study, prepared by Aurora Research Group, is included in Appendix D of this staff report.

- 59% of all respondents heard the wintertime Spare The Air requests not to burn this past winter. Among low-income residents, the percentage was 57%.
- Only 20% rated the area's air quality as poor, and only 13% rated wood smoke as a very serious cause of wintertime air pollution.
- No respondents indicated wood burning as their sole source of heat.
- Ownership of at least one wood burning appliance was lower among low-income residents (34%) than among the overall population (54%).
- Among those who reduced their burning of wood last winter, 46% did so because of air quality or health concerns, or because they heard a request not to burn. Among low-income residents, the percentage who reduced their wood burning for these reasons was much lower (26.7%).
- The strongest response to suggested methods of communicating a mandatory curtailment episode was disseminating the information through news outlets, such as television and radio.

EMISSIONS INVENTORY AND REDUCTIONS

Wood smoke is the single largest emissions source, 49%, as reported by the California Air Resources Board's 2006 wintertime PM2.5 emissions inventory for Sacramento County.

2006 Wintertime PM2.5 Inventory by Source[6]



[6] California Air Resources Board, Emission Inventory, Emission Data, Criteria Emissions, Forecasted Emissions by Summary Category 2007 Almanac (Base Year 2006), Winter, PM2.5, 2006, Sacramento Metropolitan AQMD, www.arb.ca.gov/app/emsinv/fcemssumcat2007.php

The California Air Resources Board is responsible for preparing the wood burning emission inventory for Sacramento County. The current CARB inventory (2006) estimates PM2.5 emissions to be 8.37 tons on an average winter day from wood burning in Sacramento County. CARB estimates are based on a 1987 survey conducted in Healdsburg, California that suggested that 0.28 cords of wood is burned per household per year[7].

Using Sacramento-specific data, Staff estimates that PM2.5 emissions from wood burning in Sacramento County are 2,732 - 4,280 tons per year and 22.8 - 35.6 tons on an average[8] winter day. This estimate is based on the UCB/CARB 2003 survey data for Sacramento (Houck) that indicated the usage of wood at 0.92 cords per year. The range of emissions is based on the number and percent of homes that burn from the 2003 survey (Houck) and the 2007 telephone survey (Aurora). If this range of emission estimates was used then the contribution of wood smoke to the overall PM2.5 inventory would be 72% - 80%.

Staff received public comments questioning the high percentage contribution from wood combustion compared to other areas. When expressed as a percentage of a total inventory, Sacramento's inventory may appear larger than areas with other dominant industrial or agricultural sources. But when expressed on a per capita basis, it is consistent with other areas with similar population and climate and lower than more rural counties nearby. The table below summarizes the emissions rates for several areas.

County	Total Emissions Inventory, Wintertime (tons/day)	Wood Smoke Emissions, Wintertime (tons/day)	Wood Smoke Emissions per capita (lbs/person-day)	Wood Smoke Emissions per housing unit (lbs/housing unit-day)	% PM2.5 Inventory from Wood Smoke
Sacramento County	17.09	8.37	0.012	0.032	49%
Butte County	10.12	4.77	0.044	0.120	47%
Fresno County	29.28	4.98	0.011	0.034	17%
Placer County	11.96	6.53	0.040	0.094	55%
Nevada County	11.96	9.54	0.193	0.394	80%
Kern County	29.92	3.90	0.010	0.031	13%
Contra Costa County	15.92	4.72	0.009	0.025	30%
San Joaquin County	12.77	3.19	0.010	0.030	25%
Seattle (King County) Washington	n/a	9.32	0.010	0.024	63%

Note:
1. Emission Information for California counties came from California Air Resources Board, Emission Inventory, Emission Data, Criteria Emissions, Forecasted Emissions by Summary Category 2007 Almanac (Base Year 2006), Winter, PM2.5, 2006, www.arb.ca.gov/app/emsinv/fcemssumcat2007.php
2. 2006 population data and 2005 housing units came from Census data, www.quickfacts.census.gov/qfd/states/06/06007.html
3. The 63% wood smoke contribution is reported in Puget Sound area, "Next Ten Years Fact Sheet – Fine Particulate Matter"
4. The Kings County Emission Information came from email to Hao Quinn from Agyal Kwame, 8/27/07

[7] California Air Resources Board, Area Source Methodology, Section 7.1, Residential Wood Combustion, Revised July 1997

[8] Based on a 120-day winter

Additionally, data collected[9] from the air monitoring stations on a small sample of high particulate matter days suggests that the directly emitted wood smoke portion of the ambient filter samples is 37%. Some unknown fraction of the aerosol components (ammonium nitrate and ammonium sulfate) cannot be ascribed to any individual source category but would include some fraction of NOx from wood burning. Therefore, air monitoring data corroborates the CARB emissions inventory estimates.

The primary effect of the proposed rule will be to reduce PM2.5 concentrations on peak days, reduce adverse health effects particularly for those in sensitive groups, and make progress to attain the state and federal annual and 24-hour health standards.

The emission reductions have been calculated based on both the CARB emission inventory from above and based on the higher emission inventory with the usage patterns from the UCB/CARB 2003 survey data or the 2007 telephone survey. The calculations in both cases assume a compliance rate of 78% based on the telephone survey. The San Joaquin Valley APCD assumed a compliance rate of 80% when they adopted their mandatory no burn rule. Actual air quality benefits from this program depend on several factors, including the accuracy of the PM2.5 forecasts and effectiveness of the public outreach efforts to educate wood burning residents, the actual compliance rates, and weather. Weather is the most significant factor in the buildup of pollution.

Staff used Sacramento-specific survey data as an alternative to the CARB methodology. Emissions are based on the following demographic data. The ranges in the data are due to the differences in information between the previous survey (Houck) and the most recent phone survey (Aurora). The Houck survey reported fewer homes with wood burning devices, but a higher percentage of the homes indicated they used their device than the Aurora telephone survey. Based on these two data sources, in Sacramento County:

- 155,600 – 195,800 residences have fireplaces
- 79,100 – 91,900 residences have wood stoves
- 26,400 – 30,600 residences have wood burning inserts
- 2,000 – 15,100 residences have pellet stoves

Of the homes with wood burning equipment:

- 101,200 – 139,000 residences with fireplaces burn wood
- 51,400 – 78,100 residences with wood stoves burn wood
- 17,100 – 26,000 residences with wood burning inserts burn wood
- 2,000 – 9,800 residences with pellet stoves burn pellets
- 57% use wood burning fireplaces or fireplace inserts more for aesthetics
- 43% use wood burning fireplaces or fireplace inserts more for supplemental heating

The average wood usage per residence is based on Houck survey responses.

- Fireplace Users - 0.92 cords per year
- Wood Stove Users – 1.5 cords per year
- Pellet Stove Users – 4,000 pounds per year

The table below summarizes the inventory and potential emission reductions from both the CARB

[9] "Final Staff Report SB 656 Assessment and Control Measure Evaluation", SMAQMD July 28, 2005

emission inventory and the inventory prepared from Sacramento-specific survey data. Detailed calculations and data sources are presented in Appendix C.

Emission Inventory and Emission Reductions

Pollutant	CARB Inventory Tons/day		SMAQMD Estimates Tons/day	
	Inventory	Reductions	Inventory	Reductions
PM10	8.69	6.78	23.67 – 36.96	18.43 – 28.86
PM2.5	8.37	6.53	22.8 – 35.6	17.75 – 27.8
NOx	0.71	0.49	3.8 – 4.1	2.5 – 2.9
CO	65.9	51.30	275 - 317	214 – 247

COST IMPACT

Section 40703 of the California Health and Safety code requires that the District consider and make public its findings relating to the cost effectiveness of implementing an emission control measure.

Cost to Businesses: Hotels and restaurants with solid fuel burning devices would have a cost savings from reduced wood use, because they burn wood for aesthetic purposes. Staff does not have information to quantify the impact, if any, to these businesses due to the loss of ambiance. There will be a cost impact to wood retailers, because mandatory curtailment will reduce the amount of wood burned by the public, and therefore, the amount of wood sold by retailers. The estimated cost of the wood products not burned on a mandatory curtailment day is $55,920 – $216,460 or $1,677,460 - $6,493,800 over the entire winter season.

Cost to Public: The majority of the people affected by the rule burn wood for ambiance and would have cost savings from reduced wood use. For people who use wood as their primary or supplemental heat source, there will be a shift in costs from wood to an alternate source for heat. Anecdotal information from comments during public workshops suggests that some consumers may have reduced heating costs from using wood or pellets as a supplemental heat source. The data below shows that it costs less per unit of heat delivered to use natural gas or electricity than to use wood[10]. Reported cost savings may result from personal comfort choices and/or because supplemental sources heat main living areas while other rooms remain cooler than the home's alternative heat source would provide, resulting in a net reduction in heat delivered. Staff cannot rely on anecdotal information to estimate community scale impacts.

[10] In the case that free wood is delivered to the residence at no cost, there would be an increase in fuel cost.

Heating Device	Thermal Efficiency	Fuel Cost per MMbtu
Fireplace	7%	$267.76
Certified Wood Stove	63%	$29.75
Pellet Stove	76%	$20.56
Propane Fireplace	75%	$27.67
Natural Gas Fireplace	75%	$15.07
Electric Fireplace	>99%	$23.39
Gas Central Heat & Air	80%	$14.13
Electric Central Heat & Air	100%	$23.39
Propane Central Heat & Air	80%	$25.94

Note:
1. used as primary source of heat
2. PG&E rates for natural gas (2007)
3. SMUD rates for electricity (2006)
4. Average cost of cord of wood = $215, average cost of pellets = $250/ton, and Cost of propane = $1.899/gallon

The average cost of heating a home with a wood stove for 30 days is $181, while the cost is $142 for electricity and $92 for natural gas.

Under Version B of the rule, if adopted, for households where it would be an economic hardship to not burn wood and the granting of an exemption would not cause an adverse impact, the rule allows the Air Pollution Control Officer to issue hardship exemptions.

Overall Rule Cost Effectiveness: A cost effectiveness of the rule can be calculated by using the cost (lost sales for wood suppliers, program cost to the District). In this case the cost effectiveness is estimated to be $3.99 - $4.72 per pound of PM2.5[11]. To put these costs into perspective, it is useful to compare the cost effectiveness for other District rules. District Rule 417, Wood Burning Appliances, cost $4.19/lb of PM2.5 in today's dollar. It should be noted that most of the District's existing rules are for controlling ozone precursors, usually VOC or NOx. Although this rule is not specifically a NOx reduction strategy it does achieve NOx reductions. The cost effectiveness of this rule on a NOx + PM2.5 basis is $3.66 - $4.39 per pound of NOx + PM2.5. The 2005 amendments to District Rule 411, NOx from Boilers, Process Heaters and Steam Generators cost $13.90/lb of NOx. The cost effectiveness of the gasoline dispensing regulations (Rule 449, Transfer of Gasoline into Vehicle Fuel Tanks; 12/17/1991 rule amendments) is at the higher end of the cost effectiveness range, costing $17/lb of VOC in today's dollars. Rule 452, Can Coating (8/21/1990 rule amendments), is at the low end of the range at a cost of $1/lb of VOC in today's dollars.

Cost to the District: The implementation and costs to the District for Rule 421 fall into three general areas; 1) forecasting PM2.5 air quality, 2) public outreach to educate and inform individuals, and 3) enforcement/compliance.

The first two areas will build on our long history and expertise in public outreach for ozone. Since 1995, the District has managed and provided forecasting through a contractor for the summer

[11] The cost effectiveness estimate used the CARB inventory for the low end and SMAQMD inventory for the high end.

Spare The Air program on behalf of the air districts of the Sacramento region. In 2006, the District and its forecast contractor expanded air quality forecasting to provide regional winter PM2.5 forecasts, which included the Placer County and Yolo-Solano air districts. This phase of winter PM2.5 outreach aligned with the Spare The Air program by using the same forecasting team and associated contacts within the community. Basic public relations efforts such as press releases and faxes were utilized last season by District staff, but no enhanced forecasting was developed and no paid advertising or outreach were used.

If Rule 421 is adopted, additional contract effort will be required to refine the forecasting tools to focus on forecasting Sacramento County PM2.5 violations of the federal 24-hour health standard, rather than the region's air quality in general. Staff estimates the cost of this additional forecasting effort to be $28,000 the first year with approximately $8,000 being required for each subsequent year.

In addition, significant additional staff time and media outreach efforts will be undertaken to educate the public about the health effects of particulate matter pollution, and Rule 421's implementation in particular, to encourage compliance. This program will be called Check Before You Burn.

Public outreach information about Check Before You Burn will appear on District Web sites and through the existing Air Alert notification program. Due to the mandatory nature of Rule 421, a more comprehensive outreach program will be undertaken, which may include direct mail, print advertisements and press releases in local and ethnic community newspapers, radio commercials, print materials in multiple languages distributed by volunteer community groups and businesses, and District compliance inspection staff. The program will also leverage awareness through free media opportunities including using existing contacts with local broadcast meteorologists.

The total program cost for these comprehensive outreach efforts is estimated to be approximately $160,000 for the first year. Subsequent years should maintain this same level of outreach funding in order to achieve maximum awareness and compliance with Rule 421.

Compliance with the rule will be determined by visual inspection to determine if solid fuel burning is occurring. Indoor use of burning devices will be detected by observing smoke from chimneys or flues. Financial penalties may be assessed for violations of Rule 421 based on the fee set in the rule and the District's existing Mutual Settlement Program. The estimated staff resources for the enforcement/compliance effort are 0.4 FTE, specifically for the following.

1) Surveillance by inspection staff on forecasted no burn days for at least 1 hour per day per inspection staff.
2) Responding to all reported burning or smoke complaints from the public.
3) Compliance school provided at no cost to first-time violators. This is currently anticipated to be given by the Business Environmental Resource Center under our existing contract for compliance assistance efforts.

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 requires discussion of:

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.

Type of industry or business, including small business, affected by the rule: Rule 421 applies to the use of solid fuel burning appliances and fires. This rule will affect small businesses, as well as the general public. Examples of small businesses affected are wood suppliers, restaurants, and hotels. Anyone in the general public who burns wood or other solid fuel will also be affected by this rule.

Impact of Rule 421 on employment and the economy in the District: The industry most affected by this rule is wood suppliers. This includes wood lot dealers, and more decentralized wood sales, such as wood bundles bought at a grocery store. At present, there are only a handful of wood lots located in Sacramento. Wood product sales are expected to be reduced $1,677,460 – $6,493,800 per year from wood not being used. Some of this reduction will be diverted to an increase in natural gas use. No comments on employment impacts were received during the public meetings.

There is an expected cost savings to the public. As discussed in the cost impacts section, any cost of using an alternative source for heat would be offset by the fact that the dollar cost per heat unit is greatest for wood among typical fuel sources. The average cost of heating a home with a wood stove for 30 days is $181, while the cost is $142 for electricity and $92 for natural gas.

Range of probable costs of Rule 421: This rule in not expected to have any net cost increase to households for compliance with the rule.

Availability and cost-effectiveness of alternatives to Rule 421: Alternatives to the proposed rule include:

- Adopting different PM2.5 concentration thresholds for mandatory curtailment;
- Relying on voluntary curtailment instead of mandatory curtailment;
- Allowing certain classes of wood burning devices, certified wood or pellet stoves or inserts, to operate as part of an additional voluntary or on some mandatory curtailment days; and
- Adopting alternative control measures such as requiring replacement of noncertified devices upon sale of property and/or limiting the number of devices allowed per acre.

Threshold alternative
An important aspect of the mandatory curtailment program is setting the level at which a curtailment is declared. A lower threshold will result in reducing adverse health effects and more curtailment days.

In determining what threshold to set for the mandatory curtailment, the historical PM2.5 data for the last few years were examined to determine possible effects. The following table shows the number of days each winter that exceeded certain 24-hour thresholds.

Days Above PM2.5 Thresholds from BAM Monitors				
Season	65 µg/m^3	53 µg/m^3	40.5 µg/m^3	35 µg/m^3
2004	2	2	12	23
2005	4	6	15	20
2006	3	6	28	37
Average	**2**	**5**	**18**	**27**

The thresholds above are tied to the following:

65 µg/m^3 – 1997 federal 24-hour standard
53 µg/m^3 – 127 AQI, 2006 level at which voluntary curtailment called
40.5 µg/m^3 – Equivalent to 100 on the current AQI scale, the dividing line between moderate air quality and unhealthy for sensitive groups
35 µg/m^3 – New 2006 federal 24-hour standard, 89 AQI

Staff recommends setting the curtailment threshold to match the current federal 24-hour health standard. Using this criterion, a mandatory curtailment will be called when the 24-hour average PM2.5 concentration is predicted to exceed 35 µg/m^3.

The cost effectiveness values of each of these alternative thresholds are nearly identical to the proposed threshold, because the emissions benefits and the majority of costs are proportional to reduction in wood use. The proposed threshold of 35 µg/m^3 is the federal 24-hour health standard for PM2.5 and therefore provides for protection of public health. The other options essentially allow continued burning on days that air quality is forecasted to be unhealthy even though wood burning significantly contributes to that poor air quality.

Voluntary program alternative
A key difference in the effectiveness of a voluntary curtailment versus a mandatory curtailment is the level of compliance. Questions about changes in wood burning behavior were included in the 2007 Wood Burning Survey in an effort to gauge the level of compliance. While a similar number of respondents indicated they would comply with both a voluntary and mandatory curtailment (83% and 85%), the actual level of compliance with the voluntary curtailment was significantly lower. Of those wood-burning respondents who heard this past winter's Spare The Air message, only 46% actually curtailed their wood burning. This translates into only a 27% reduction (46% of 59%) in wood burning on voluntary curtailment days. This compliance rate is not expected to bring Sacramento into compliance with the health-based standards.

Certified devices alternatives

Since 1992, EPA has required that certain wood stoves be designed to meet established emissions standards[12]. Manufacturer's brochures suggest that pellet stoves and inserts also emit less than EPA certified wood stoves. Three alternatives were considered 1) add a voluntary no burn component, or 2) create a two-stage mandatory no burn rule, or 3) allow certified devices to burn on all mandatory no burn days.

Voluntary no burn program

The first alternative would expand the no burn program, by adding a voluntary no burn program that allows certified devices and pellet stoves to operate on days forecast to exceed a specified level below the mandatory no burn threshold, but recommends that non-certified devices not be operated. Staff evaluated a 30 µg/m^3 threshold. Staff anticipates that this would result in an average of 33 days per year (about 6 more than the proposed 35 ug/m^3 threshold no burn days, albeit voluntary) for those without certified devices or pellet stoves. The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) and Puget Sound, Washington both included this type of voluntary component. They both prohibit the use of all devices, including certified devices, at a poorer air quality levels. San Joaquin Valley established their program to address violations of the federal PM10 standards. Plans are due for the 1997 PM2.5 standards in 2008, and they have not yet addressed the 2006 PM2.5 standards. Puget Sound is not a federal nonattainment area and is not expected to be nonattainment for the new PM2.5 standards. The Board of Directors could direct staff to implement this type of voluntary program without regulatory language.

Modified mandatory no burn program

The second alternative is to modify the mandatory no burn program to allow certified devices or pellet stoves to operate on either 1) days forecast to exceed 30 µg/m^3 but less than 35 µg/m^3, or 2) some level above the recommended 35 µg/m^3 level, but below a higher threshold, or 3) allow certified devices to operate on all mandatory no burn days.

Mammoth Lakes and Denver established rules 12-20 years ago to address federal PM10 nonattainment problems. Albuquerque also established rules at this same time but were not nonattainment for PM10. All three areas allow certified devices to burn on mandatory no burn days. Their rules were put in place about the time EPA issued certification requirements. This early effort to educate consumers when certified devices were first appearing on the market may have eased implementation difficulties. None of these areas is expected to violate federal PM2.5 violations.

Special requirements for certified devices are not recommended for several reasons:

1. While certified devices and pellet stoves are designed to pollute less than fireplaces and non-certified wood stoves, their emissions are about an order of magnitude higher than gaseous fueled devices.

Comparison of Emission Factors

Technology	PM2.5 Emission Factor (lb/mmBtu)
Certified Wood Stove	1.85
Pellet Stove	0.69
Propane Fireplace	0.01

[12] EPA's Standards of Performance for New Stationary Sources: Residential Wood Heaters

Natural Gas Fireplace	0.01
Electric	None

2. Certified devices and pellet stoves can smoke if not installed or operated properly. Prohibiting all wood smoke, whether from a certified device or uncontrolled fireplace, is most appropriate for air quality and equity reasons.
3. Collectively, certified wood and pellet stoves and inserts comprise 7% of the wood burning emissions. This percentage will increase as new devices are installed or older devices replaced, particularly since no new fireplaces may be installed after October 2007, and new developments must use either gas fireplaces or certified equipment. All emissions reductions contribute to attainment of federal health standards.
4. Although pellet stoves are easily recognizable to the public, certified wood stoves are not easily distinguished from non-certified wood stoves. To know whether you have a certified stove you either need to know when the device was purchased (after 1992), or check the model number of the stove (located on the back or side of the device) and look it up on EPA's Web site. This may be difficult for some residents and would make enforcement more difficult.
5. Independent public opinion surveys reported that only 13% of residents rate wood smoke as a very serious cause of wintertime air pollution. Public education staff and our consultants stress the importance of creating a simple message as a key to the success of Rule 421 outreach efforts. Creating additional complexity will further burden an already difficult educational effort.
6. Although manufacturers suggest that creating special provisions for certified devices will increase compliance, no data has been provided or is available that substantiates these assertions.
7. Manufacturers also suggest that not allowing certified devices to operate on some or all no burn days reduces the incentive to replace dirty devices with cleaner burning alternatives. No data has been provided to substantiate that assertion. Replacing dirty devices with cleaner burning alternatives is fairly expensive. The capital and operational costs are likely to be more significant factors in determining whether to replace dirty devices, and the choice of which devices to select. The District's incentive program provides the greatest incentive to install gaseous fueled devices. Voucher data suggests that 60% of incentive program participants choose gaseous fueled devices. Staff can track this and propose modifications to incentives or rule requirements if participation levels drop.

	Cost of Devices[13]	Thermal Efficiency	Fuel Cost	Voucher incentive	
			$ per MMBtu	Non-EJ	EJ
Wood Stove	$600-2900	63%	29.75	$250	$400
Wood Insert	$1100-3000	63%	29.75	$250	$400
Gas/Propane Stove	$1000-2700	75%	27.67	$350	$500
Gas Insert	$1400-3500	75%	15.07	$350	$500
Pellet Stove	$1200-4100	76%	20.56	$350	$500
Pellet Insert	$1400-3800	76%	20.56	$350	$500
Electric fireplace	~$300	>99%	23.39	$0	$0

[13] Installation costs are pretty similar $350-500 and additional material costs had a wide range from $250-1000 depending on the specifics of the installation. Installation and material costs for electric fireplaces are 0-$75.

Additional Control Measure alternatives
Two additional wood burning control measures were included on the SB 656 Further Study schedule. They include replacement of non-certified units upon sale of property, and density restrictions for all wood burning appliances. These measures are not mutually exclusive, and each can provide emissions reductions in addition to those provided by proposed Rule 421. If they are found to be feasible, these measures could be considered for adoption in 2010. Therefore, these alternatives were not included in Rule 421.

The emission reduction potential of Rule 421: The proposed rule will achieve the following emission reductions (See discussion under Emissions Impact):

Emission Inventory and Emission Reductions

Pollutant	CARB Inventory Tons/day		SMAQMD Estimates Tons/day	
	Inventory	Reductions	Inventory	Reductions
PM10	8.69	6.78	23.67 – 36.96	18.43 – 28.86
PM2.5	8.37	6.53	22.8 – 35.6	17.75 – 27.8
NOx	0.71	0.49	3.8 – 4.1	2.5 – 2.9
CO	65.9	51.30	275 - 317	214 – 247

Moreover, the rule may reduce the numbers of days that the county exceeds the federal 24-hour PM2.5 standard.

The necessity of adopting, amending, or repealing the rule or regulation to attain state and federal ambient air standards: Rule 421 is necessary to comply with feasible and most effective control measures requirements of SB 656 and to provide emission reductions that contribute to attainment of the state and federal PM2.5 standards and state PM10 standards.

OTHER FACTORS:

Technological Feasibility: Staff evaluated the technological feasibility of the proposed rule. Mandatory curtailment programs have been implemented in the San Joaquin Valley Unified APCD and areas of Colorado, New Mexico, and Washington State, and have been demonstrated to be feasible.

Enforceability: Compliance with the mandatory curtailment program will be enforced with visual inspection to determine if burning is occurring. Indoor use of wood burning devices will be detected by observing smoke from chimneys or flues. Fines of $50 would be issued to first-time violators, increasing for further violations. First-time violators would be allowed to attend an instructional class in lieu of paying the fine. Subsequent violations will be processed under the District's existing Mutual Settlement Program.

Public Acceptability: A number of districts have adopted similar measures, which have been in effect for several years (see table below).

District or Location	In Effect Since
San Joaquin Valley APCD	2003

Denver, Colorado	1987
Puget Sound, Washington	1995
Mammoth Lakes, California	1990
Bernalillo County (Albuquerque), New Mexico	1995

The April 2007 survey, by Aurora, of Sacramento County residents gauged support and likely compliance with a curtailment program. The survey indicated that 71% of all respondents would support the adoption of mandatory curtailment restrictions. Among low-income residents, the percentage for support was 73%. Additionally, 85% would likely comply with a mandatory curtailment.

SECTION 40727.2(a) ANALYSIS OF RULE 421

Section 40727.2(a) of the Health and Safety Code mandates that the District prepare a written analysis of the proposed Rule. Section 40727.2(a) also allows the District to put this analysis in a matrix form. The matrix analysis of Rule 421 is presented as Appendix A.

PUBLIC COMMENTS

Staff conducted eight public workshops throughout Sacramento County between July 23rd and August 1st. One of them included a structured presentation, on July 26, 2007. The other seven were held in an open house format to encourage conversational dialogue with affected residents and businesses.

Workshop Location	Date	Time
Tsakopoulos Library Galleria 821 I Street, East Meeting Room, Sacramento	July 23	6:00 p.m.
La Sierra Community Center Gibbons Room 700 5325 Engle Rd., Carmichael	July 24	6:00 p.m.
Rancho Cordova City Hall 2729 Prospect Drive, Rancho Cordova	July 25	6:00 p.m.
SMAQMD District Office 777 12th Street, 3rd Floor, Sacramento	July 26	1:30 p.m.
Laguna Creek High School Multipurpose Room 9050 Vicino Drive, Elk Grove	July 26	6:00 p.m.
Orangevale Community Center Meeting Room B 6826 Hazel Avenue, Orangevale	July 30	6:00 p.m.
Chabolla Center 610 Chabolla Avenue, Galt	July 31	6:00 p.m.
Folsom Community Center, Ballroom 52 Natoma Street, Folsom	Aug. 1	6:00 p.m.

Noticing for these public meetings included:

- Letters to all elected officials in Sacramento County
- Ad in the Metro Section of the Sacramento Bee
- Notice to 15 newspapers for inclusion in the calendar sections
- Notice to 18 radio stations and 10 television stations
- Letters to 50 homeowners associations and 51 neighborhood associations
- Notice on the District's Web site
- Notices by mail to the District's list of parties interested in rule development
- Notices also sent to senior centers, adult education centers, and community centers.

In addition, staff conducted stakeholder meetings on August 6th and 8th. The stakeholder meetings were attended by the Asian Pacific Chamber of Commerce, the Cleaner Air Partnership, the Natomas Chamber of Commerce, the Buffalo Chips, and HDR. Staff was requested to present Rule 421 at the La Raza Network monthly meeting and that occurred on September 6, 2007.

Staff received comments and questions at the open houses and stakeholder meetings as well as written comments through the mail and e-mail. Comments and responses are listed in Appendix E.

Staff also presented Rule 421 at the city councils in Sacramento County. The table below lists those city council meetings.

Council	Meeting Date/Time
City of Elk Grove	August 22, 2007/6:00 pm
City of Folsom	August 28, 2007/6:30 pm
City of Sacramento	September 11, 2007/6:00 pm
City of Isleton (Not confirmed)	September 12, 2007/7:00 pm
City of Citrus Heights	September 13, 2007/7:00 pm
City of Rancho Cordova	September 17, 2007/5:30 pm
City of Galt	September 18, 2007/7:00 pm

ENVIRONMENTAL REVIEW AND COMPLIANCE

Rule 421 was created as part of the response to the requirements of Senate Bill 656 that the District implement cost-effective control measures for particulate matter emissions. Staff finds that the proposed rule is 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. The proposed rule will not increase emissions and will not cause any significant adverse effects on the environment; therefore the Environmental Coordinator has concluded that no environmental impacts will be caused by compliance with the proposed rule.

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.

Rule 421 – Required Findings

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 Rule 421 by California Health and Safety Code (HSC) Sections 40001, 40702, 40716, 41010, 41013 and 42402.5. [HSC Section 40727(b)(2)].
Necessity: The District must find that the rulemaking demonstrates a need exists for the rule, or for its amendment or repeal.	The District is required by HSC Section 39614 (SB 656) to adopt the most cost-effective local measures for controlling particulate matter from the list developed by CARB. Rule 421 implements a wood burning measure from the CARB list. [HSC 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.	The District has reviewed the proposed rule and determined that it can be understood by the affected parties. In addition, the record contains no evidence that people directly affected by the rule cannot understand the rule. [HSC 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 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. [HSC 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.	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. Rule 421 does not duplicate the federal requirements because it requires curtailment of use of any fires or solid fuel burning device on certain days. [HSC 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.	In adopting the proposed rule, the District is implementing the requirements of HSC Section 39614 (SB 656). [HSC Section 40727(b)(6)].
Additional Informational Requirements: In complying with HSC 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.	The matrix included in Appendix A compares Rule 421 to the applicable federal and District requirements. [HSC Section 40727.2].

REFERENCES

1. Broderick, David R., and Houck, James E. 2003. “Emissions Inventory Improvement Program (EIIP) Residential Wood Combustion Coordination Project”

2. Dominici, Francesca, Peng, Roger D., Bell, Michelle L., Pham, Luu, McDermott, Aidan, Zeger, Scott L., and Samet, Jonathan M. “Fine Particulate Air Pollution and Hospital Admission for Cardiovascular and Respiratory Diseases” *The Journal of the American Medical Association*, Vol. 295, No. 10, March 8, 2006.

3. Houck, James E., Scott, Andrew T., Sorenson, Jared T., Davis, Bruce S., and Caron, Chris. “Air Emissions Comparisons Between Cordwood and Wax-Sawdust Firelogs Burned in Residential Fireplaces”

4. Houck, James. 2003. “Results of Wood Burning Survey – Sacramento, San Joaquin, and San Francisco Areas, University of California Berkeley/California Air Resources Board – GIS Study”

5. Morley Chavero, Dawn, Holobow, Naomi E., “2007 Wood Burn Research Study”, May 2007

6. STAPPA-ALAPCO, EPA, Emissions Inventory Improvement Program. (EIIP) 2001. “Residential Wood Combustion”, Volume III, Chapter 2

7. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources, AP-42, Section 1.4 – Natural Gas Combustion, 1998

8. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources, AP-42, Section 1.9 – Residential Fireplaces, 1996

9. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources, AP-42, Section 1.10 – Residential Wood Stoves, 1996

10. 2006 Winter Emission Inventory for PM2.5, Sacramento County, 2007 CARB Almanac, 2006 Baseline, extracted 8/23/2007

Appendix A
40727.2 Matrix

		Comparative Requirements		
Elements of Comparison	**Specific Provisions**	**Proposed Rule 421**	**Rule 417**	**40CFR60 Subpart AAA**
Exemptions		Cookstoves Sole source of heat Religious Activity If Version B is adopted, Economic Hardship Gaseous fueled appliances	Cookstoves	Open masonry fireplaces constructed on site Boilers Furnaces Cookstoves Devices with air-to-fuel ratio > 35-to-1, minimum burn rate > 11 lb/hr, firebox > 20 cubic ft, or weight > 1,760 lb
Averaging Provisions		none	none	none
Units		none	g/hr	g/hr
Emissions Limits		none	Catalytic Units: 4.1 g/hr Non-Catalytic Units: 7.5 g/hr	Catalytic Units: 4.1 g/hr Non-Catalytic Units: 7.5 g/hr
	Compliance alternatives	none	Pellet stoves, masonry heaters	none
Operating Parameters		Prohibits operation on days with PM2.5 concentration projected above 35 $\mu g/m^3$.	Prohibits burning trash and other specified fuels	none
Work Practice Requirements		none	Wood advertised by retailers as “seasoned” or “dry” must contain less than 20% moisture.	none
Monitoring/ Records	Recordkeeping	none	none	none
	Frequency	none	none	none
Monitoring/ Testing	Test Methods	none	Wood Moisture Content, ASTM D4442-92	Test methods: -PM: Method 28 -Emissions Concentration, if a dilution tunnel sampling location uses: Method 5G -Emissions Concentration, if a stack location is used: Method 5H

Appendix B
SUMMARY OF PROPOSED RULE
Rule 421, Mandatory Episodic Curtailment of Wood and Other Solid Fuel Burning

SECTION NUMBER	PROPOSED LANGUAGE
101	Sets the purpose of the rule to limit PM emissions from solid fuel burning in fires or in specified devices.
102	Sets the rule applicability to anyone that operates a wood burning device or fires.
103	Incorporates the District's standard severability language in case the rule is challenged in court.
110	Sets an exemption for gaseous fuel fired devices.
111	Sets an exemption for cookstoves.
112	Sets an exemption for wood burning devices that are the sole source of heat in a residence.
113	Sets an exemption for fires conducted as part of a religious ceremony.
114 in Version B of the rule	Sets an exemption for persons who are granted a Hardship Waiver.
201	Sets the definition of a cookstove as described in 40 CFR 60.531.
202	Sets the definition of fire as a solid fuel fire not in a wood burning device.
203	Sets the definition of a fireplace as any permanently installed masonry or factory built device designed to operate with solid fuel.
204	Sets the definition of a pellet-fueled wood burning heater as any wood burning heater which is operated on compressed pellets of wood or other biomass material.
205	Sets the definition of season to the entire four consecutive months of November, December, January, and February.
206	Sets the definition of sole source as the only permanent source of heat that is capable of meeting the space heating demands of a residence.
207	Sets the definition of solid fuel to any wood, non-gaseous, or non-liquid fuel consistent with Rule 417.
208	Sets the definition of a wood burning device as any fireplace, wood burning heater, pellet-fueled wood burning heater, or any similar indoor or outdoor device burning any solid fuel used for aesthetic or space-heating purposes.
209	Sets the definition of a wood burning heater as an enclosed, wood burning appliance capable of, and intended for space heating as described in 40 CFR 60.531.
301.1	Prohibits the operation of a wood burning fire or wood burning appliance whenever a mandatory curtailment is in effect.
301.2	Requires the Air Pollution Control Officer to declare a mandatory curtailment whenever he/she determines the 24-hour average PM2.5 concentration may exceed 35 $\mu g/m^3$.
401	Specifies the methods by which the Air Pollution Control Officer will notify the public of each mandatory curtailment.
402	Sets an administrative civil penalty of $50 for first-time violations, pursuant to HSC Section 42402.5. Provides for an adjustment to this penalty if approved by the District Board of Directors. Subsequent violations will be subject to a penalty under the District's Mutual Settlement Program, similar to violations of other District rules.
403 in Version B of the rule, if adopted	Allows the Air Pollution Control Officer to issue waivers for economic hardship if there is a documented compelling reason and the waiver will not have adverse impacts.

Appendix C

Rule 421, Mandatory Episodic Curtailment of Wood and Other Solid Fuel Burning

Emissions Calculations

The baseline emissions are based on historical usage patterns. Emissions are calculated as follows:

Emissions = (Number of Homes) x (fraction of homes w/ device) x (fraction of homes w/ device that burn) x (Average amount of wood burned per home) x ($EF_{burning}$)

This calculation is repeated for each type of device, and the totals are summed. These emissions are assumed to all be emitted during the winter season, which includes 120 days.

The reduction from a day of mandatory curtailment is calculated by taking $1/120^{th}$ of the total calculated emissions, and adjusting this amount by the expected compliance rate, based on survey data. The total reduction for the season is calculated as the daily reduction times the expected number of days of mandatory curtailment (30 days).

The variables used and the calculations are summarized in the following tables:

Wood Burning Statistics & Information			
Information			**Source**
New Residence Construction	20000	Units per year	Nevin, 2006
Total Residences	502142	Units	SACOG Projections 12/16/04
% of Homes w/ fireplace	39%		Houck, 2003
% of Homes w/ fireplace that burn wood	71%		Houck, 2003
% of Homes w/ fireplace that burn Manufactured logs	35%		Houck, 2003
% of Homes w/ stove that burn wood	85%		Houck, 2004
% of Homes w/ firepit, chiminea	5%		
Average Wood Usage Per Household that burns wood	0.92	cord/home	Houck, 2003
Average Manufactured Log Use Per Household that	19	Log/yr	Houck, 2003
Average Wood Use Per Household that burns wood	1.5	cord/home	Houck, 2003
Average Pellet Use Per Household that burns wood	4000	lb/yr	Houck, 2004
Average Wood Use Per firepit, chiminea	0.62	cord	Yu
Percent of Wood that is Purchased	51.4%		Houck, 2003
Heating Value of Wood	6,050	Btu/lb	Representative of Certifed Units
Heating Value of Manufactured Log	15,700	Btu/lb	Houck, Wax-Sawdust Firelogs
Uncontrolled Fireplace EF	34.6	lb PM_{10}/ton of wood	AP 42 1.9
Uncontrolled Stove EF	30.6	lb PM_{10}/ton of wood	AP 42 1.10
Controlled (non-catalytic) Fireplace EF	14.6	lb PM_{10}/ton of wood	AP 42 1.10
Manufactured Log EF	10.7	lb PM_{10}/ton of log	Houck, Wax-Sawdust Firelogs
Pellet Stove EF	8.8	lb PM_{10}/ton of wood	AP 42 1.10
NG PM10 EF	0.007	lb/MMBtu	AP 42 1.4
NOx EF	2.6	lb/MMBtu	AP 42 1.9
CO EF Fireplace	352.6	lb/ton of wood	AP 42 1.9
CO EF Uncontrooled Stove	230.8	lb/ton of wood	AP 42 1.10
CO EF Phase II Stove	140.8	lb/ton of wood	AP 42 1.10
CO EF Pellet Stove	39.4	lb/ton of wood	AP 42 1.10
Thermal Efficiency Fireplace	7%		Houck, 1998
Thermal Efficiency Certified Stove	63%		Representative of Certifed Units
Thermal Efficiency NG Fireplace	75%		Houck, 1998
Incremental Cost to install Certified Fireplace Insert	$ 2,500.00		John Crouch, HPBA
Incremental Cost to install NG Fireplace Insert	$ 500.00		John Crouch, HPBA
Incremental Cost to install Electric Fireplace	$ 400.00		John Crouch, HPBA
Cost of Wood (per Cord)	$ 215.00		Staff Survey
Cost of Manufactured Log (per Log)	$ 3.00		Staff Survey
Cost of NG ($/MMBtu)	$ 11.30		Staff Survey
Cost of Electricity ($/kWh)	$ 0.08		Staff Survey
Burn Rate of Wood in Fireplace	6.60	lb/hr	Houck, 1998
Burn Rate of Manufactured Log in Fireplace	3.00	hr/log	Houck, Wax-Sawdust Firelogs
Median Burn Rate Certified Fireplace Insert	3.16	lb/hr	Representative of Certifed Units
Heat Input Rate NG Insert	30,000	BTU/hr	Staff Survey
Volume Cord of Wood (exluding void space)	79	ft3/cord	EIIP
Density of Pacific Hardwood	24	lb/ft3	EIIP
Weight of Manufactured Log	4.95	lb/log	Broderick, 2003

Based on Previous Surveys

Total Housing Units	502142	Expected Compliance Rate		78%	
Threshold	35	µg/m^3	Days	30	
Wood Burning Appliance Types	Fireplace	Non-Certified Stove	Certified Stove	Pellet Stoves	**Total**
%	39%	22%	2%	0.4%	64%
# total	195835	110270	12252	2009	320366
# total that burn	139043	93730	10414	2009	245196
Total Cost					$172,878
$ amount of fuel used	31,409,645	30,227,869	3,358,652	803,427	$ 65,799,593.01
$ amount of reduced fuel used	6,124,881	5,894,434	654,937	156,668	$ 12,830,920.64
Total Uncontrolled Emissions (lb/yr)	4,230,440	4,078,485	216,216	35,351	8,560,491
Total Reduction (lb/yr)	824,936	795,305	42,162	6,893	1,669,296
Percent Reduction	19.5%	19.5%	19.5%	19.5%	19.5%
Overall Cost Effectiveness ($/ton)					$ 7,987.41
Overall Cost Effectiveness ($/lb)					$ 3.99
NOx Reduction (lb/yr)	84,738	72,773	8,086	10,810	176,407
NOx from NG	2,141	19,812	2,201	597	24,752
Net NOx Reduction	82,597	52,960	5,885	10,213	**151,655**
CO Reduction (lb/yr)	8,408,534	5,998,571	406,604	30,864	14,844,573
CO from NG	1,798	16,642	1,849	502	20,792
Net CO Reduction	8,406,735	5,981,929	404,755	30,362	**14,823,782**
CO2 Reduction (lb/yr)	82,537,568	88,367,167	8,663,448	2,312,424	181,880,608
CO2 from NG	2,569,284	23,774,971	2,641,551	716,724	29,702,529
Net CO2 Reduction	79,968,284	64,592,197	6,021,897	1,595,701	**152,178,078**

Based on April 2007 Phone Survey

Total Housing Units	502142	Expected Compliance Rate		78%	
Threshold	35	µg/m^3	Days	30	
Wood Burning Appliance Types	Fireplace	Non-Certified Stove	Certified Stove	Pellet Stoves	**Total**
%	31%	19%	2%	3.0%	55%
# total	155664	94905	10545	15064	276178
# total that burn	101182	61688	6854	9792	179516
Total Cost					$172,878
$ amount of fuel used	16,849,029	19,894,380	2,210,415	3,916,800	$ 42,870,624.00
$ amount of reduced fuel used	3,285,561	3,879,404	431,031	763,776	$ 8,359,771.68
Total Uncontrolled Emissions (lb/yr)	2,421,327	2,684,242	186,088	172,339	5,463,996
Total Reduction (lb/yr)	472,159	523,427	36,287	33,606	1,065,479
Percent Reduction	19.5%	19.5%	19.5%	19.5%	19.5%
Overall Cost Effectiveness ($/ton)					$ 8,887.37
Overall Cost Effectiveness ($/lb)					$ 4.44
NOx Reduction (lb/yr)	84,738	47,895	6,959	52,701	192,293
NOx from NG	2,141	13,039	1,449	2,911	19,540
Net NOx Reduction	82,597	34,856	5,510	49,789	**172,753**
CO Reduction (lb/yr)	8,408,534	3,947,941	349,946	150,464	12,856,886
CO from NG	1,798	10,953	1,217	2,445	16,414
Net CO2 Reduction	8,406,735	3,936,988	348,730	148,019	**12,840,472**

Cost Effectiveness Based on CARB Inventory

Total District Annual Cost	$172,877.81
$ amount of fuel used	$15,761,086.03
$ amount of reduced fuel used	$3,074,070.84
Total Uncontrolled Emissions (lb/yr)	2,008,800
Total Reduction (lb/yr)	391,800
Percent Reduction	19.5%
Overall Cost Effectiveness ($/ton)	$9,445.34
Overall Cost Effectiveness ($/lb)	$4.72

Appendix D
2007 Wood Burn Research Study

Sacramento Metropolitan Air Quality District

2007 WOOD BURN RESEARCH STUDY

FINAL REPORT

MAY, 2007

SUBMITTED BY:

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2007 WOOD BURN RESEARCH STUDY

FINAL REPORT

MAY, 2007

EXECUTIVE HIGHLIGHTS (4 PAGES)

Inventory

- The vast majority (92%) of Sacramento County residents surveyed heat their home with natural gas (63%) or electricity (29%). Three percent use wood as their primary heat source.
  - There were no respondents who indicated that wood was their sole source of heat.
  - Respondents who use wood as their primary fuel source to heat their home were more likely to own their home, and describe it as a single-family home than those who used other fuel sources.
- Overall, more than half (54%) of all households have at least one wood-burning device. Half (50%) had an interior device and 9% an exterior one, including the 6% who owned both types. In general, only a third (34%) of low-income respondents owned a wood-burning device, significantly fewer than the general population as a whole.
- One third (33%) of all respondents in the base study of Sacramento County residents were classified as "burners": they owned wood or pellet burning devices (either indoors or outdoors), and they burned wood, pellets, or manufactured logs at least once this past winter. Significantly fewer "burners" were identified in the low-income group: approximately one in five (17%) were classified as burners.
  - There were only three demographic characteristics that distinguished burners from non-burners: home ownership (more burners than non-burners were owners rather than renters), type of home (more burners than non-burners lived in single family dwellings), and household income (more burners than non-burners lived in wealthier households). All other demographics did not distinguish burners from non-burners.
- Last winter, 58% of the general population burners and 68% of the low-income burners lit wood, pellet or manufactured log fires at least once a week.
  - Wood was the most commonly consumed fuel in fireplaces (77%), fireplace inserts (87%), and wood stoves (100%) of the general population households. Additionally, 30% of pellet stove/insert users usually burned wood (instead of pellets) in their pellet stoves. Low-income respondents used similar types of fuel, namely wood.
- Overall, about six in ten indoor burners (57%) used wood fires more for pleasure than for supplemental heating.
  - However, the reason for burning wood appears to be linked to the type device used: fireplace users were significantly more likely to burn wood for pleasure while wood stove users and pellet stove users were more likely to burn for supplemental heating.
- On average, burners in the general population used 5 logs to fuel a typical wood fire that lasted almost 4 hours. However, fireplace users who burned artificial logs consumed significantly less fuel than wood burners yet achieved about the same length of burn.
  - Similar results were found among low-income burners: the average burn lasted 3.3 hours and consumed 4.2 logs.
- Half (50%) of those who owned wood-burning devices said they burned less wood last winter compared to a typical winter.
- Three in ten interior device owners recalled occasions when they decided not to burn wood when they normally would have, and about half of them attributed their decision

to air quality or environmental reasons (25%), health reasons (7%) or because they saw or heard a request not to burn (14%).

- When asked specifically about air quality and health reasons, about half said they chose not to burn wood because of air quality (56%) and health reasons (46%). The median number of times that wood burns were avoided for air quality reasons was 4.5 and it was slightly higher (6 times) for health reasons

Air Quality and PM Pollution Knowledge

- A third of all respondents rated the quality of air in the area positively, but the majority (two-thirds) felt local air quality was only "poor" or "fair", indicating a broad recognition of air pollution in Sacramento County.
- There is much room for educating the general public about the negative effects of residential wood-burning on wintertime air quality: approximately four in ten respondents felt wood-burning was not a serious cause of air pollution.
  - Males were significantly more likely than females to say that residential wood-burning fires were "not at all serious" causes of air pollution (55% vs. 36%).
- Only 16% of all respondents in the general population said they were "very knowledgeable" about particulate matter pollution. An additional 61% felt "somewhat knowledgeable". Low-income respondents claimed significantly less knowledge about PM pollution.
  - Wood burners were just as knowledgeable (or not) about particulate matter pollution as non-wood burners.
  - More males than females claimed to be "very" knowledgeable about PM pollution.
  - A higher percentage of respondents who claimed the least knowledge were: poorer, less well educated, not registered to vote, and lacking Internet access than their counterparts.

Awareness of Summertime Spare The Air

- Recognition of the summertime Spare the Air Program in Sacramento County is very high among the general population – nearly nine out of ten respondents in the base study were familiar with the voluntary driving reduction program. There was less familiarity among respondents in the low-income group, but it was still relatively high at 80%.

Baseline Awareness of Wintertime No-Burn Requests

- Awareness of the requests not to burn wood during the winter of 2006/2007 was the same across the general population, low-income respondents and burners as well as non-burners. It was fairly high, given that there was no paid advertising of the requests this past winter: 59% of the respondents in the general population base survey and 57% of those in the low-income group said they heard the wintertime no burn requests.
  - Older respondents were more likely to have heard the requests not to burn than younger respondents.

Support for a Voluntary No-Burn Program and Likelihood to Comply

- The vast majority of all respondents approved of a voluntary no-burn rule (85%) and said they would comply with it (93%) – a strong endorsement for a voluntary measure. However, these figures include respondents who do not own wood-burning devices or burn wood.

- Although support was slightly lower among the low-income group than among the general population of respondents, the majority (77%) approved of a voluntary no-burn measure and 86% said they would comply with one.
- Perhaps the best reflection of levels of acceptance of a voluntary measure to request that residents not burn wood is between those who burned wood this year versus non-burners. Results indicated that the majority (83%) of those who burned wood this past winter also approved of a voluntary no-burn rule. The highest approval was among respondents who owned wood-burning devices but did not use them (93%). In terms of compliance, there were no differences – the vast majority (over 90%) in all groups said they would comply.

Actual Voluntary Compliance in Winter of 2006/2007

- Among those who were aware of the requests not to burn during the past winter, only 34% of the general population base survey respondents, and 41% of low-income respondents actually complied and voluntarily reduced the number of fires they burned.
  - Among the group of burners, of those who heard the no-burn requests, 46% complied and reduced their number of fires. In other words, nearly half of the Sacramento County residents who burned wood reduced the number of fires they burned this past winter, specifically because they heard the requests – but just over half chose to not refrain from burning.
  - A possible explanation is that those burners who did not comply do not believe that residential wood-burning is a serious cause of wintertime air pollution or that there is a problem with the overall quality of air in the area.
- Further analysis revealed a discrepancy between actual compliance behavior and hypothetical compliance (what respondents said they would do) -- the largest discrepancy occurring in the group of respondents who did not comply with the request not to burn but said they would. Those who did comply and also said they would comply were far more consistent.

Support for a Mandatory No-Burn Regulation

- Although approval was significantly lower than for a voluntary no-burn rule, the majority of all respondents (71%) nevertheless approved a mandatory no-burn rule.
  - Those who “strongly” approved of a mandatory no-burn rule did so mainly because of air quality and health concerns.
  - The 20% who “strongly” disapproved of a mandatory no-burn rule did so mainly because they don’t want their freedom limited by government regulation.
  - Approval of a mandatory no-burn rule was about the same in the low-income group as in the general population: 73% either somewhat or strongly approved a mandatory measure.
  - Not surprisingly, approval of a mandatory no-burn rule was significantly lower among burners (56%) than non-burners (78%) in the general population.

Likelihood to Comply with a Mandatory No-Burn Regulation

- Among those in the general population of Sacramento County respondents who owned wood-burning devices (whether or not they used them), over three-quarters (78%) said they would likely comply with a mandatory no-burn rule.
  - Respondents were significantly more likely to say they would comply with a mandatory no-burn rule than to approve of it, indicating that prior support may not be a necessary requirement for successful implementation of a mandatory rule. In other words, respondents may not like the regulation but the majority would hypothetically comply with it.

Discrepancy between Support for a Mandatory No-Burn Rule and Actual Behavior

- Further analysis revealed approximately the same magnitude of discrepancy between what respondents who owned wood-burning devices said they would do voluntarily and what they actually did this past winter (about 60% less), regardless of whether or not they supported a mandatory no-burn rule.
- However, actual levels of compliance this past winter did vary according to whether or not owners supported a mandatory rule: among those who approved of mandatory measures, 37% actually reduced the number of fires they burned. This was significantly higher than the 24% of respondents who complied but who disapproved of mandatory measures.
    - Nevertheless, because the majority (63%) of even favorably-disposed respondents of a mandatory no-burn rule did not voluntarily reduce the number of fires they burned this past winter, if a mandatory regulation was implemented, it would probably have to be visibly and publicly enforced in order to increase levels of compliance.

Communication Strategies

- The general news media, such as TV, radio, and newspaper, would be the best way to let residents know whether or not they can burn wood on a particular day.
    - Preference for a recorded telephone message varied by a few demographic features (income, ethnicity, education, Internet access, type of dwelling and wood burn activity). Ethnicity influenced the level of positive ratings of e-mail and text messages.
    - There were no differences by demographics in terms of the positive ratings for the use of general media or posting information on the website.
- Electronic billboards along the freeway and telephone calls were identified as other effective ways to advise the public about a no-burn day.
    - Eight percent said they would like to receive something in the mail. Although this would obviously not be a way to alert the public about a no-burn request for the next day, a closer look at the verbatim responses implies an opportunity for public education about air quality and no-burn days in general.

These results were based on 401 telephone interviews conducted in April, 2007 with a random sample of Sacramento County residents, representative of the population as a whole. Results are accurate to within +/- 4.9%, 19 times out of 20. A total of 139 interviews were also conducted with a group of low-income (based on federal guidelines) residents.

PROJECT BACKGROUND & OBJECTIVES

The mission of the Sacramento Metropolitan Air Quality Management District (SMAQMD) is to protect public health and the environment through innovative and effective programs that aim to improve air quality in Sacramento County. The District conducts a Spare The Air Program that now has two seasonal components. The summer season runs from May 1 through October 31 and focuses mainly on reducing driving during the hot summer months. The winter season runs from November 1 to April 30 and focuses on reducing the amount of fine particulate matter (PM) pollution that is caused by burning wood in fireplaces, woodstoves, and outside fire pits and chimeneas. [The winter PM voluntary reduction program was not advertised to the general public to the same extent as the summer program in the 2006-07 season: it was advertised mainly through voluntary subscription to AirAlert messages and press releases).] A Spare The Air (STA) day/night is triggered when the air quality index (AQI) reaches or exceeds 127. When a winter STA day/night is called, the No Burn program urges residents to refrain from using their wood-burning devices.

The objectives of the current study were to conduct interviews with a representative sample of Sacramento County residents as well as with a group of low-income (based on federal guidelines) residents in order to assess:

- the current inventory as well as use of wood-burning devices,
- baseline awareness of PM pollution and the District's voluntary No Burn Program,
- effectiveness of the No Burn Program in terms of encouraging residents not to burn wood on specific STA days,
- support for (or opposition to) a voluntary No Burn Program,
- support for (or opposition to) a mandatory No Burn Program, and
- likely compliance with voluntary and mandatory curtailment program.

RESEARCH METHODOLOGY

Aurora Research Group was contracted to conduct this public opinion research study.

For the general population base study, random-digit-dialed (RDD) telephone interviews were completed with a representative sample of 401 Sacramento County residents.

The District was also interested in understanding the opinions and behavior of low-income residents, that is, the households that had earnings of $20,000 or less.[1] An oversample of 98 additional telephone surveys was therefore conducted, using a sample that specifically targeted the selected population of interest (ZIP codes with a high incidence low-income residents. These interviews were combined with the 41 interviews

[1] Current federal poverty guidelines identify a family unit consisting of 4 persons and earning $19,350 or less as poor. 2005 HHS Poverty Guidelines. Federal Register, Vol. 70, No. 33, February 18, 2005, pp.8373-8375.(Source: http://aspe.hhs.gov/poverty/05poverty.shtml)

that were obtained in the base study, for a total of 139 completed interviews with low-income residents.

The margin of error for the study as a whole was + or – 4.9%, at the 95% confidence level. In other words, we are 95% sure that the true population parameters lie within +/- 4.9% of the sample statistics. As an example, if a response category to a question were chosen by 50% of respondents, we would be 95% sure that the true population parameters would be between 45.1% and 54.9% (50.0% +/- 4.9%). The margin of error for the subgroup of low-income residents (139 surveys in total) is much larger (+/- 8.3% at the 95% confidence level).

Aurora Research Group designed the questionnaire which addressed the previously-mentioned objectives, and SMAQMD staff approved the final survey. Most of the questions were asked in a closed-ended format, but three questions were asked as open-ended. Verbatim responses were captured and later categorized for quantitative analyses. (Transcripts of all the verbatim responses will be provided in the statistical binder.) The questionnaire was translated into Spanish and 6% of the general base study interviews were conducted in Spanish. The questionnaire was programmed for a CATI system and interviews took approximately 13 minutes on average to administer. Respondents were screened for age (adults at least 18 years old[2]) and to confirm residency in Sacramento County. Interviewing took place between April 7 and April 25, 2007.

Methods of Analysis

Survey results were analyzed using univariate, and multi-variate statistical techniques. The type of analysis depended upon the kind of variable analyzed and the hypotheses that were generated through an examination of the initial results. Unless otherwise noted, frequency percentages cited in this document represent *adjusted* frequencies, meaning that percentages have been adjusted to account for any non-responses (refusals to answer) or non-qualified responses (questions not answered due to answers to previous questions).

Researchers are interested in assessing whether or not the differences in observed percentages between certain groups of individuals are due to chance, or if they represent real differences among the subpopulations. Differences are identified by running statistical analyses and are discussed in the report. Statistical significance within crosstabulation tables was calculated using chi square ($\chi 2$) statistics. Tests of proportion were used to identify differences in responses between questions or groups of respondents. The level of significance was generally set to a p value of .01.

Caveat:

The sole purpose of this report is to provide a collection, categorization and summary of public opinion data. Aurora Research Group intends to neither endorse nor criticize the Sacramento Metropolitan Air Quality Management District; or their policies, products, board of directors or staff. The Client shall be solely responsible for any modifications, revisions, or further disclosure/distribution of this report.

[2] In order to speak with someone under 18 years of age, by law we would need to get the parents' written permission.

RESULTS & CONCLUSIONS

The survey results are organized and presented as follows: the inventory of wood-burning devices and their use is first presented. Included in this section a subpopulation of "burners" was identified. Within each section of the report, the overall base survey results based on the 401 completed surveys with the general population of Sacramento County residents are first presented. Next, results from a group of low-income respondents are presented (41 surveys from low-income (under $20,000 per year) households in the base study were combined with an oversample of 98 surveys with low-income residents for a combined total of 139 respondents in the low-income group) and any significant differences from the general population in the base study are discussed. This is followed by results which contrast households which burned wood this past winter (burners) with those who did not (non-burners). Finally, any statistically significant group differences or demographic characteristics (age, income, ethnicity, gender, internet access, the number of people living in the house, home ownership, the age of the dwelling, the type of dwelling, air alert subscription, voter registration, or education[3]) are presented. In other words, up to 13 separate cross-tabulations will have been conducted for each question. If no group results are described, it is an indication that they were not significant differentiators for a particular question. Unless otherwise specified, the reported results exclude responses of "undecided" as well as refusals. The order of topics presented in the report was chosen as the most logical in terms of meeting the information requirement objectives of the study and does not necessarily conform to the order of the questions within the survey.

INVENTORY OF HEATING DEVICES

General Population Base Survey

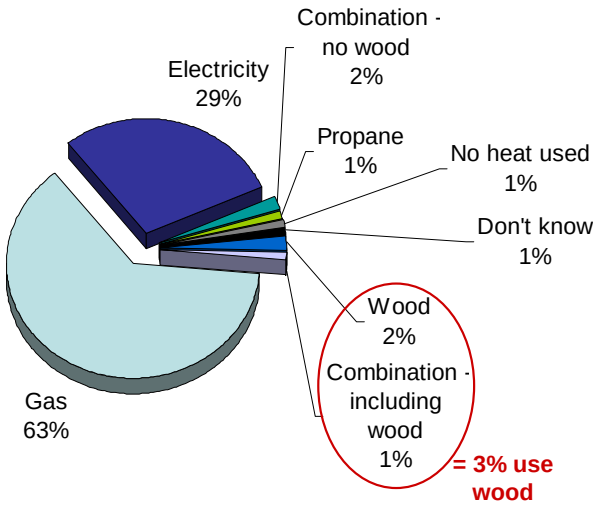
- ***1 The vast majority (92%) of Sacramento County residents surveyed heat their home with natural gas (63%) or electricity (29%). Three percent use wood as their primary heat source, although it was not found to be their sole source of heat.***

  All respondents were asked to identify how they primarily heat their home. It can be seen in Figure 1 that natural gas was the fuel used most frequently, mentioned by six in 10 respondents (63%). Twenty-nine

[3] The reader is referred to the demographic characteristics section near the end of this report to see how the demographics were categorized.

percent heat their home with electricity. Other fuels mentioned by fewer than 5% included: wood (2%) or a combination including wood (1%), a combination not including wood (2%), and propane (1%). In other words, 3% use wood as a primary source of heat. One percent said they do not heat their house (but use blankets) and one percent was unsure.

FIGURE 1 – PRIMARY HEAT SOURCE
(AMONG ALL RESPONDENTS)



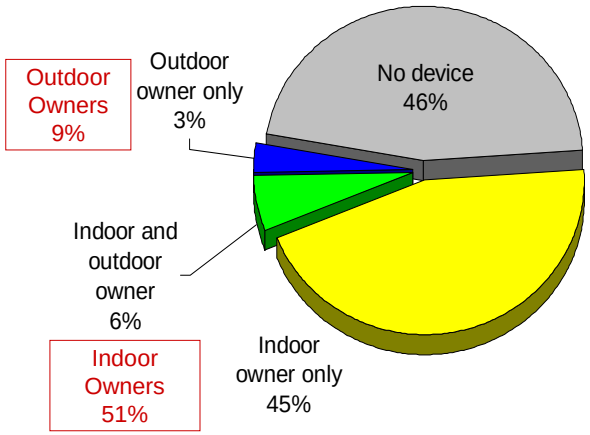
Those who heat their home primarily with wood[4] were asked if wood was the only heat source available in their home or could they heat it by using another means if they preferred. All 6 respondents said their house was equipped with a gas heater that could be used. In other words, there were no households in which the sole source of heat was wood.

❖ ***2 Overall, more than half (54%) of all households have at least one wood-burning device. Half (50%) had an interior device and 9% an exterior one, including the 6% who owned both types.***

Survey questions were asked to determine the incidence rate of Sacramento homes with indoor and outdoor wood-burning devices. The data were then combined to establish an overall percentage of respondents with at least one wood-burning device, regardless of its location. Results indicated that 54% of respondents had at least one wood-burning device inside or outside their home and the remaining 46% did not own a device that burns wood. More specifically, as shown in Figure 2, half of all respondents have an indoor wood-burning device and 9% owned one outdoors, including the 6% that have both types.

[4] This question was only asked of the 6 respondents who said their primary source of heat was wood and did not include those who said they use a combination of fuels, including wood.

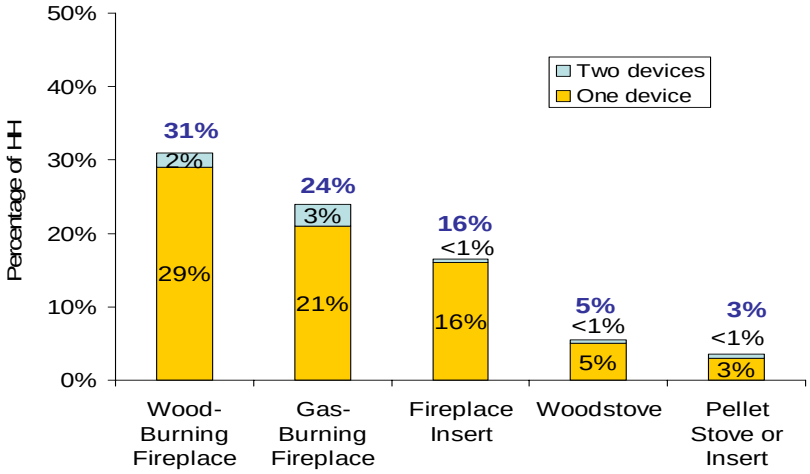
FIGURE 2 – OWNERSHIP OF WOOD-BURNING DEVICES
(AMONG ALL RESPONDENTS)



❖ ***3 About three in ten residents (31%) have a wood-burning fireplace in their home and a further 16% have a wood-burning fireplace insert.***

Respondents were read a list of various indoor heating devices, including wood- and gas-burning fireplaces, wood- and pellet-burning stoves, and fireplace inserts, and asked whether or not their home had one (or more). The most common indoor heating device found was the wood-burning fireplace, reported to be in 31% of the respondent homes, followed by gas-burning fireplaces (24%) and wood-burning inserts (16%).[5] The less common heating devices included wood stoves (5%) and pellet stoves (or inserts, 3%).

FIGURE 3 – PERCENTAGE OF SACRAMENTO HOUSEHOLDS WITH INDOOR HEATING DEVICES
(AMONG ALL BASE STUDY RESPONDENTS, INCLUDING UNDECIDED RESPONSES)

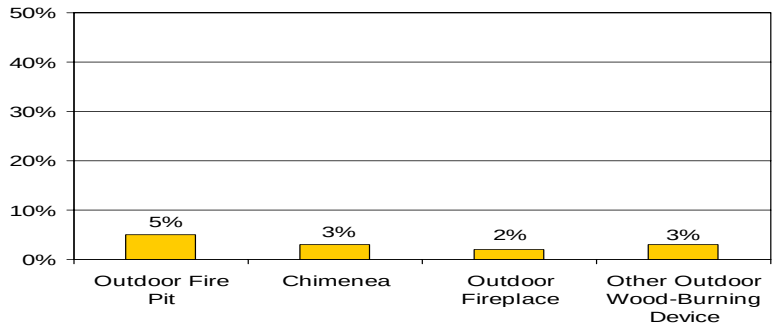


[5] There were 48 respondents in the base study and six in the low –income oversample who said they have a fireplace and a fireplace insert. Based on the assumption that they probably burn wood in the insert and not in the fireplace (without the insert), these records were recoded as fireplace insert users (only).

❖ ***4 The most commonly-owned outdoor device was the outdoor fire pit – reportedly owned by 5% of respondents.***

Respondents were also asked about any outdoor heating devices, specifically fire pits, chimeneas, outdoor fireplaces or other wood-burning devices. Overall, ownership of outdoor wood-burning devices was less widespread that of indoor wood-burning devices. As shown in the next chart, no more than 5% reported having any one of the outdoor wood-burning devices mentioned, with outdoor fire pits mentioned more frequently – by 5%. Three percent of those surveyed had a chimenea and a similar number (2%) had an outdoor fireplace.

FIGURE 4 – PERCENTAGE OF SACRAMENTO HOUSEHOLDS WITH OUTDOOR HEATING DEVICES
(AMONG ALL BASE STUDY RESPONDENTS, INCLUDING UNDECIDED RESPONSES)

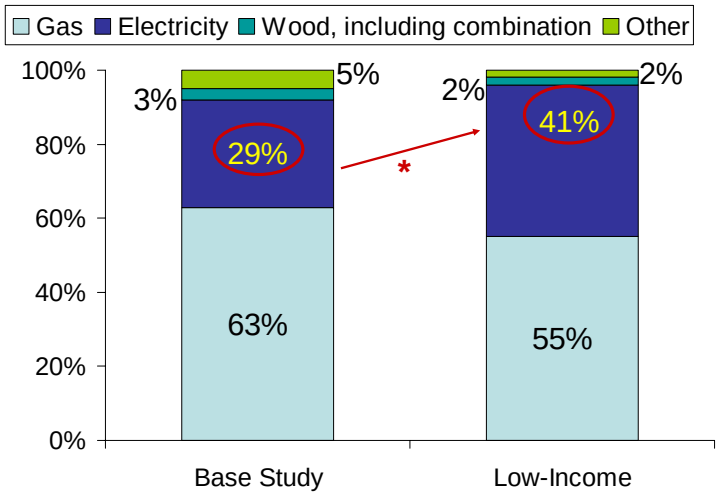


Low-Income

❖ ***5 Like the general population, more than half of low-income respondents also use natural gas (55%) as a primary heat source and very few (2%) use wood. However, low-income respondents were more likely to use electricity (41%) than the general population (29%).***

The base study results were compared with the results of those who were identified as low-income respondents to determine any significant differences in the way they primarily heat their home. Results indicated, as shown in the next figure, that the majority of low-income respondents used natural gas, similar to the general population. However, low-income respondents were more likely to use electricity (41% vs. 29% of the general population). The proportion of residents who used wood as a primary heat source was nearly identical among both populations (3% of the general population and 2% of low-income respondents).

FIGURE 5 – PRIMARY HEAT SOURCE: LOW-INCOME & BASE STUDY RESULTS



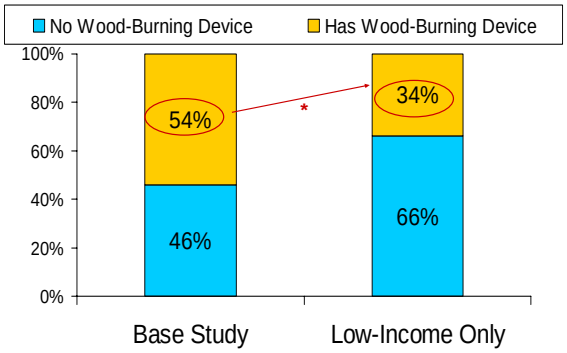
❖ ***6 In general, only a third (34%) of low-income respondents owned a wood-burning device, significantly fewer than the general population as a whole (54%).***

Analyses were conducted to determine the percentage of low-income respondents that owned at least one wood-burning device, regardless of its location. Overall results indicated that only a third (34%) of low-income respondents had at least one wood-burning device inside or outside their home, and the majority (68%) did not. More specifically, results showed that:

- 29% of respondents have an indoor wood-burning device (only).
- 2% have an outdoor wood-burning device (only).
- 2% have both an outdoor device and an indoor device that burn wood.

As shown in the next chart, the 34% of low-income households with wood-burning devices was almost 20 points lower than the proportion of base study households with wood-burning devices, which was found to be a statistically significant difference.

FIGURE 6 – OVERALL PERCENTAGE OF HOUSEHOLDS THAT OWN A WOOD-BURNING DEVICE: BASE STUDY VS. LOW-INCOME
(INCLUDING UNDECIDED RESPONSES)

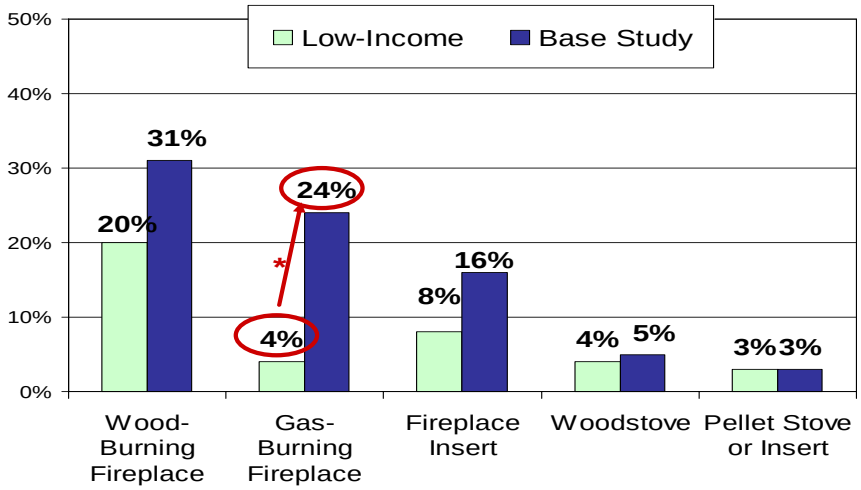


(* indicates a statistically significant difference)

❖ ***7 More specifically, low-income respondents were significantly less likely to live in homes with <u>indoor</u> gas-burning fireplaces than the general population.***

In terms of the different types of indoor heating devices discussed, it can be seen in Figure 7 that low-income respondents were significantly less likely to own gas-burning fireplaces than the general population.[6] The differences in ownership of fireplace inserts, wood or pellet stoves were not found to be statistically different.

FIGURE 7 – OWNERSHIP OF <u>INDOOR</u> HEATING DEVICES
(AMONG LOW-INCOME & BASE STUDY HOUSEHOLDS INCLUDING UNDECIDED RESPONSES)



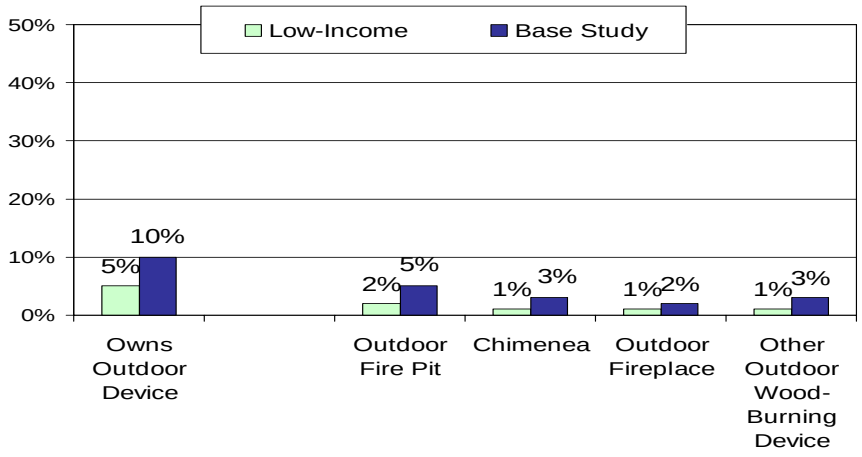
(* indicates a statistically significant difference)

[6] Although the differences seem large, the percentage of low-income fireplace owners (20%) and fireplace insert owners (8%) were not statistically different those of the base study fireplace owners (31%) and fireplace insert owners (16%).

❖ ***8 Similar to the general population, 5% of low-income residents owned <u>outdoor</u> heating devices.***

It can be seen in Figure 8 that ownership of outdoor wood-burning devices among low-income respondents did not vary significantly from that of the general population in terms the overall incidence rate or by specific apparatus.

FIGURE 8 – PERCENTAGE OF LOW-INCOME & BASE STUDY HOUSEHOLDS WITH <u>OUTDOOR</u> HEATING DEVICES
(INCLUDING UNDECIDED RESPONSES)



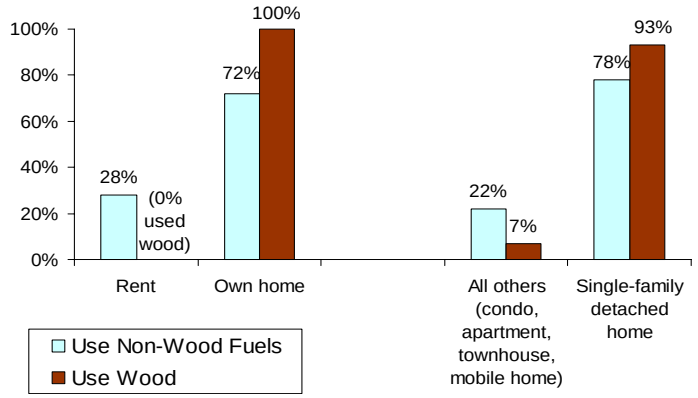
Other Group Differences

❖ ***9 Respondents who use wood as their primary fuel source to heat their home were more likely to own their home, and describe it as a single-family home than those who used other fuel sources.***

In order to try and characterize households in Sacramento County that use wood[7] as a primary heat source from those that used other fuel sources, a series of chi-square analyses were conducted on the general population base study results, including all demographic features. Two attributes emerged as statistically important: home ownership and type of home. As shown in Figure 9, all (100%) who heated their home primarily with wood owned their home versus 72% of those who used non-wood sources; and 93% of wood users lived in a single-family home versus 78% of those who used non-wood fuels.

[7] For these analyses, we included the respondents who mentioned wood as primary heat source, alone and in combination with other fuels.

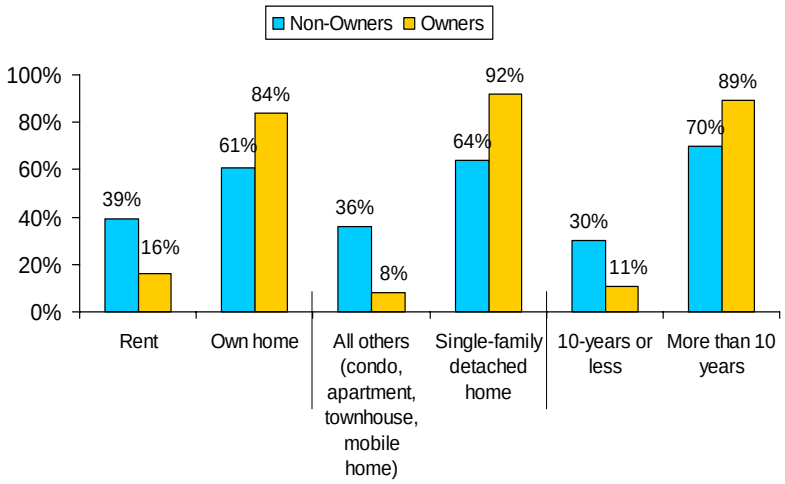
FIGURE 9 – DISTINCTIVE DEMOGRAPHIC CHARACTERISTICS OF THOSE WHO PRIMARILY USE WOOD VS. OTHER FUELS FOR HEAT:
GENERAL POPULATION BASE STUDY ONLY



❖ ***10 Those who owned <u>indoor</u> wood-burning devices were more likely than non-owners to own their home, and describe it as a single-family home that was built more than 10 years ago.***

Additional chi-square analyses were also conducted on the general population base study results to differentiate households in Sacramento County that were equipped with indoor wood-burning devices from those that were not. Results indicated that only <u>three</u> of the twelve characteristics were significant: home ownership, type of dwelling and age of the structure. In other words, those who owned an indoor wood-burning device were more likely to own their home, and describe it as a single-family home that was built more than 10 years ago. No other demographic characteristics were significant.

FIGURE 10 – DISTINCTIVE DEMOGRAPHIC CHARACTERISTICS OF <u>INDOOR</u> DEVICE "OWNERS" VS. NON-OWNERS:
GENERAL POPULATION BASE STUDY ONLY



There were no demographic characteristics that distinguished outdoor device owners from non-owners. In other words, outdoor device ownership was independent of respondents' ethnicity, gender, age, income, education, number of household members, homeownership, type of home, and age of home.

"BURNERS" VS. "NON-BURNERS"

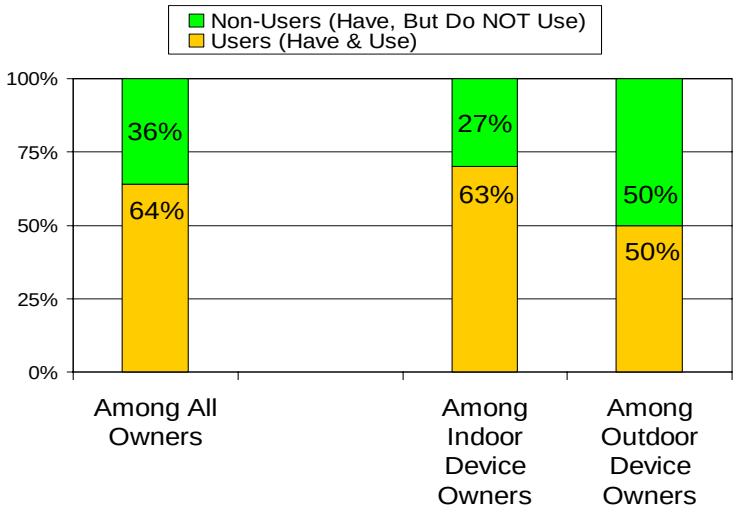
Incidence Rate

❖ ***11 Overall, 64% of wood-burning device owners lit a wood fire last winter. More specifically, 63% of indoor device owners and 50% of outdoor device owners were classified as "burners."***

The criterion used to classify a "burner" was that respondents had to have either an interior or an outdoor wood or pellet-burning device, and had to have used it at least once this past winter. Multiple questions[8] were used in order to insure the accuracy of this dichotomy.[9] Results indicated that the majority (64%) of wood-burning device owners burned wood last winter.

The survey data were analyzed by type of device (indoor versus outdoor) and results indicated that at least half of the owners were also users or "burners." Usage was slightly higher (63%) among indoor device owners than among outdoor users; however, the difference was not found to be statistically significant.

FIGURE 11 – USAGE AMONG BASE STUDY OWNERS
(INCLUDING UNDECIDED RESPONSES)



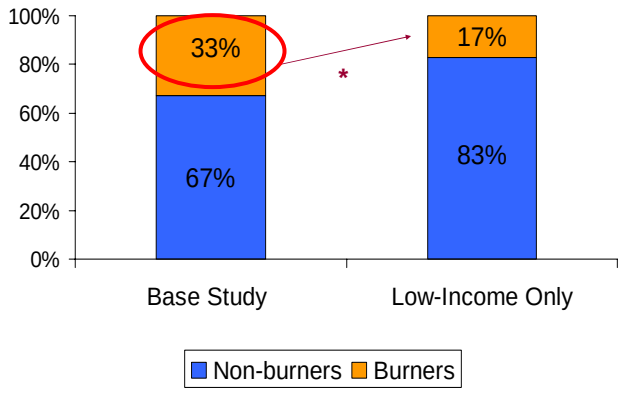
[8] This includes questions about the type of fuel (questions 2.5a-d), the reason for burning (questions 2.6a-d), the frequency of use (questions 2.7 and 3.2) and the length of the burn (questions 2.8 and 2.9).

[9] For example, some respondents owned wood-burning appliances and said they burned wood, but in fact had never done so this past winter and so were re-classified as non-burners; respondents who did not have interior wood-burning appliances but had used outdoor wood-burning equipment were classified as burners; etc.

❖ ***12 One third (33%) of all respondents in the base study of Sacramento County residents were classified as "burners": they owned wood- or pellet-burning devices (either indoors or outdoors), and they burned wood, pellets, or manufactured logs at least once this past winter. Significantly fewer "burners" were identified in the low-income group: approximately one in five (17%) were classified as burners.***

Figure 12 indicates that, in the base study, 33% of all respondents surveyed in Sacramento County were classified as burners, and the remaining 67% were non-burners. In the low-income only group, a significantly lower percentage of respondents at 17%, were classified as burners. This latter finding was interesting because the study design, which called for an oversample of low-income households to be studied separately, was based on the hypothesis that lower-income residents might be more likely to burn wood than other residents, perhaps due to the cost of other heating sources among other reasons. This analysis indicates that this was <u>not</u> found to be true – respondents in the low-income group were less likely to burn wood.

FIGURE 12 – CLASSIFICATION OF "BURNERS" VS. NON-BURNERS:
GENERAL POPULATION BASE STUDY VS. LOW-INCOME GROUPS



* indicates a statistically significant difference

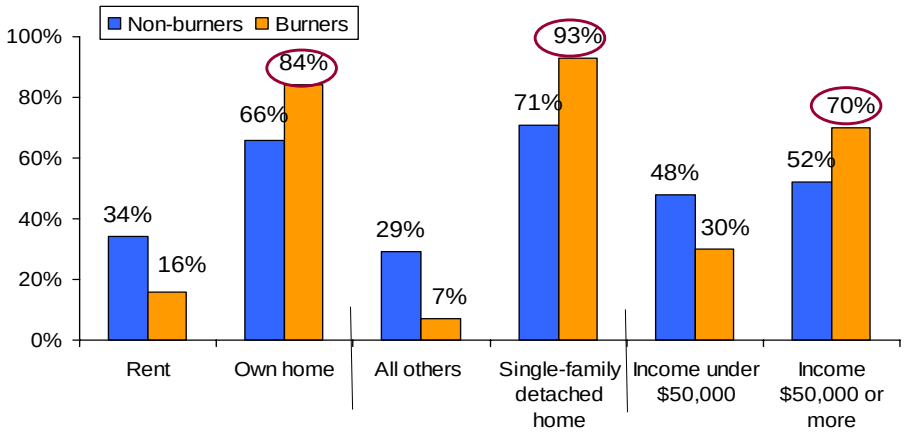
Distinctive Characteristics

❖ ***13 There were only three demographic characteristics that distinguished burners from non-burners: home ownership (more burners than non-burners were <u>owners</u> rather than renters), type of home (more burners than non-burners lived in <u>single-family dwellings</u>), and household income (more burners than non-burners lived in <u>wealthier</u> households). All other demographics did <u>not</u> distinguish burners from non-burners.***

In order to try and characterize "burner" households in Sacramento County from those that did not burn wood, a series of chi-square analyses were conducted on the general population base study results, including all

demographic features. Results indicated that only three of the twelve characteristics were significant: home ownership, type of dwelling and income.[10] It can be seen in the next chart (Figure 13) that 84% of burners owned their own homes versus 66% of non-burners; 93% of burners lived in single-family detached homes versus 71% of non-burners; and 70% of burners reported household incomes of $50,000 or more versus 52% of non-burners. No other demographic characteristics distinguished burners from non-burners: neither gender, ethnicity, education, age, internet access, the number of people living in the house, the age of the house, air alert subscription nor voter registration were significant. In other words, males and females were just as likely to be burners as non-burners, as were older and younger residents, better educated and less-educated residents, etc.

FIGURE 13 – DISTINCTIVE DEMOGRAPHIC CHARACTERISTICS OF "BURNERS" VS. NON-BURNERS
(GENERAL POPULATION BASE STUDY ONLY)



WOOD-BURNING ACTIVITY

Frequency

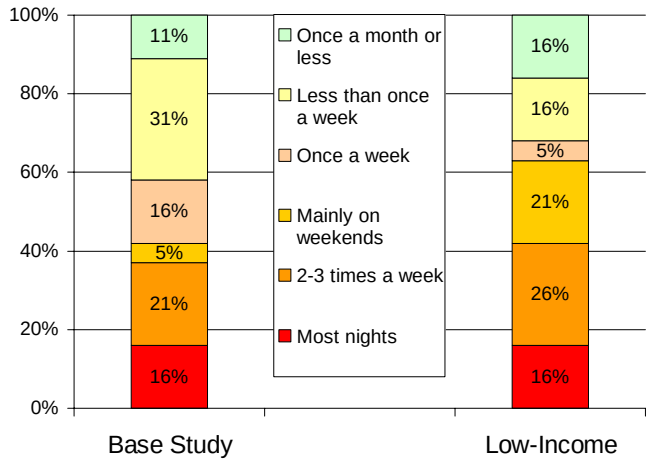
❖ ***14 Last winter, 58% of the general population burners and 68% of the low-income burners lit wood, pellet or manufactured log fires at least once a week.***

Wood-burning device owners were asked to quantify how often they burned wood last winter using the following categories: most days, 2 or 3 times a week, about once a week, less than once a week, mainly on weekends, or

[10] For the purpose of this analysis, household income was dichotomized, using $50,000 as the split point.

something else.[11] Results among indoor burners for both the general population and low-income groups are shown in Figure 14. Among indoor burners, the frequency of burning wood was comparable: more than half of the general population (58%) and the low-income group (68%) reported burning wood at least once a week.

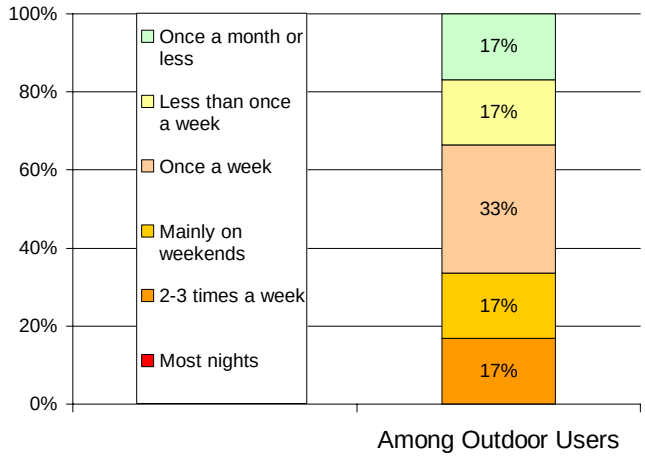
FIGURE 14 – FREQUENCY OF INDOOR WOOD-BURNING
(AMONG BASE STUDY & LOW-INCOME BURNERS EXCLUDING UNDECIDED RESPONSES)



The frequency of use was similar among outdoor burners, with 67% of the general population saying they had a wood fire outdoors at least once a week. It is interesting to note that 16% of indoor burners said they burn wood on most nights, while no outdoor burners said they burned wood outside that often. However, due to the small sample size of outdoor burners, this figure was not found to be statistically significant.

[11] Responses to the frequency of wood-burning questions (2.7 and 3.2) were compared with the responses to other wood-burning activity questions for consistency in "do not use" responses. In most cases, the 15% of indoor device owners and the 58% of outdoor device owners who volunteered they "never" use their wood-burning device were categorized as "owners who do not use" as well as grouped with the "non-burners."

FIGURE 15 – FREQUENCY OF OUTDOOR WOOD-BURNING
(AMONG BASE STUDY BURNERS EXCLUDING UNDECIDED RESPONSES)



Of the two low-income respondents who were outdoor burners, one reported burning mainly on the weekends and the other said it was less than once a month.

Reason for Use

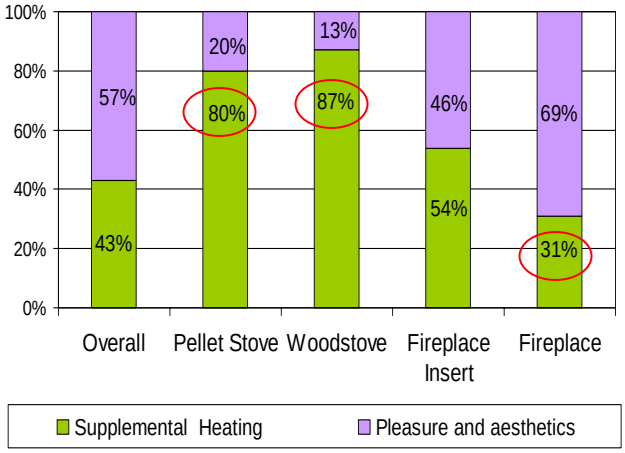
- ***15 Overall, about six in ten indoor burners (57%) used wood fires more for pleasure and ambiance than for supplemental heating.***

  Respondents who burn wood, manufactured logs, or pellets were asked to categorize why they burn wood: more for pleasure and ambiance or more for supplemental heating. The same question was asked about each type of indoor wood-burning apparatus owned. The combined overall results indicated that the majority (57%) of those who burn wood do so more for pleasure than for warmth (43%).

- ***16 However, the reason for burning wood appears to be linked to the type device used: fireplace users were significantly more likely to burn wood for pleasure while wood stove users and pellet stove users were more likely to burn for supplemental heating.***

  Results by indoor device type are shown in the next chart (Figure 16). It can be seen that the majority of wood stove users (80%) and pellet stove users (87%) burned wood for supplemental heating, which is a significantly higher percentage then the 31% of fireplace users. In other words, the majority of fireplace users (69%) were more likely to burn wood for pleasure than for warmth. (Due to the small sample size, the proportion of respondents who have and use fireplace inserts was not found to be statistically different from the other groups.)

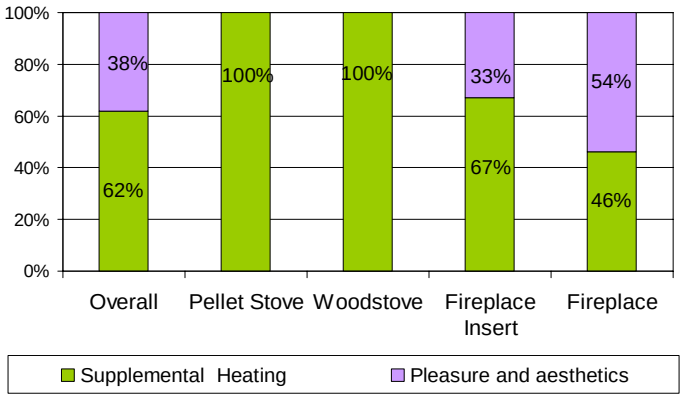
FIGURE 16 - REASON FOR BURNING WOOD INDOORS
(AMONG GENERAL POPULATION INDOOR BURNERS EXCLUDING UNDECIDED RESPONSES)



❖ ***17 Low-income respondents tended to burn wood for the same reasons as the general population.***

Results of the reasons for burning wood by indoor device among the low-income burners are shown in the next chart. However, due to the fact that there were fewer low-income burners, the differences were not found to be statistically significant.

FIGURE 17 - REASON FOR BURNING WOOD INDOORS
(AMONG LOW-INCOME BURNERS EXCLUDING UNDECIDED RESPONSES)

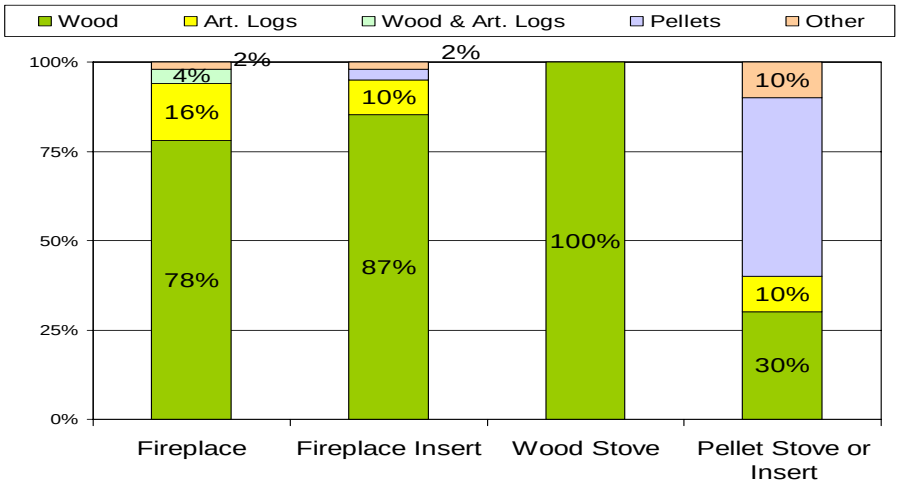


Type of Fuel

❖ ***18 Wood was the most commonly consumed fuel in fireplaces (78%), fireplace inserts (87%), and wood stoves (100%) in the general population households. Additionally, 30% of pellet stove/insert users usually burned wood (instead of pellets) in their pellet stoves. Low-income respondents used similar types of fuel, which mainly involved wood.***

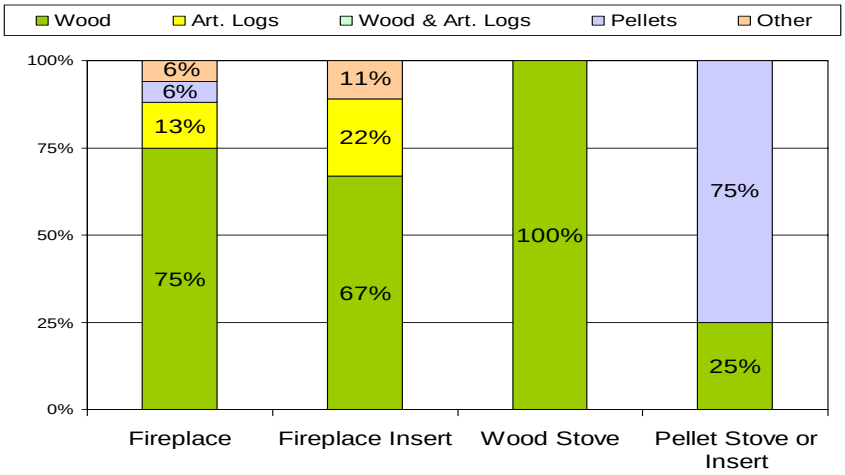
Respondents who owned indoor wood-burning devices were asked to specify the kind of fuel they usually burned in each of their wood-burning appliances: wood, pellets, artificial manufactured logs, or something else. Results among the general population of burners are shown in Figure 18. It can be seen that wood was the most frequently consumed fuel in fireplaces (78%), fireplace inserts (87%), and wood stoves (100%). As one might expect, pellets were the most commonly used fuel (46%) among pellet stove (and insert) users, although 30% said they usually burn wood.

FIGURE 18 – TYPE OF FUEL USED FOR INDOOR WOOD-BURNING DEVICES
(AMONG BASE STUDY USERS EXCLUDING UNDECIDED RESPONSES)



Among the low-income group, wood was also the most commonly consumed fuel, as shown in the next chart.

FIGURE 19 – TYPE OF FUEL USED FOR INDOOR WOOD-BURNING DEVICES
(AMONG LOW-INCOME USERS EXCLUDING UNDECIDED RESPONSES)



Length of Burn

❖ ***19 On average, burners in the general population used 5 logs to fuel a typical wood fire that lasted almost 4 hours. However, fireplace users who burned artificial logs consumed significantly less fuel than wood burners yet achieved about the same length of burn. Similar results were found among low-income burners: the average fire lasted 3.3 hours and consumed 4.2 logs.***

Those who burned wood or artificial logs were asked to quantify an average wood burn in terms of the number of hours as well as the number of pieces of wood (or manufactured logs) burned. Overall, wood burns ranged from 1 to 15 hours, with a mean (or average) of 3.9 hours. In terms of fuel usage, users burned 1 to 16 logs of fuel, with an average of 5.1 logs.

We conducted additional analyses on fireplace users in order to determine any differences in the length of burn by the type of fuel used.[12] It can be seen in Figure 20 that fireplace users who burned artificial logs enjoyed a fire for about the same amount of time; however, they used significantly less fuel than wood-burning fireplace users (an average of 1.3 logs versus 5.75 logs).

Additional analyses were conducted on the low-income burners to see if the length of their burns were more or less than the general population. As shown in the next table, the average burn among low-income burners lasted 3.3 hours and consumed 4.2 logs. While these figures are slightly lower than the results of the base study, the differences were not found to be statistically significant.

FIGURE 20 – LENGTH OF BURN BY HOURS & LOAD
AMONG BASE STUDY DEVICE USERS WHO BURN WOOD OR ART. LOGS
(EXCLUDING UNDECIDED RESPONSES)

DESCRIPTION	AVERAGE # OF HOURS	RANGE	AVERAGE # OF LOGS	RANGE
Overall Burners	3.9 hours	1 – 15 hrs.	5.1 logs	1 – 16 logs
Fireplace Wood Burners	3.9 hours	1 – 15 hrs.	5.7 logs	1 – 16 logs
Fireplace Artificial Log Burners	3.0 hours	2 – 4 hrs.	1.3 logs	1 – 3 logs
Low-Income Burners	3.3 hours	2 – 6 hrs.	4.2 logs	1 – 8 logs

Reduced Usage

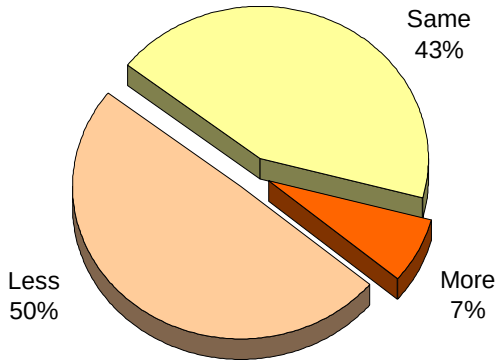
❖ ***20 Half of those who owned wood-burning devices (50%) said they burned less wood last winter compared to a typical winter.***

All owners (regardless of usage) were asked to evaluate last winter's usage in terms of being more, less or the same as a typical winter. Nine percent of

[12] Fireplace users were analyzed because it was the most common wood-burning device used, which provide more data for our analyses.

wood-burning device owners were unable to decide if their wood-burning activity changed last winter. These results were excluded from the data and the percentages were recalculated and are shown in Figure 21. Half (50%) of the owners said they burned less this past winter, while 7% said they burned more. The remaining 43% felt last winter's wood-burning activity was similar to a typical winter.

FIGURE 21 – WOOD-BURNING ACTIVITY LAST WINTER COMPARED WITH A TYPICAL WINTER
(AMONG BASE STUDY USERS EXCLUDING UNDECIDED RESPONSES)



When asked to compare last winter's wood-burning with that of a typical year, activity among low-income owners was similar to that of the general population: 45% burned less, half (50%) burned the same and 5% said they burned more last winter than a typical year.

❖ ***21 Among those who owned indoor devices, three in ten recalled occasions when they decided not to burn wood when they normally would have.***

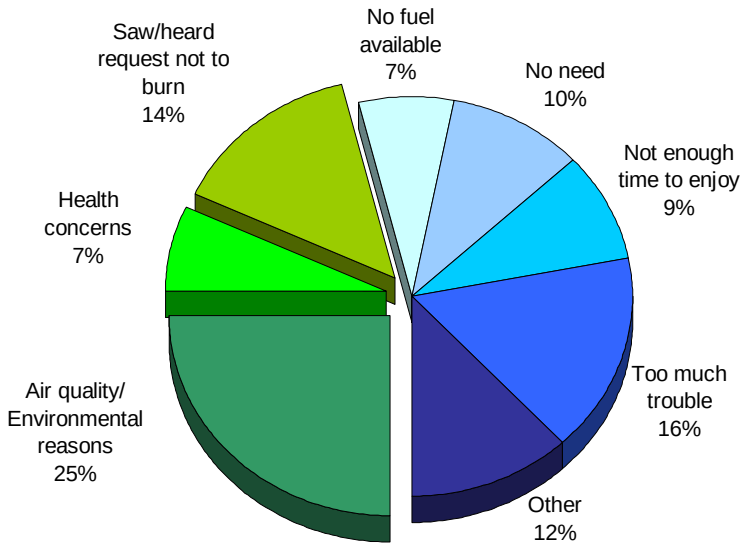
Respondents were asked if there were occasions last winter when they normally would have burned wood, pellets, or manufactured logs but decided not to. About three in ten (29%) owners said yes, while the majority said no (66%) or were unsure (5%). Among low-income respondents results were similar: 33% said there had been days they decided not to burn wood. Sixty-three percent said there were none and 4% were undecided.

❖ ***22 About half who decided not to burn attributed their decision to air quality or environmental reasons (25%), health reasons (7%) or because they saw or heard a request not to burn (14%).***

Those who decided to not burn on certain occasions were asked, in an open-ended format, to explain the main reason why they chose to not burn wood, pellets or manufactured logs on those occasions. Verbatim responses were captured and then later categorized for quantitative analysis. Air quality and environmental concerns was the most common

reason given, mentioned by 25% of these respondents. Seven percent mentioned health reason and 14% recalled hearing or seeing a request not to burn wood. Categorized reasons are shown in the following chart. Verbatim comments will be presented in the statistical report.

FIGURE 22 – REASON FOR NOT BURNING WOOD ON CERTAIN OCCASIONS LAST WINTER
(AMONG BASE STUDY USERS WHO CHOSE NOT TO BURN EXCLUDING UNDECIDED RESPONSES)



Among the 15 low-income respondents that decided not to burn wood last winter on certain occasions, 2 respondents said it was for air quality reasons, 1 person did it for health reasons, and 1 person saw or heard a request not to burn. Two claimed not have any fuel that day, 1 person said it was too inconvenient, and 3 people said they did not have a need. Five others gave responses that did not fit into the categories chosen. Once again, all verbatim responses will be presented in the statistical binder.

❖ ***23 When asked specifically about air quality and health reasons, about half said they chose not to burn wood because of air quality (56%) and health reasons (46%). The median number of times that wood burns were avoided for air quality reasons was 4.5 and it was slightly higher (6 times) for health reasons.***

Respondents were then asked to quantify the number of times they had decided not to burn wood, pellets, or manufactured logs last winter for air quality reasons and for health reasons. About half said air quality (56%) and health reasons (46%) had been part of their decisions not to burn on certain

occasions and the other half said they had not (0 times). Results among those who had made a choice not to burn wood for air quality and health reasons are shown in the following table (Figure 23). It can be seen that those who chose not to burn on certain days for air quality reasons refrained from doing so a median of 4.5 days. Those who did not burn wood for health reasons chose not to burn wood a median 6 times

FIGURE 23 – FREQUENCY OF CHOOSING NOT TO BURN WOOD FOR AIR QUALITY & HEALTH REASONS
(AMONG BASE STUDY USERS WHO CHOSE NOT TO BURN EXCLUDING UNDECIDED RESPONSES)

REASON	RANGE	MEDIAN
Air Quality	1 – 50 times	4.5 times
Health	1 – 30 times	6 times

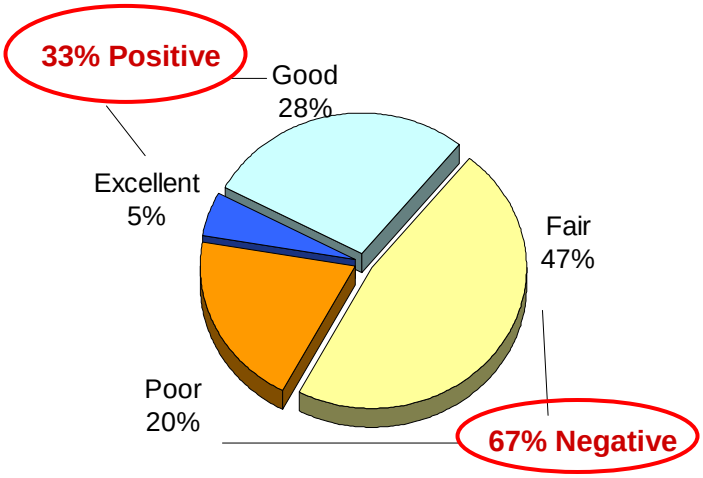
AIR QUALITY ISSUES

General Population Base Survey

- ***24 A third of Sacramento County respondents rated the quality of air in the area positively, but the majority (two-thirds) of respondents felt local air quality was only "poor" or "fair."***

  In the telephone interview, respondents were first asked to rate the overall quality of air in Sacramento County, using a four-point scale: poor, fair, good, or excellent. As can be seen in the next figure, only 5% rated the quality of air as "excellent," and a further 28% rated it at "good," indicating that a combined total of 33% were positive in their evaluations. The majority (67%) gave negative evaluations: nearly half (47%) rated the overall quality of air in the area as "fair" and a fifth (20%) said it was "poor." This indicates that the majority of the general population recognizes and accepts that air pollution in the Sacramento area is a fact.

FIGURE 24 – OVERALL ASSESSMENT OF SACRAMENTO AREA AIR QUALITY
(BASE STUDY RESPONDENTS EXCLUDING UNDECIDED RESPONSES)



❖ ***25 There is much room for educating the general public about the negative effects of residential wood-burning on wintertime air quality: approximately four in ten respondents felt wood-burning was <u>not</u> a serious cause of air pollution. That being said, the fact that nearly the same proportion of respondents said that <u>traffic was a very serious contributor</u> to air pollution is an indication of the success of public education programs in general, and possibly of the effectiveness of the long-running Sacramento region summertime Spare the Air public education campaign.***

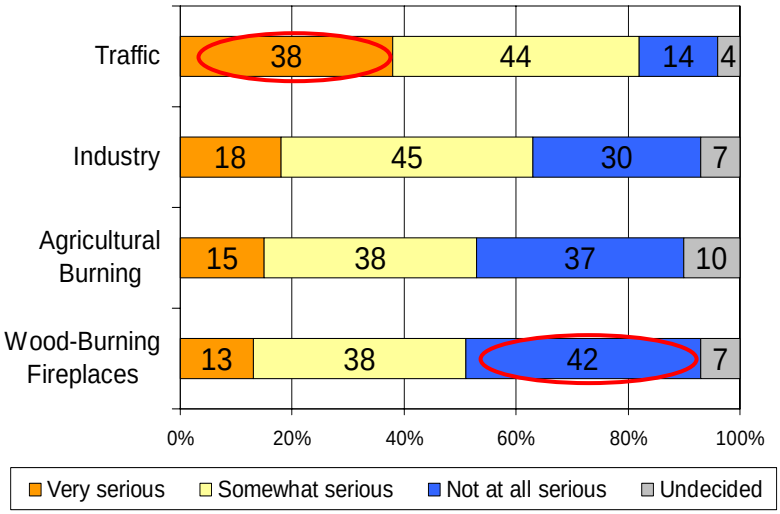
Respondents were next asked to rate how serious they thought various causes of wintertime pollution were as contributors to air pollution in Sacramento County. Results, including responses of undecided/don't know[13], are presented in Figure 25. It can be seen, first of all, that <u>traffic</u> was considered to be the **most** serious cause of wintertime air pollution: nearly four in ten respondents (38%) said it was a "very" serious problem. Only 18% of all respondents felt that <u>industry</u> was to blame and 15% felt that <u>agricultural burning</u> was responsible. <u>Residential wood-burning fireplaces</u> were seen as the **least** serious causes of wintertime air pollution: only one in ten respondents (13%) rated wood-burning as "very" serious.

This indicates that further public education about the causes of wintertime air pollution is warranted. It also attests to the ability of successful public education campaigns to influence public perceptions, insofar as the

[13] Typically, in attitudinal surveys, the percentage of undecided/don't know responses is low (between 0% and 4%). We chose to present the percentage of undecided/don't know responses in Figure 2 because three questions resulted in a relatively high percentages (7% and 10%) of respondents saying they did not know, a volunteered response rather than an actual response category. **These indicate specific areas where more public education on the causes of wintertime air pollution (industry, agricultural burning, and residential wood-burning) could be beneficial.**

seriousness of traffic in causing air pollution (regardless of the season) is now well-entrenched. In the Sacramento area, the summertime Spare the Air program has been in effect for 12 years and, although it is not the only source of education, it is now highly recognizable among the local population in general.[14]

FIGURE 25 – SERIOUSNESS: SOURCE OF WINTERTIME AIR POLLUTION
(BASE STUDY RESPONDENTS INCLUDING UNDECIDED RESPONSES)



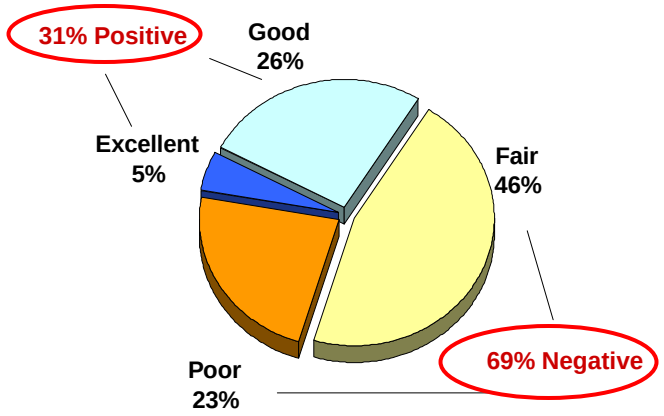
Low-Income Group

❖ ***26 Low-income respondents evaluated the quality of air in the area similarly to the general population: the majority (69%) felt local air quality was only "poor" or "fair."***

Results of the evaluation of air quality in the area by the low-income group of respondents are presented in Figure 26. It can be seen that results are very similar to those of the general population in Sacramento County: 31% rated the quality of air as "excellent" or "good," and the majority (69%) gave negative evaluations.

[14] See: SMAQMD 2006 Air Quality & Transportation Telephone Tracking Survey, Aurora Research Group, January 2007: two thirds (66%) of all respondents were familiar with the summertime Spare the Air program.

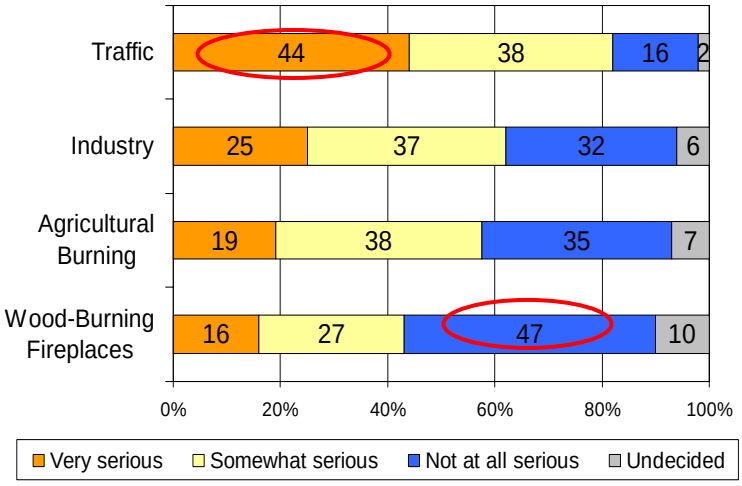
FIGURE 26 – OVERALL ASSESSMENT OF SACRAMENTO AREA AIR QUALITY
(LOW-INCOME RESPONDENTS ONLY EXCLUDING UNDECIDED RESPONSES)



❖ ***27 Low-income respondents were also similar to the general population in terms of how they rated the seriousness of the various causes of winter air pollution: traffic was viewed as the most serious contributor and residential wood-burning the least serious.***

It can be seen in Figure 27 that the low-income group of respondents felt that traffic was the most serious cause of winter air pollution in Sacramento County: 44% rated it as a "very" serious contributor. This was followed by industry (25% rating it "very" serious) and agricultural burning (19%). Only 16% of low-income respondents felt that residential wood-burning was a "very" serious contributor to wintertime air pollution – in fact, nearly half (47%) said it was "not at all" serious.

FIGURE 27 – SERIOUSNESS: SOURCE OF WINTERTIME AIR POLLUTION
(LOW-INCOME ONLY RESPONDENTS INCLUDING UNDECIDED RESPONSES)



Other Group Differences

- ***28 Registered voters were significantly more likely to rate the quality of air in the region accurately (that is, negatively); as were those aged between 35 and 54 years. The youngest respondents were the least accurate in their assessments. No other demographic characteristics emerged – evaluations of air quality did not depend on gender, ethnicity, education, income, etc.***

  To see if there were any features that distinguished those respondents who gave negative evaluations of air quality from those who gave positive evaluations, results were dichotomized (percent "poor + fair" versus percent "good + excellent"), and a series of chi-square analyses was conducted. Variables included in the analyses included: age, income, education, gender, ethnicity, home ownership, type of dwelling, age of dwelling, number of people in household, access to the internet, voter registration, air alert subscription, and whether the household was a wood burner or not.

  Only two features showed significant differences: voter registration and age. Significantly more respondents who were registered to vote evaluated the quality of air negatively (71%) than those not registered to vote (55%). Younger respondents (aged between 18 and 34 years) were the least likely to assess the quality of air in the region negatively (52%) – those between the ages of 35 to 54 were more accurate in their assessment (73% said the air quality was poor or fair), as were the oldest respondents (68% negative.) **A public education program about the air quality in the region that could target the younger adult population in particular could be useful.**

  Further chi-square analyses (52 in total (4 questions x 13 demographic features) were run on each of the causes of wintertime air pollution to see if there were distinguishing demographic features as to the seriousness of each cause. There were only 4 analyses that yielded significant differences:

  - females were significantly more likely than males to say that traffic was a "very serious" cause of wintertime air pollution (46% vs. 32%),
  - **males were significantly more likely than females to say that residential wood-burning fires were "not at all serious" causes of air pollution (55% vs. 36%**),
  - renters were more likely than owners to say that industry was a "very serious" cause of air pollution (31% vs. 14%), and
  - renters were also more likely than owners to say that agricultural burning was a "very serious" cause (25% vs. 13%).

  In short, because there were so few demographic differences, a public education campaign about the sources and seriousness of wintertime air pollution that is designed to target residents of all descriptions in Sacramento County should be effective. However, if there were a way of educating males in particular about the pollution problems associated with

wood-burning, there could be added benefits, as they demonstrated a significant information gap.

AWARENESS OF SUMMERTIME SPARE THE AIR

General Population and Low-Income Groups

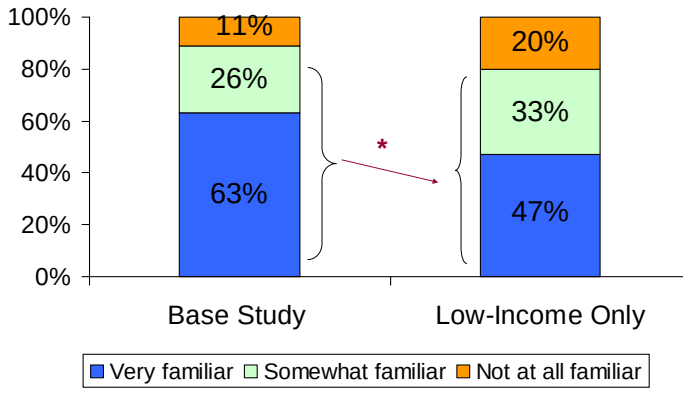
❖ ***29 Recognition of the summertime Spare the Air Program in Sacramento County is very high among the general population – nearly nine in ten respondents in the base study were familiar with the voluntary program. There is less familiarity among the low-income group, but it is still relatively high at 80%.***

Respondents were next asked how familiar they were with the voluntary driving reduction program called Spare the Air during the summer months.[15] Figure 28 shows the results from both the general population base study and the low-income group of respondents. It can be seen, first of all, that among the general population in Sacramento County, the summertime program is highly recognizable: 63% of respondents said they were "very" familiar with the program and an additional 26% said they were "somewhat" familiar with it, indicating that a combined total of 89% of all respondents were familiar with summertime Spare The Air. (It is interesting to note that the 63% of respondents who were "very" familiar with the program is identical to the level of general awareness of Spare The Air among Sacramento County residents during the summer of 2006.[16]) Although fewer than half of the low-income respondents were "very" familiar with Spare The Air (47%), an additional 33% said they were "somewhat" familiar with the program for a combined total of 80% aware. This is a significantly lower percentage than in the general population, but it is still quite high.

[15] The exact wording of the question was: "During the summer months, that is, from May through October, you may have heard about a voluntary driving reduction program called Spare The Air, which is aimed at reducing the amount of ozone in the air caused by vehicles during particularly hot days with poor air quality. Does this sound not at all familiar, somewhat familiar, or very familiar to you?"

[16] See "SMAQMD Final Report – Awareness of the 2006 Spare The Air Campaign", Naomi E. Holobow, November 2006.

FIGURE 28 – FAMILIARITY WITH SUMMERTIME SPARE THE AIR DRIVING REDUCTION PROGRAM
(BASE STUDY VS. LOW-INCOME GROUPS EXCLUDING UNDECIDED RESPONSES)



* indicates a statistically significant difference

Other Group Differences

❖ ***30 Recognition of the summertime Spare the Air Program in Sacramento County varied by a few demographic features (age, income, ethnicity, education, Internet access and home ownership).***

Further chi-square analyses were conducted to determine if there were any statistically significant differences in terms of demographic characteristics between respondents who were familiar with the summertime Spare The Air program and those who were not. Results can be described as follows:

Respondents familiar (both somewhat and very) with the summertime Spare The Air program were significantly more likely to:

- be homeowners (94% vs. renters, 75%);
- be registered voters (93% vs. not registered, 71%);
- have access to the Internet (93% vs. no access, 78%);
- have at least a college education (96% vs. less than college, 83%);
- be Caucasian (94% vs. other ethnicities, 75%)
- have household incomes of $50,000 or more (92% vs. less than $50,000, 84%); and
- be older than 35 years of age (93% vs. 18 to 34 years, 71%).

No other significant differences were found – **burners were just as familiar with Spare The Air as non-burners**, males as familiar as females, etc.

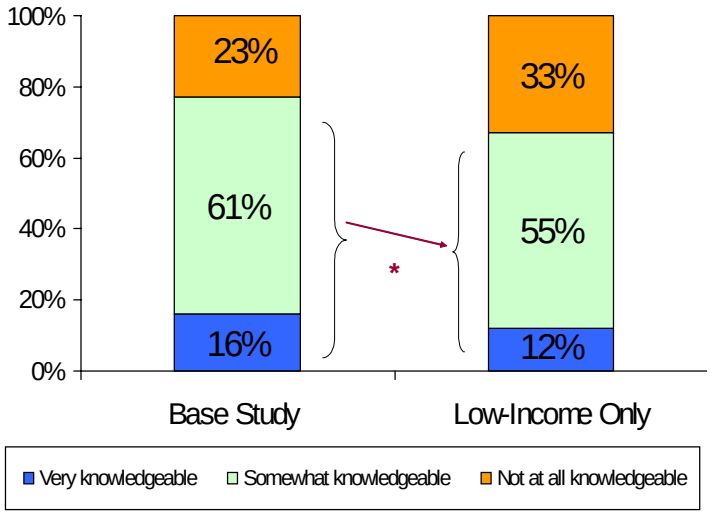
KNOWLEDGE OF PARTICULATE MATTER

General Population and Low-Income Groups

❖ ***31 Only 16% of all respondents in the general population said they were "very knowledgeable" about particulate matter pollution, but an additional 61% felt "somewhat knowledgeable." Low-income respondents claimed significantly less knowledge about PM pollution.***

Next, respondents were asked to rate how knowledgeable they considered themselves to be about particulate matter or particle pollution. Results from the general population base study as well as the low-income group are presented in the next figure. It can be seen, first of all, that few respondents in either group claim to be "very" knowledgeable about PM (16% in the general population and 12% in the low-income group), **indicating that there is a good opportunity for a public information program to educate its residents about PM pollution.** Secondly, although a substantial proportion in both groups claims to be somewhat knowledgeable, the fact that 23% and 33% claim no knowledge at all about PM pollution is an indication that the causes of wintertime air pollution need to be put more in the public eye.

FIGURE 29 – LEVEL OF KNOWLEDGE ABOUT PARTICULATE MATTER OR PARTICLE POLLUTION:
(BASE STUDY VS. LOW-INCOME GROUPS EXCLUDING UNDECIDED RESPONSES)



* indicates a statistically significant difference

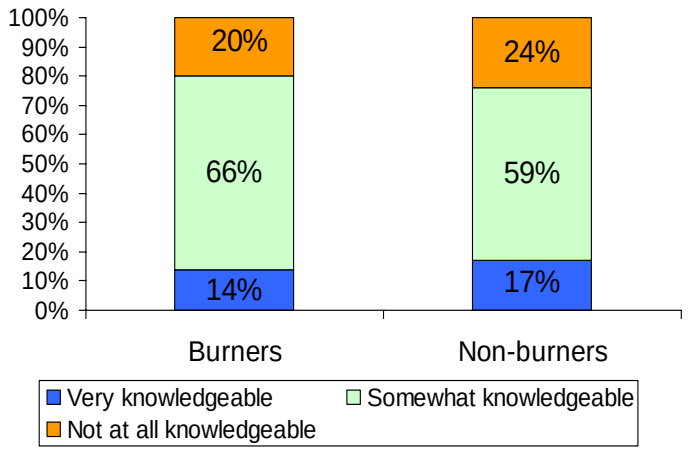
Burners vs. Non-Burners

❖ ***32 Wood burners were just as knowledgeable (or not) about particulate matter pollution as non-wood burners.***

The self-reported level of knowledge about PM pollution from burners and non-burners in the general population base study are presented in the next figure. There were no significant differences between the two groups of respondents. Among burners, 20% said they were "not at all" knowledgeable. Two thirds (66%) claimed to be "somewhat" knowledgeable and only 14% claimed to be "very" knowledgeable about PM pollution.

One possible interpretation of the results could be to speculate that because only 14% of burners claimed to be "very" knowledgeable (and thus were willfully ignoring what they "knew" when they decided to burn wood this past winter anyway), the majority of burners (the remaining 86%) were not as knowledgeable and could therefore benefit from learning more about the effects of wood-burning on air pollution.

FIGURE 30 – LEVEL OF KNOWLEDGE ABOUT PARTICULATE MATTER OR PARTICLE POLLUTION:
(BURNERS VS. NON-BURNERS EXCLUDING UNDECIDED RESPONSES)



Other Group Differences

❖ ***33 More males than females claimed to be "very" knowledgeable about PM pollution. A higher percentage of respondents who claimed the least knowledge were: poorer, less well educated, not registered to vote, and lacking Internet access than their counterparts.***

Further chi square analyses revealed that:

- more males said they were "very" knowledgeable compared to females (21% vs. females, 11%);

- those not registered to vote were more likely to say they were "not at all" knowledgeable about PM pollution (41% vs. registered, 18%);
- less educated respondents were more likely to say they were "not at all" knowledgeable (31% vs. college degree or higher, 12%);
- more of those without Internet access said they were "not at all knowledgeable" (36% vs. have Internet access, 18%); and
- more of those with household incomes of less than $50,000 were "not at all" knowledgeable (31% vs. $50,000 or more, 14%).

AWARENESS OF WINTERTIME NO-BURN REQUESTS

❖ ***34 Awareness of the requests not to burn wood during the winter of 2006/2007 was the same across the general population, low-income respondents and burners as well as non-burners. It was fairly high, given that there was no paid advertising of the requests this past winter: 59% of the respondents in the general population base survey and 57% of those in the low-income group said they heard the wintertime no burn requests. (Some of this could possibly be due to a carry-over of awareness from the summertime Spare The Air program.) Levels of awareness should increase when the full residential no-burn public education program is launched with full media buy.***

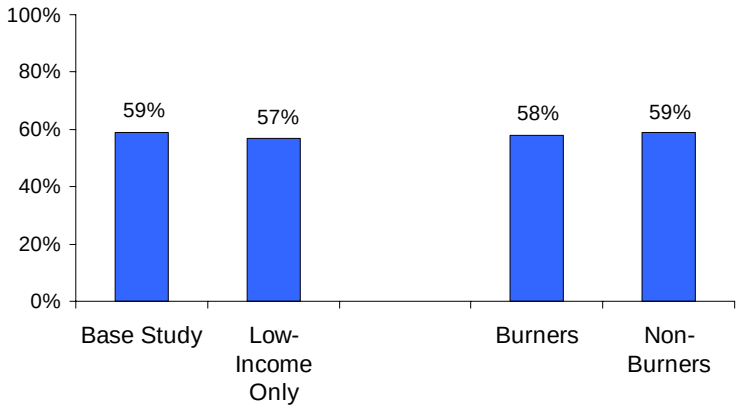
Although there was no paid advertising to announce the nights throughout the 2006/2007 winter when particulate matter pollution was forecast to reach 127 on the Air Quality Index (AQI) -- the "unhealthy for sensitive groups" level -- there were several news stories on both television and radio as well as in the Sacramento Bee weather page that asked residents in the Sacramento area to refrain from using their wood-burning fireplaces and outdoor fire pits on certain nights. In addition, Air Alerts for Spare the Air nights were issued to those approximately 3,050 Sacramento County residents[17] who had registered to receive them for the summer Spare The Air season. Survey respondents were asked:

> "During this past winter, did you hear, read, or see any news stories, advertisements, or public service announcements about particulate matter pollution or poor air quality, and requests not to use wood-burning fireplaces and outdoor fire pits?"

Excluding the respondents who were undecided or did not know, results indicated that 59% (+ / - 4.9%) of all respondents in the general population base survey and about the same percentage (57%) of those in the low-income group were aware of the requests not to burn during the past winter. Considering that there was no media buy this past winter, these are quite high levels of awareness. The next graph shows these two groups, and in addition plots the level of awareness among burners and non-burners in the base study. There were no significant differences among any of the groups.

[17] Per an e-mail from Lori Kobza, of the Communications Office of Sacramento Metropolitan Air Quality Management District, there are a total of 5,512 Air Alert subscribers, 55% of which live in Sacramento County (3048 subscribers).

FIGURE 31 – PERCENT AWARE OF REQUEST NOT TO BURN THIS PAST WINTER
(BASE STUDY, LOW-INCOME GROUPS, BURNERS AND NON-BURNERS EXCLUDING UNDECIDED RESPONSES)



Another factor to consider when assessing levels of awareness of a public education campaign is that some survey respondents might have a tendency to give the most socially-acceptable responses (that is, the assessed level of awareness could be an overestimate). The difficulty is to predict how many respondents this could represent. The evaluation of the summertime Spare The Air campaign[18] has always included a Control group of respondents, that is, residents who are interviewed about non-Spare the Air days but are asked whether they recently heard a Spare The Air advisory asking them not to drive. The percent of respondents who say "yes" (and were therefore wrong) are then used as a correction factor and subtracted from results when emission reduction estimates are conducted. Our experience with the 2006 summer evaluation showed that the percentage of Control day respondents in Sacramento County who erroneously thought they heard a STA advisory ranged between 4% and 24%, depending on the specific wording of the question. It is quite possible that the 59% of respondents who said they heard the wintertime no-burn requests is an overestimate, but without control-day interviewing, we cannot measure this extent of this effect.

❖ ***35 Older respondents were more likely to have seen or heard the requests not to burn than younger respondents.***

Of the thirteen chi-square analyses, only one significant difference emerged: age was the only demographic feature that distinguished those who heard or saw the wintertime request not to use wood-burning fireplaces and outdoor fire pits. Of

[18] Aurora Research Group has conducted annual evaluations of the summertime Spare The Air campaign in the Sacramento Region for many years.

those respondents 55 years of age and older, 69% were aware, versus 53% of those aged between 35 – 54 years. The youngest group (aged between 18 and 34 years) was the least likely to have seen the announcements: only 46% of these respondents were aware.

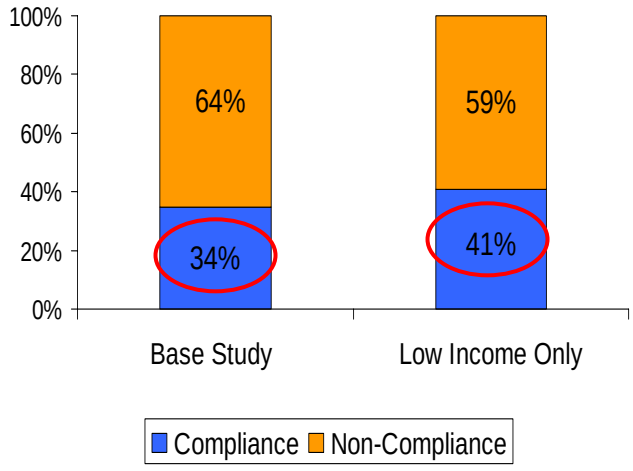
WINTER 2006/2007 ACTUAL COMPLIANCE WITH VOLUNTARY NO-BURN REQUESTS

General Population and Low-Income Groups

❖ ***36 Among those who were aware of the requests not to burn during the past winter, only 34% of the general population base survey respondents, and 41% of low-income respondents actually complied and voluntarily reduced the number of fires they burned.***

Respondents who indicated they had seen or heard requests not to use wood-burning fireplaces (59% of the general population of respondents and 57% of the low-income group) were then asked if they actually reduced the number of fires they burned during the winter because of the requests. Results, presented in the next chart, indicate that voluntary compliance was quite low. In the general population of respondents in Sacramento County, only about a third (34%) of these respondents reduced the number of fires burned. In the low-income group, 41% complied, a percentage which is not statistically significantly different from the general population results.

FIGURE 32 – COMPLIANCE WITH VOLUNTARY REQUEST NOT TO BURN
(AMONG THOSE WHO HEARD THE NO BURN REQUESTS:
GENERAL POPULATION BASE STUDY VS. LOW-INCOME GROUPS)



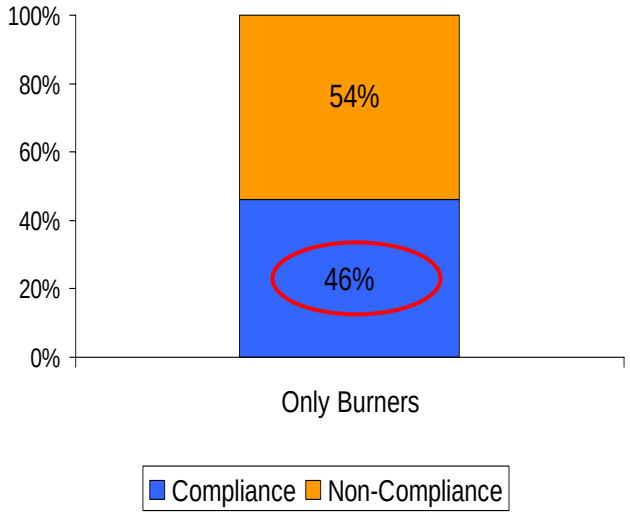
No statistically significant difference between the groups.

Burners Only

❖ ***37 Actual compliance with voluntary no-burn messages was only approximately 50-50 among burners: of those who heard the no-burn requests, 46% complied and reduced their number of fires. In other words, nearly half of the Sacramento County residents who burned wood reduced the number of fires they burned this past winter, specifically because they heard the requests – but just over half chose <u>not</u> to refrain from burning.***

We next looked at just the subpopulation of those who were classified as "burners" in the general population base study, that is, those who owned wood or pellet burning devices (either indoors or outdoors), and burned wood, pellets, or manufactured logs at least once this past winter. It has already been reported above that 58% of these respondents were aware of the requests not to burn wood. The next chart shows the compliance results among those who were aware of the announcements. It can be seen that nearly half, 46%, actually reduced the number of fires they burned last winter because they heard the requests. That being said, it also means that just over half of those who heard the requests actually did <u>not</u> reduce the number of fires they burned.

FIGURE 33 – COMPLIANCE WITH VOLUNTARY REQUEST NOT TO BURN
(AMONG THOSE WHO HEARD THE NO BURN REQUESTS: ONLY BURNERS)



❖ ***38 Among burners, there were <u>no</u> significant demographic features that could be used to characterize voluntary compliers from non-compliers.***

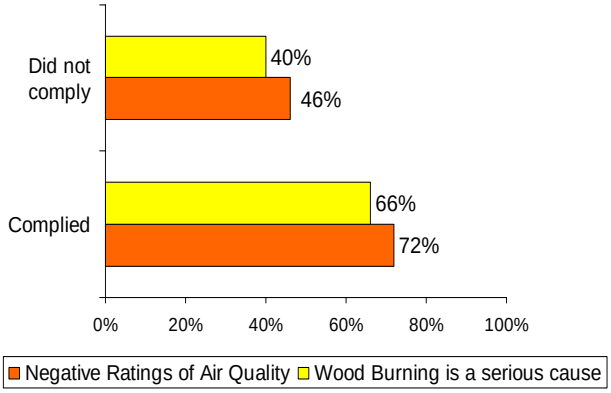
In order to see whether there were any demographic features that could distinguish burners who complied with the voluntary no-burn notices from those who did not comply, a series of chi-square analyses were run on just the subpopulation of burners. Results indicated that there were **<u>no</u>** significant identifiers that could be used to characterize compliers from non-compliers:

not gender, age, income, ethnicity, education, home ownership, age of neighborhood, or Internet access were significant. In other words, burners who complied with the voluntary measures had the same demographic profile as burners who did not comply.

❖ ***39 A possible explanation is that those burners who did not comply do not believe that residential wood-burning is a serious cause of wintertime air pollution or that there is a problem with the overall quality of air in the area.***

In an effort to try and understand why some burners actually complied with the no-burn request they heard while others did not, we re-examined burners' responses to the questions of overall air quality in the area and how they rated the seriousness of air pollution caused by residential wood-burning. Results, presented in the next figure, indicated that those who complied and reduced the number of fires this past winter were significantly more likely to rate the quality of air in the region negatively (72% gave ratings of "fair" or "poor") and to say that residential wood-burning is a serious cause of air pollution (66% said "somewhat" or "very") than were non-compliers (46% and 40%, respectively). **In other words, there is an information credibility gap – and therefore an opportunity for a public education program to correct this disbelief.**

FIGURE 34 – ACTUAL 2007 COMPLIANCE BY RATINGS OF AIR QUALITY & SERIOUSNESS OF RESIDENTIAL WOOD-BURNING:
(BURNERS ONLY)



SUPPORT FOR VOLUNTARY NO-BURN RULE AND HYPOTHETICAL COMPLIANCE

General Population

❖ ***40 The vast majority of all respondents approved of a voluntary no-burn rule (85%) and said they would comply with it (93%) – a strong endorsement for a voluntary measure. However, these figures include respondents who do not own wood-burning devices or burn wood.***

All respondents were asked whether they generally approved or disapproved of asking residents to voluntarily suspend non-essential woodstove and fireplace burning while there is poor air quality in the area where they live. They were then asked how likely they would be to comply if such a request were made.[19] Results from the general population base study are presented in Figure 35. It can be seen, first of all, that the majority of all respondents approved of a voluntary no-burn rule: 59% "strongly" approved and a further 26% "somewhat" approved. Only 15% of all respondents disapproved – either "somewhat" (7%) or "strongly" (8%). Secondly, it can be seen that the vast majority of respondents in the general population claim they would comply with a voluntary request: nearly three quarters (74%) said they would be "very likely" to comply (significantly higher than the 59% who strongly approved), and a further 19% said they would be "somewhat likely" to comply. Although representative of the attitudes of the entire population of residents in Sacramento County in general, these figures include respondents who do not own wood-burning devices or burn wood and who therefore would have no difficulty approving and complying with any voluntary measure.

FIGURE 35 – SUPPORT FOR VOLUNTARY NO-BURN RULE AND LIKELIHOOD TO COMPLY
(BASE STUDY GROUP EXCLUDING UNDECIDED RESPONSES)

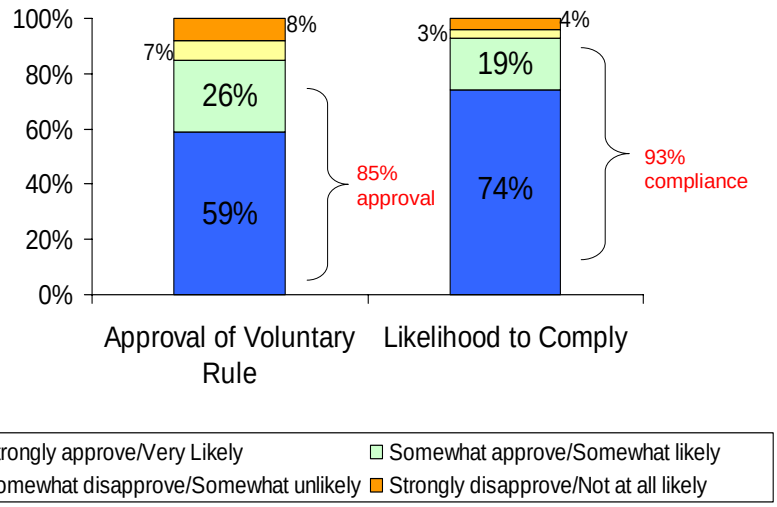
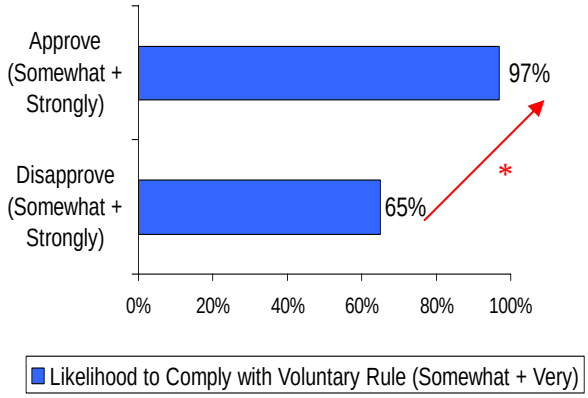


Figure 36 shows the proportion of respondents who said they would be likely to comply with a voluntary no-burn rule according to whether or not they approve of a voluntary program. It can be seen that among the general

[19] The exact wording of the latter question was: "And when residents are asked to voluntarily suspend non-essential woodstove and fireplace burning because of poor air quality, how likely are you to comply? Would you would you say not at all likely, somewhat unlikely, somewhat likely or very likely?

population study of respondents, 97% of those who said they "somewhat" or "strongly" approved of a voluntary no-burn rule also said they would be "somewhat" or "likely" to comply with it. Among those who did not approve of the voluntary measure (only 15% of the general population), hypothetical compliance was significantly lower, at 65%.

FIGURE 36– LIKELIHOOD TO COMPLY WITH VOLUNTARY NO-BURN RULE BY LEVEL OF APPROVAL
(GENERAL POPULATION BASE STUDY)



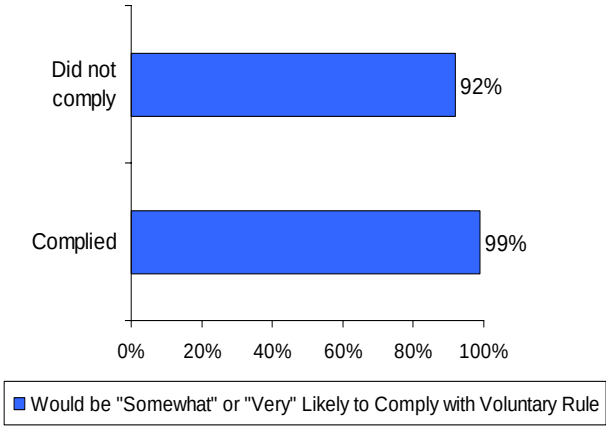
* indicates a statistically significant difference between the groups

Consistency between Actual Compliance Behavior and Hypothetical Compliance

❖ ***41 Further analysis revealed a discrepancy between actual compliance behavior and hypothetical compliance (what respondents said they would do) – the largest discrepancy occurring in the group of respondents who did not comply with the request not to burn but said they would. Those who did comply and said they would be likely to comply were far more consistent.***

One final analysis of the general population base study compared actual compliance behavior with what respondents hypothetically said they would do. Figure 37 indicates that the **largest discrepancy** between actual compliance behavior and hypothetical compliance occurred in the group who did not comply with the request not to burn (even though they said they had heard the requests not to burn): 92% of them said they would be likely (either "somewhat" or "very") to comply with a voluntary no-burn rule -- only 8% (10 respondents) of those who actually did not reduce the number of fires they burned (125 respondents in total) said they would not comply with a voluntary rule. There was much more consistency among the (albeit) smaller group of 70 respondents who actually complied by reducing the number of fires they burned in the winter of 2006/2007: all but one of them (99%) said they would be likely to comply with a voluntary no-burn rule and did.

FIGURE 37 – ACTUAL 2007 COMPLIANCE BEHAVIOR BY HYPOTHETICAL BEHAVIOR:
(RESPONDENTS IN BASE STUDY GROUP WHO HEARD REQUEST NOT TO BURN EXCLUDING UNDECIDED RESPONSES)

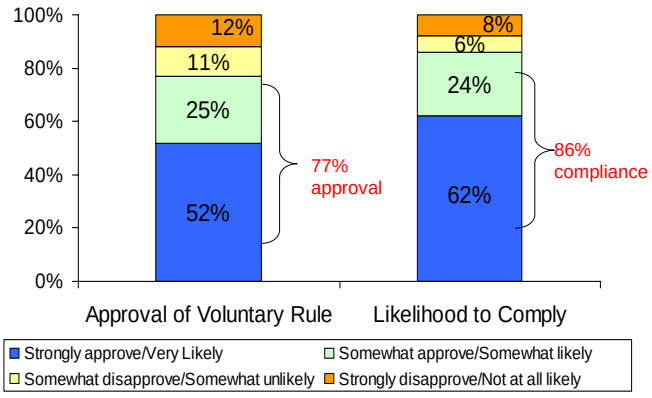


Low-Income Group

❖ ***42 Although support was slightly lower among the low-income group than among the general population of respondents, the majority (77%) approved of a voluntary no-burn measure and 86% said they would comply with one.***

Results of approval for and likelihood to comply with a voluntary no-burn rule among just the low-income group of respondents are presented in the next figure. It can be seen that 77% of these respondents approved of a voluntary measure and a combined total of 86% said they would comply with it.

FIGURE 38 – SUPPORT FOR VOLUNTARY NO-BURN RULE AND LIKELIHOOD TO COMPLY
(LOW-INCOME GROUP EXCLUDING UNDECIDED RESPONSES)

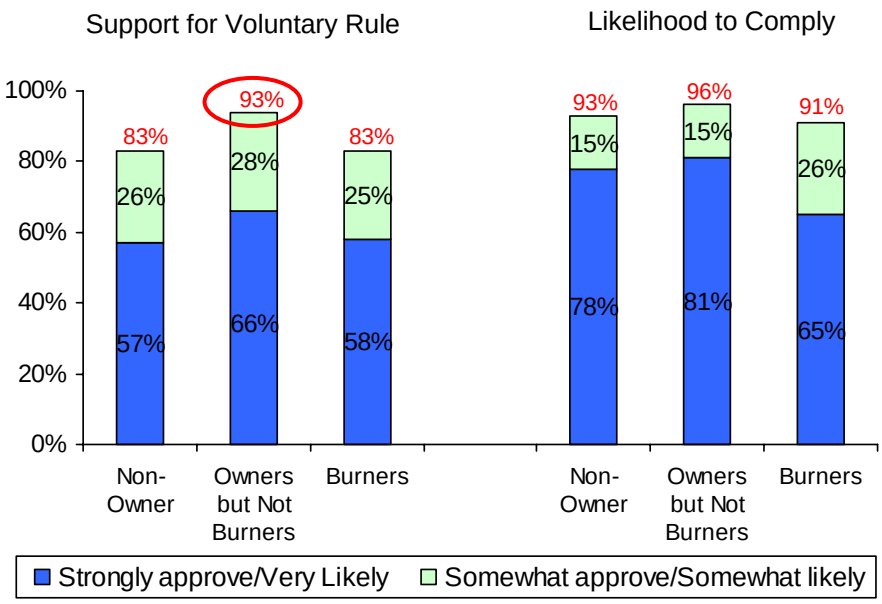


Burners vs. Non-Burners

❖ ***43 Perhaps the best reflection of levels of acceptance of a voluntary measure to request that residents not burn wood is between those who burned wood this year versus non-burners. Results indicated that the majority (83%) of those who burned wood this past winter also approved of a voluntary no-burn rule. The highest approval was among respondents who owned wood-burning devices but did not use them (93%). In terms of compliance, there were no differences – the vast majority (over 90%) in all groups said they would comply.***

For the purpose of this analysis, the non-burner group was separated into two: those who actually owned wood-burning devices but never used them, and those who did not own wood-burning devices. Results of the approval for and the likelihood of complying with a voluntary no-burn rule among three groups of respondents (burners, owners but not burners, and non-owners) are shown in Figure 39.

FIGURE 39 – SUPPORT FOR VOLUNTARY NO-BURN RULE AND LIKELIHOOD TO COMPLY
(NON-OWNERS, OWNERS BUT NOT USERS, & BURNERS, EXCLUDING UNDECIDED RESPONSES)



It is interesting to note, first of all, that support and hypothetical compliance among those respondents who do not own wood-burning devices is not 100% -- (17% did not approve and 7% would not comply), meaning that some of the residents who cannot burn wood, would, if they could.

Secondly, although levels of approval and levels of hypothetical compliance within each group are not statistically different from one another, the very fact that there are differences at all indicates that there is a small number of individuals in each group who disapprove of the rule but say they would comply. Similarly there is a small number of individuals who approve of the rule but say they would not comply. In attitudinal survey research this is not an uncommon finding.

Closer examination of a couple of the discrepancies within just the **burner** group revealed that among the 17% of respondents who did not support a voluntary no-burn rule (22 individuals said they "somewhat" or "strongly" disapproved), half of them said they would comply, and in fact 9 individuals heard the requests not to burn this past winter and of these, 2 respondents reduced the number of fires they burned. Among the 9% of burners (or 12 individuals) who said they would not comply with a voluntary reduction, nearly half (5 individuals, or 42%) said they approved of a voluntary rule, 7 of them (or 58%) heard the no-burn requests this past winter, and 1 respondent actually reduced the number of fires because of the request. In other words, there were gaps between some respondents' attitudes, what they said they would do, and how they actually behaved. Fortunately, for the most part, these discrepancies were apparent within only a relatively small number of respondents.

SUPPORT FOR MANDATORY NO-BURN RULE

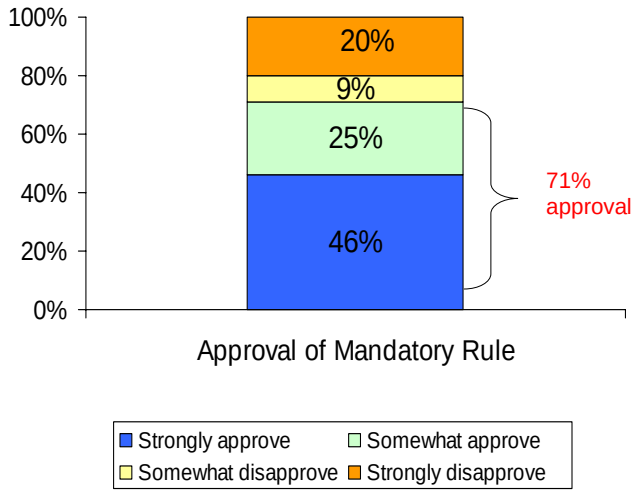
General Population

- ***44 Although approval was significantly lower (than for a voluntary no-burn rule), the majority of respondents (71%) nevertheless approved a mandatory no-burn rule.***

  All respondents were read a description[20] of a mandatory no-burn rule which some counties have already adopted, and were asked whether they approved or disapproved of it. Results, presented in the next figure, indicate that 46% "strongly" approved of a mandatory measure, and a further 25% of all respondents "somewhat" approved of it, for a combined approval rating of 71%. This is significantly lower than the 85% who approved of a voluntary rule, but still indicates that the majority of the general public would approve of a mandatory no-burn rule. That being said, there is also a fairly large polarized group of 20% of all respondents who were "strongly" opposed to mandatory legislation who could be quite vocal in their opposition.

[20] "Some counties in California have already adopted mandatory NO-Burn regulations for specific days during the winter when particulate matter is predicted to be unhealthy. A local agency is also considering adopting a mandatory No-Burn rule. However, gas fireplaces and residents whose only source of heating is wood-burning would be exempt from the regulation."

FIGURE 40 – SUPPORT FOR MANDATORY NO-BURN RULE
(BASE STUDY GROUP EXCLUDING UNDECIDED RESPONSES)

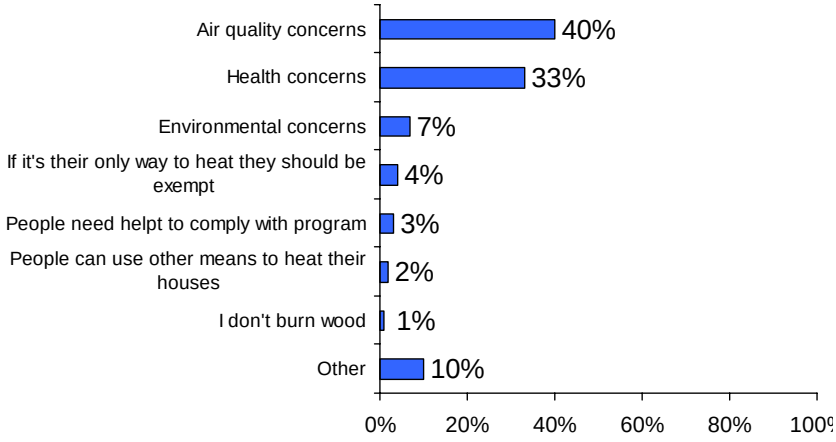


Main Reasons For Strongly Approving a Mandatory No-Burn Rule

❖ ***45 Those who "strongly" approved of a mandatory no-burn rule did so mainly because of air quality and health concerns.***

All respondents were then asked to give their main reasons for approving or disapproving of a mandatory measure. All responses were content-analyzed and categorized and the full verbatim transcripts will be presented in the statistical binder. Among the 46% of respondent who "strongly" approved, it can be seen in the next figure that the main reasons for approving a mandatory no-burn regulation were for air quality reasons and health concerns.

FIGURE 41 – MAIN REASONS FOR "STRONGLY APPROVING" A MANDATORY NO-BURN RULE
(GENERAL POPULATION BASE STUDY)



To give a sense of the actual words respondents used, a few examples are included. First, some of the comments having to do with **air quality concerns** were:

- "*Anything that is better for the air is good.*
- *Because of the smog and everything in the air. I think we need to have cleaner air than we do now.*
- *Because we have to reduce air pollution.*
- *Because we can't ignore the air quality in the valley, it continues to get worse and the things we know are contributing to the air quality should be addressed such as wood-burning fireplaces and fire pits.*
- *Because wood-burning worsens our atmosphere and burning wood is NOT necessary.*
- *Because you have to stop the pollution and if you stop it will help.*
- *I am pro nature. Like to improve the air quality.*
- *I feel that everyone has an opportunity to help improve our air quality therefore any individual effort such as not burning a fireplace that is not needed for heat should not be.*
- *I like to breathe clean air, and I spend quite a bit of time outside, it is very evident when the air quality in Sacramento is poor. I am particularly irritated when I feel that people burn trash in their fireplaces.*
- *I think the air quality is bad, and we need to look at what is making the air quality bad. If the only way to increase the awareness is to have this become mandatory, then they should do it.*
- *It would help clean up the air.*
- *I think that it is important to have good air quality and some days I don't want to and don't go outside due to the poor air quality.*
- *If it's going to reduce particulate matter in the air and make it better I don't see why we can't all work together on it.*
- *To reduce pollution. There is a need for it.*
- *Just the air quality -- it's not getting better if we aren't helping to get it better. If you don't need a fireplace for your primary source of heat it is a luxury that is damaging the rest of us.*
- *That there's probably too much air particulate -and it needs to be stopped.*
- *The less you burn, the less air pollution there will be.*
- *The poor quality of air to breathe and things can only get worse. We've come to a point where we have to do something as stringent as this.*
- *To keep the pollution and particulate matter out of the air.*
- *We have to get pollution under control and I think voluntary programs won't work.*
- *Whatever we have to do for air quality is what we need to do unless you are an exception.*
- *We need* to do something about all the pollution."

A few of the supportive comments of mandatory legislation that had to do with **health concerns** included:

- *"Because I have asthma.*
- *Because I don't have any health issues and it wouldn't be fair of me not to think of people who do have those health problems.*

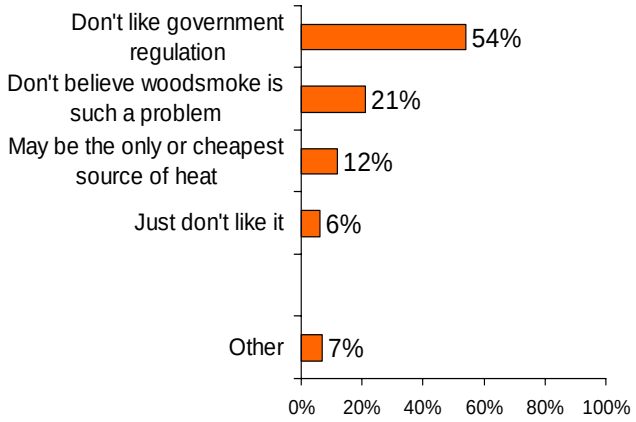
- *Because my father has 25% lung capacity and he is on oxygen 100% of the time because of his emphysema. We monitor the air quality reports and he has to stay in on days when the air quality is bad.*
- *For the purpose of everybody breathing, I would agree that they should regulate it. That is why we have rules, I have elderly parents and I know that My mother-in-law has lung problems.*
- *I'm thinking of the children. And we want a healthy population. Without breathing this stuff in.*
- *I go outside and smell smoke, and I'm prone to lung problems, so I approve.*
- *I have two daughters who are asthmatic, and I think that we should do what is best for everybody.*
- *I only have one set of lungs and pair of eyes, I have allergies and pollution irritates every one of these things.*
- *I think everybody should be able to breath. I think wood-burning is a luxury and if we can't afford the luxury because of the damage it causes than giving up wood-burning stoves and fireplaces is a small thing to ask.*
- *I understand the health risks to this. I'm healthy and I know that there are many people who are not. So just to have compassion for others.*
- *It's not good for the people that have a problem breathing.*
- *My wife died of pulmonary problems.*
- *Not only from my own asthma, but as a teacher I see many children with breathing problems.*
- *Well because of the whole particulate matter pollution and there are a lot kids now getting asthma from the wood-burning.*
- *Well personally I believe there is quite a bit of particulate matter in the air. I personally have an allergy or sinus related issues and it basically only happens since I moved here and I attribute it to the particulate matter in the air.*
- *When I go out and wood-burning stoves are on and fireplaces are going it really does get to me in my lungs."*

Main Reasons For Strongly Disapproving of a Mandatory No-Burn Rule

❖ ***46 The 20% who "strongly" disapproved of a mandatory no-burn rule did so mainly because they don't want their freedom limited by government regulation.***

The next figure indicates that the most frequently given reason for "strongly" disapproving a mandatory no-burn rule is that respondents do not like government regulation (54% of responses), followed by a belief that wood smoke is not such a problem (21%).

FIGURE 42 – MAIN REASONS FOR "STRONGLY DISAPPROVING" A MANDATORY NO-BURN RULE
(GENERAL POPULATION BASE STUDY)



A few examples of respondents who did **not like government regulation** include:

- "*A person should be able to do what he wants to do in his house.*
- *Government intrusion. In general I don't see the Government needing to be involved in a matter like this that's not so serious.*
- *I'm just a little bit tired of busybodies trying to tell people how to live.*
- *I believe that people should be able to warm their houses however they like.*
- *I don't like being nailed into something that can be turned out to bite me in the ass. What sounds good on Monday doesn't always sound so good on Tuesday.*
- *I don't like the government telling me what I "HAVE" to do in my personal life. It is just too much. I believe in the volunteer method.*
- *I don't think the government should tell you when and what you can burn.*
- *I don't think we should be forced to comply.*
- *I still think there should still be a bit of a choice in there. It's that "No you can't that bothers me".*
- *I think governments are getting too much control.*
- *It's a political sham the majority of people have a fireplace you can burn wood in, now we are told when we can burn and when we can't. This is what happens when you have a state controlled by Democrats.*
- *It is up to the people themselves, not have a regulatory commission dictate to them.*
- *I don't think they should regulate that.*
- *You have people out there who have wood-burning fireplaces and they should be allowed to use their property. If they want to adopt new building regulations for wood-burning but pre-existing homes with wood fireplaces should be exempt.*
- *I don't want the government regulating my life.*
- *I don't like any more regulation. I think it should be voluntary.*

- *They are infringing on people's rights.*
- *Whatever people want to do is their own business.*
- *They have no right telling me I can't have a fire. If I'm trying to save money on my monthly bill you bet I'm going to light a fire. I don't see anybody paying my bills.*

And finally, a few examples from respondents who **do not believe wood smoke is a problem**:

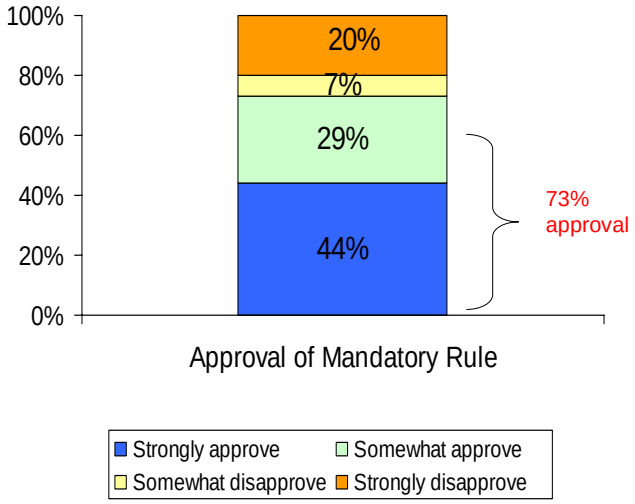
- *"Because I believe the so called threat is over-exaggerated and not substantiated.*
- *I don't see people driving less, which is the real cause of pollution.*
- *I don't think that it is a major cause of air pollution. It's a very minimal cause, and for the few times I burn it's a negligible cause.*
- *I haven't seen enough information to tell me that this is the primary cause of the high particulate matter in the winter. Equally, I don't see enough evidence that there are restrictions on industry and vehicles.*
- *There are not enough wood-burning fireplaces to really make a difference. When they allow the farmers to burn thousands and thousands of acres of rice fields, and put tons of particulate matter into the air, my fireplace seems inconsequential.*
- *We say burning furnaces causes more pollution than fireplaces.*
- *There are other areas be focused on, such as auto exhaust and municipal diesel buses.*
- *People need to conserve energy. There are other sources to be concerned about.'"*

Low-Income Group

❖ ***47 Approval of a mandatory no-burn rule was about the same in the low-income group as in the general population: 73% either somewhat or strongly approved a mandatory measure.***

The levels of approval of a mandatory no-burn measure among low-income respondents are presented in Figure 43. Results were generally the same as those obtained in the base study, with approximately 73% of low-income respondents approving mandatory measures and the remaining 27% disapproving.

FIGURE 43 – SUPPORT FOR MANDATORY NO-BURN RULE
(LOW-INCOME GROUP EXCLUDING UNDECIDED RESPONSES)

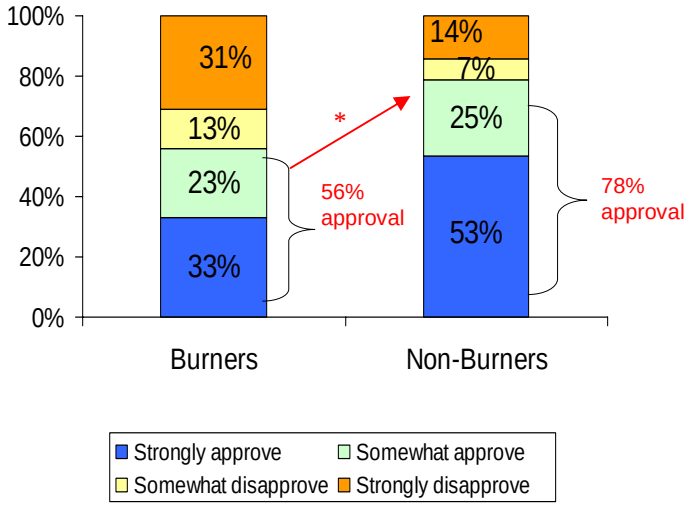


Burners vs. Non-Burners

❖ ***48 Not surprisingly, approval of a mandatory no-burn rule was significantly lower among burners (56%) than non-burners (78%) in the general population.***

Figure 44 shows the levels of approval of a mandatory no-burn measure among burners and compares them with non-burners in the general population. Results indicated that burners were significantly less likely than non-burners to approve of mandatory measures – only 33% "strongly" approved and another 23 "somewhat" approved, for a combined total of 56% approval. This contrasts with 78% of non-burners who approved of a mandatory no-burn rule.

FIGURE 44 – SUPPORT FOR MANDATORY NO-BURN RULE
(BURNERS VS. NON-BURNERS GROUP EXCLUDING UNDECIDED RESPONSES)



* indicates a statistically significant difference between the groups

Other Group Differences

- ***49 There were <u>no</u> other demographic features (than burners vs. non-burners) that distinguished respondents who approved mandatory no-burn measures from those who did not.***

  The series of 13 chi-square analyses which were run to determine whether certain demographic features distinguished those who approved of a mandatory no-burn rule from those who disapproved did not yield any significant differences – the same proportion of males as females both approved and disapproved; as did respondents in older neighborhoods as well as newer neighborhoods; owners as well as renters; wealthier households as well as poorer households; etc.

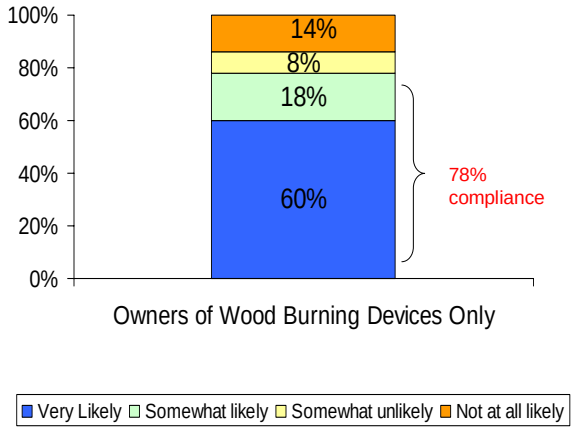
LIKELIHOOD TO COMPLY WITH A MANDATORY NO-BURN RULE

Owners of Wood-burning Devices

- ***50 Among those in the general population of Sacramento County respondents who <u>owned</u> wood-burning devices (whether or not they used them), over three-quarters (78%) said they would likely comply with a mandatory no-burn rule.***

In order to get as accurate a description as possible about projected levels of the likelihood of compliance with mandatory wintertime no-burn measures, only those respondents who owned wood-burning devices and thus had the capability of burning wood (whether or not they actually used them during the past winter) were asked to speculate on how likely they would be to comply with a mandatory no-burn rule if it were implemented in the Sacramento area. Just over half of the general population was owners (this included the 134 respondents who burned wood and the 82 respondents who owned, but did not burn wood this past winter) and just under half were non-owners of wood-burning devices. Of the 54% of owners (216 in total), 60% said they would be "very" likely to comply with any mandatory no-burn regulation, and a further 18% said they would be "somewhat" likely to comply. In other words, among the group of respondents who have the capability to burn wood, 78% said they would comply with a mandatory no-burn measure.

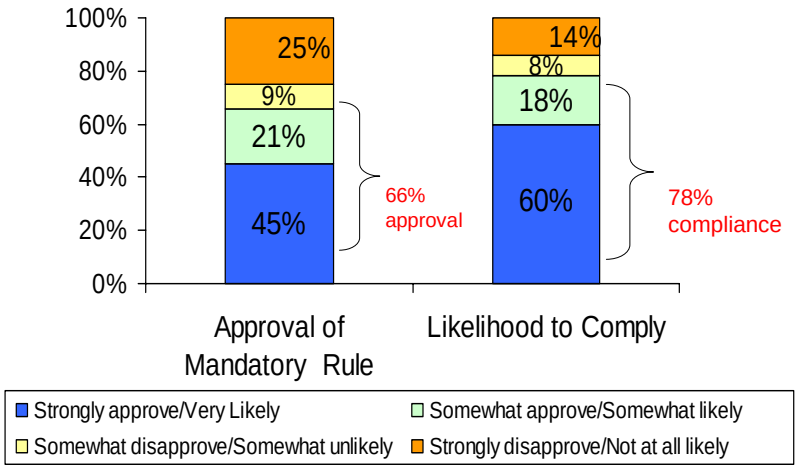
FIGURE 45 – LIKELIHOOD TO COMPLY WITH MANDATORY NO-BURN RULE
(OWNERS OF WOOD-BURNING DEVICES ONLY EXCLUDING UNDECIDED RESPONSES)



❖ ***51 Respondents who owned wood-burning devices were significantly more likely to say they would comply with a mandatory no-burn rule than to approve of it, indicating that prior support may not be a necessary requirement for successful implementation of a mandatory rule. In other words, respondents may not like the regulation but the majority would hypothetically comply with it.***

In order to show levels of approval of a mandatory no-burn measure in the same graph as respondents' likelihood to comply with it, we re-calculated levels of mandatory support by including only those respondents who were asked the compliance question – namely, those who owned wood-burning devices. Results are shown in the next figure, along with the just-reported levels of compliance. It can be seen that respondents who owned wood-burning devices were significantly more likely to comply with a mandatory no-burn rule (78%) than approve of it (66%).

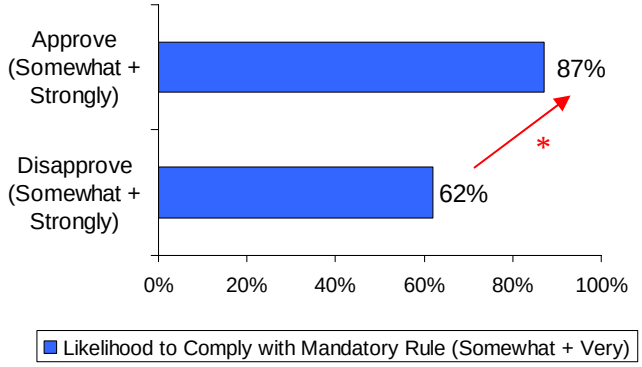
FIGURE 46 – SUPPORT FOR MANDATORY NO-BURN RULE AND LIKELIHOOD TO COMPLY
(OWNERS OF WOOD-BURNING DEVICES ONLY)



❖ ***52 Crosstabulations indicated that the majority of owners who approved of mandatory measures also said they would be likely to comply with them (87%). Significantly fewer owners who <u>dis</u>approved of mandatory measures would be likely to comply (62%).***

In order to see if the same discrepancies between attitudes and behavior that were found in the responses to voluntary no-burn measures also occurred in reactions to mandatory measures, we examined the fit between support for mandatory measures and likelihood to comply with them for the subgroup of respondents who were capable of burning wood (i.e. the same population of owners as just described above). Results, shown Figure 47, indicate that, among those who ("somewhat" or "strongly") approved of a mandatory no-burn rule, 87% said they would likely comply ("somewhat" or "very likely") with it. Significantly fewer owners who <u>dis</u>approved of mandatory measures would be likely to comply (62%). In other words, and similar to what was found in the voluntary rule analysis, there was a small percentage of individuals who approved of mandatory measures but who said they would not comply with them (13%); and there was a larger percentage of respondents who <u>dis</u>approved of mandatory measures but nevertheless said they would comply with them (62%).

FIGURE 47 – LIKELIHOOD TO COMPLY WITH MANDATORY NO-BURN RULE BY LEVEL OF APPROVAL OF MANDATORY MEASURE
(OWNERS OF WOOD-BURNING DEVICES ONLY)



* indicates a statistically significant difference between the groups

Consistency: Support, Hypothetical Compliance and Actual Compliance

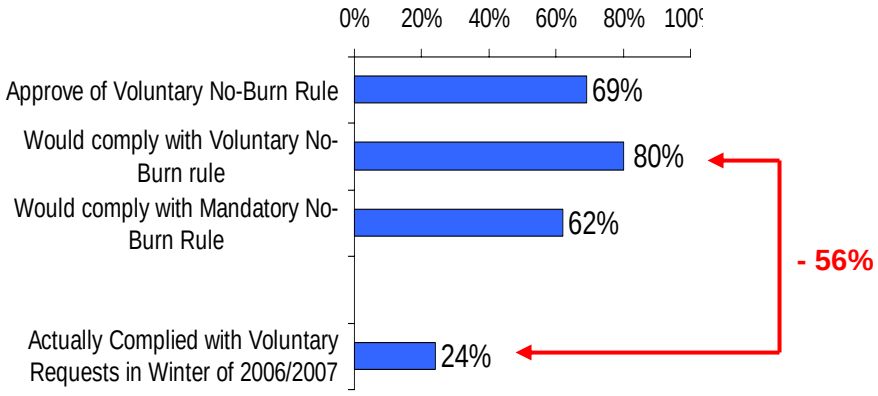
- ***53 Further analysis revealed that, although the extent of the discrepancy between what respondents said they would do voluntarily and what they actually did was similar between those who approved of mandatory measures and those who disapproved of mandatory measures; compliance this past winter was significantly higher among those who approved of mandatory measures (37%) than among those who disapproved (24%).***

- ***54 However, because the majority (63%) of even favorably-disposed respondents of a mandatory no-burn rule did <u>not</u> voluntarily reduce the number of fires they burned this past winter, if a mandatory no-burn regulation were implemented, it would probably have to be visibly and publicly enforced in order to increase levels of compliance.***

In order to assess the levels of consistency between attitudes, hypothetical behavior and actual behavior, we separated those owners of wood-burning devices who did not support a mandatory no-burn rule from those who approved of it and within each of these two groups, examined their prior responses. The next two figures show the results of this analysis.

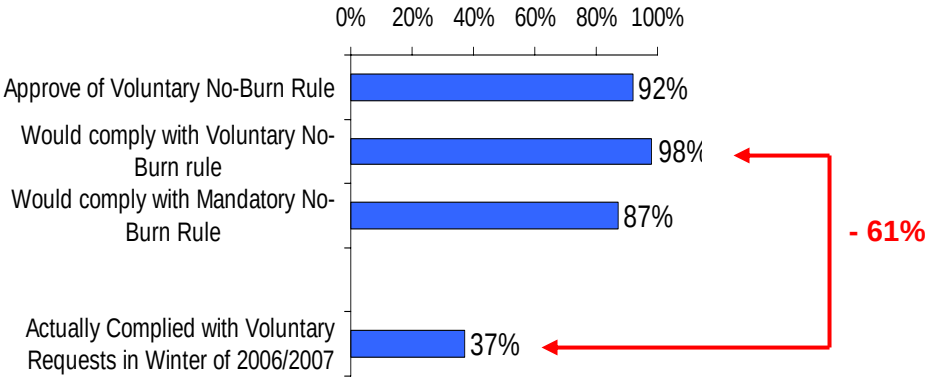
It can be seen in figure 48 that among the group who <u>dis</u>approved of a mandatory no-burn rule, the majority (69%) of owner respondents <u>approved</u> of a voluntary measure, and an even greater percentage (80%) said they would comply with a voluntary rule; however, only a quarter (24%) actually did reduce the number of fires they burned this past winter after hearing the voluntary requests. In other words, there was a fairly large gap between what these respondents said they would do and what they did (56% difference).

FIGURE 48 – OWNERS WHO DID NOT APPROVE OF A MANDATORY NO-BURN RULE: VOLUNTARY SUPPORT, HYPOTHETICAL COMPLIANCE AND ACTUAL COMPLIANCE



In terms of the group of respondents who approved of a mandatory no-burn regulation, the vast majority (92%) likewise approved of voluntary measures and nearly all (98%) said they would comply with a voluntary rule; however, only 37% of these respondents actually did reduce the number of fires they burned this past winter after hearing the voluntary requests. In other words, although support and predicted compliance was much higher among this group of owners, there was still a gap between what this otherwise favorably-disposed group of respondents said they would do voluntarily and what they actually did (61%).

FIGURE 49 – OWNERS WHO APPROVED OF A MANDATORY NO-BURN RULE: VOLUNTARY SUPPORT, HYPOTHETICAL COMPLIANCE AND ACTUAL COMPLIANCE

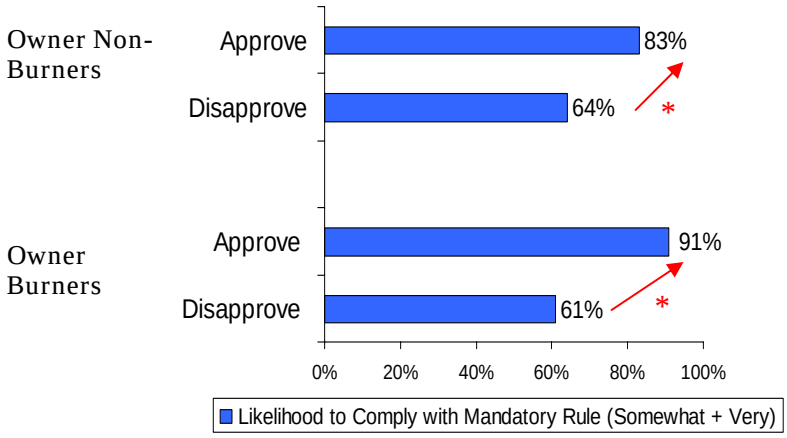


Owner Burners vs. Owner Non-Burners

❖ ***55 Among owners of wood-burning devices, although levels of approval of mandatory measures were significantly different for burners and non-burners, levels of hypothetical compliance were the same.***

Significantly fewer owners of wood-burning devices who burned wood this past winter approved of mandatory measures (56%) than owners who did not burn wood (83%). That being said, Figure 50 shows that, regardless of whether or not they approved, the same percentage of burners as non-burners[21] would be likely to comply with a mandatory restriction – among those who approved of mandatory measures, 83% of non-burners said they would likely comply with mandatory measures. This is not significantly different from the 91% of burners who approved and said they would comply. Similarly, among those who disapproved of mandatory restrictions, 64% of non-burners would nevertheless comply and 61% of burners said they would comply.

FIGURE 50 – LIKELIHOOD TO COMPLY WITH MANDATORY NO-BURN RULE BY LEVEL OF APPROVAL OF MANDATORY MEASURE:
(OWNER NON-BURNERS VS. OWNER BURNERS)



* indicates a statistically significant difference between the groups

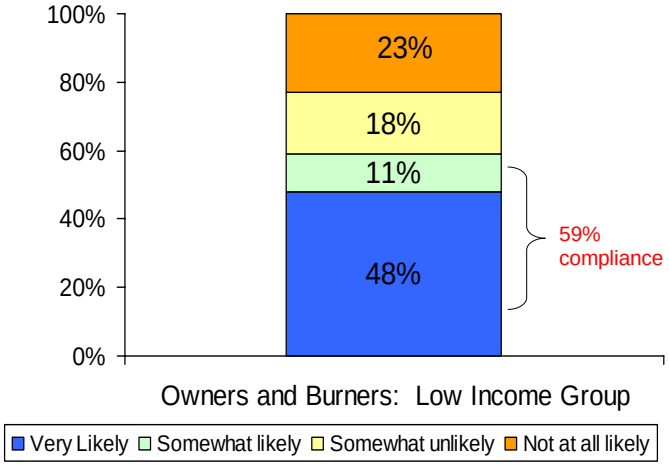
Low-Income Group

❖ ***56 Owners of wood-burning devices in the low-income group were not as likely to comply with a mandatory no-burn rule.***

[21] This particular analysis of burners vs. non-burners is among owners of wood-burning devices only (i.e. those who were asked the mandatory compliance question). Previous analyses of burners vs. non-burners were based on a larger number of respondents as they included as non-burners the subset of the general population (185 respondents) who did not own any wood-burning devices and therefore did not burn wood this past winter.

The next figure shows the levels of hypothetical compliance with a mandatory no-burn rule among low-income respondents who owned wood-burning devices. It can be seen that only 59% of these respondents would be somewhat or very likely to comply with mandatory regulation, compared with 78% of owners in the general population. (It should be kept in mind, however, that the number of owners in the low-income group is relatively small – this analysis includes only 44 respondents.)

FIGURE 51 - LIKELIHOOD TO COMPLY WITH MANDATORY NO-BURN RULE
(OWNERS OF WOOD-BURNING DEVICES ONLY: LOW-INCOME GROUP EXCLUDING UNDECIDED RESPONSES)



Other Group Differences

- ***57 There were no demographic features that distinguished respondents who said they were likely to comply with mandatory no-burn measures from those who were not.***

The series of 13 chi-square analyses which were run on owners of wood-burning devices to determine whether certain demographic features distinguished those who were likely to comply with a mandatory no-burn rule from those who were not likely to comply did not yield any significant differences – the same proportion of males as females would comply as would not, as would owners as well as renters, those from wealthier homes and poorer homes, better educated respondents as well as less educated respondents; etc. **In other words, a public education campaign about PM pollution does not need to target specific demographics -- a broad outreach to all residents in Sacramento County should have an impact.**

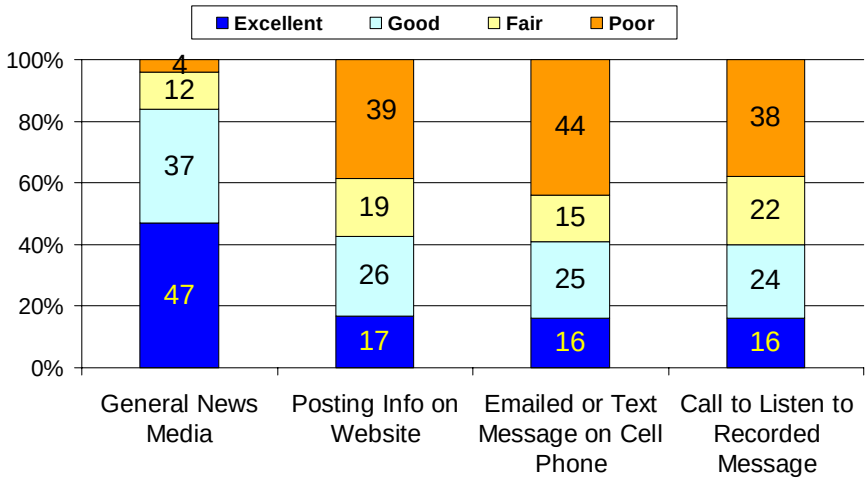
COMMUNICATION STRATEGIES

General Population

❖ ***58 The general news media, such as TV, radio, and newspaper, would be the best way to let residents know whether or not they can burn wood on a particular day.***

Respondents were read a list of possible ways that residents could find out about the air quality on a particular day and whether or not they could burn wood in the event that a mandatory no-burn rule was adopted. They were asked to rate each one in terms of how effective it would be for them personally, using a four-point scale: poor, fair, good, or excellent. As shown in Figure 52, the general news media was considered to be the most effective, with nearly half of those surveyed considering the TV, radio, or newspaper to be an "excellent" way to alert the public of a No-Burn Day. A further 37% said it would be a "good" way to reach them, for a combined total of 84% who held positive opinions about this communication strategy. This figure was found to be statistically significantly higher than the combined positive ratings towards the three other options mentioned: posting info on the website, 43%; emailed or text message on cell phone, 41%; or call to listen to a recorded message, 40%.

FIGURE 52 - EFFECTIVENESS RATINGS OF COMMUNICATION STRATEGIES FOR NO-BURN DAYS
(AMONG BASE STUDY EXCLUDING UNDECIDED RESPONSES)



❖ ***59 Electronic billboards along the freeway and telephone calls were identified as other effective ways to advise the public about a No-Burn Day. Additionally, 8% suggested air quality information be sent via the mail.***

Respondents were asked to identify any other way they would prefer to receive information about the air quality to keep them informed about whether or not it is

okay to burn wood on a particular day. Responses were captured in an open-ended format, cleaned and categorized for quantitative analysis. The majority of those surveyed (73%) offered no suggestions. Some respondents reiterated communication channels that had already been discussed (newspaper, 2%); TV, 2%; radio,1%; and general media,1%). Other ideas were more creative and included:

Eight percent said they would like to **receive something in the mail**. Although this would obviously **not** be a way to alert the public about a no-burn request for the next day, a closer look at the verbatim responses implies an **opportunity for public education about air quality and no-burn days** in general.

- Several people who mentioned receiving information in the form of utility bill inserts said:
  - *"A newsletter. Maybe something similar to a schedule.*
  - *By mail from PGE.*
  - *Inserts in utilities bills*
  - *The monthly utility bill could add some air quality information.*
  - *By mail through utility services."*
- Other comments were more generic and included:
  - *"Direct mail of all the dates and I would post on my refrigerator.*
  - *Door to door flyers mail drops*
  - *I didn't know this was such a big problem, so send it in the mail.*
  - *In the mail which is on paper which is a wood product.*
  - *Information with electric or gas bills would be a better way to inform me*
  - *Mail flyers. Have a place to sign the flyer, show that they read it, and mail it back and get like $5 for reading it.*
  - *Maybe a flyer or a postcard.*
  - *Memorandum by mail or by email.*
  - *Pamphlet.*
  - *Possibly a flyer or something sent in the mail."*

Several respondents (3%) would like to **receive a telephone call**. Comments included:

- *"A phone message or a call on those days.*
- *A telephone blast.*
- *Automated phone book where you could call people to alert people. Generated by a computer. Look people up in the phone book to call them.*
- *Call me.*
- *Give me a phone call.*
- *Recorded announcement for my phone.*
- *They could call me.*
- *They need to call me on the phone.*
- *To call the people of the county.*
- *Voluntary automated phone calls to people who have signed up."*

A few people (3%) thought **electronic billboards along the freeway** would be effective. Comments included:

- *"Amber signs posted.*
- *Billboards over the freeway, electronic billboards, like the ones used for construction, one will automatically read it when passing by one.*
- *Billboards.*
- *Displays on the highway.*
- *Electronic billboards.*
- *Highway signs.*
- *Signs on freeway, flashing saying it is a no burn day.*
- *Signs on the freeway like the Amber alerts to let people know.*
- *The Amber Alert sign on the highway.*
- *To do sign boards like the Amber Alert or all along the freeway."*

Other suggestions for communicating No-Burn Days that were unique and could not be grouped into the same category included:

- *"A helicopter with a loudspeaker, but that would cause pollution itself.*
- *A reminder that you will be notified about no burn days in the next three months.*
- *By helicopter warnings.*
- *E-mail on the computer; not just through the phone e-mail.*
- *Flying a blimp, or signs on the buses.*
- *Have a flag on capitol building - like city hall.*
- *I would consider a pop-up on the internet service. A flag system also, something like what they used to have at the fire stations.*
- *I would like to see it come through your thermostat on my house. A smart thermostat with display to show no wood-burning.*
- *New year blimp*
- *Notify people at work.*
- *People who would carry signs around to let people know.*
- *Posters.*
- *Put up a tower and put lights on the top of it where green if you can burn and red when you can't.*
- *Register homeowners with fireplaces.*
- *Reverse 911 system to be used in emergencies.*
- *Streaming news would be helpful.*
- *Supermarket alert in supermarket or gas pump. Places we frequent a lot. Schools. A hot air balloon.*
- *The internet is the best way.*
- *They should give us a schedule in our area as to when we can burn wood or not burn it.*
- *Through community groups.*
- *Warning signal like an air raid signal.*
- *You would have to send a no-burn officer to the door in order to contact me."*

Low-Income Results

- ***60 Communication preferences among low-income respondents were very similar to those of the general population, with the general news media ranking the highest (82% gave favorable ratings).***

Eight in ten said that the general news media would be a "good" (37%) or "excellent" (45%) way of communicating information about air quality and no-burn days. A third of low-income respondents felt that posting on a website (34%) and sending an e-mail or text message (35%) were favorable options. About half (50%) favored a telephone number which they could call to hear a recorded message.

Group Differences

- ***61 Preference for a recorded telephone message varied by a few demographic features (income, ethnicity, education, Internet access, type of dwelling and wood burn activity). Ethnicity influenced the level of those favoring e-mail and text messages.***

  The series of 13 chi-square analyses that were run on the general population to determine whether certain demographic features distinguished those who were gave positive evaluations of the various communication strategies from those who gave negative ratings did not yield any significant differences the use of general media or posting information on a website.

  Those who gave positive ratings ("good" or "excellent") for receiving e-mailed messages or text messages on a cell phone to alert them about no-burn days were more likely to:

  - identify their ethnic background as African American or Hispanic or Latino (both 63%) than Caucasian (35%).

  Those who gave positive ratings for a telephone number with a recorded telephone message in terms of being an effective communication tool were more likely to:

  - live in an apartment, condo, townhome, or mobile home (54% vs. a single-family home, 36%),
  - have less formal education (46% vs. have a college degree, 32%),
  - not currently access the Internet (54% vs. those who do, 35%),
  - have lower incomes (52% vs. 33% of those earning $50,000 or more),
  - not burn wood (45% vs. 30% of the burners),
  - identify their ethnic background as African American (56%) and Hispanic or Latino (65%) versus Caucasian (37%).

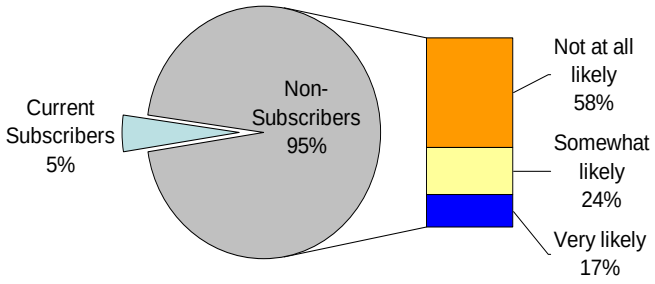
AIR ALERT SUBSCRIPTIONS

- ***62 Five percent of those surveyed said they currently subscribe to Air Alert. Among the non-subscribers, about four-in-ten said they would be likely to do so in the future, with 17% saying they would be "very" likely.***

  Respondents were asked whether or not they subscribed to the District's Air Alert notification system and 5% said they did. The 95% who were not

current subscribers were asked: "How likely would you be to sign up for an e-mail notification that would alert you to no-burn days?" As shown in the next figure, 17% would be "very" likely and an additional 24% would be "somewhat" likely. In other words, four-in-ten respondents said they would be likely to sign up for Air Alerts. The other 58% were not interested in the program.

FIGURE 53 – SUBSCRIPTION TO AIR ALERT NOTIFICATIONS
(AMONG BASE STUDY EXCLUDING UNDECIDED RESPONSES)



Group Differences

❖ ***63 Two demographic characteristics distinguished current non-subscribers who would be likely to sign up for Air Alert from those who would not: access to the Internet and age of home. Likelihood to subscribe was independent of other respondent demographics, including age, education, income and burner vs. non-burner, etc.***

The series of chi-square analyses were run to try to distinguish those who would be ("somewhat" or "very") likely to sign up for Air Alert from those who would not among current non-subscribers. Results yielded two statistically significant differences. Those who were more likely to become Air Alert subscribers:

- had access to the Internet (51% vs. not access it, 18%), and
- live in homes that are less than 30 years old (50% vs. older homes, 28%).

DEMOGRAPHICS

❖ ***64 The plurality of Sacramento base study respondents: were Caucasian, between the ages of 35 and 64, held a college degree, and had household earnings of at least $50,000. They were homeowners, living in single-family homes that were built at least 20 years ago, with at least one other person, and were registered to vote.***

The tables on the following pages indicate the demographic characteristics of the Sacramento base study residents and the group of low-income respondents who responded to the survey. While the percentages of non-responses by refusal are included in these tables, they were usually excluded from the analyses, unless otherwise stated. Within the base study column, pluralities are indicated in bold.

The "other" responses given for type of occupation, ethnicity, and party affiliation can be found in the statistical binder.

FIGURE 54: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

GENDER	PERCENT OF BASE RESPONDENTS	PERCENT OF LOW-INCOME RESPONDENTS
Female	50%	59%
Male	50%	41%
Total	100%	100%
AGE	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
18 – 24	3%	6%
25 – 34	13%	13%
35 – 44	**18%**	11%
45 – 54	**21%**	12%
55 – 64	**19%**	10%
65 or older	23%	47%
Non-response (Refused)	3%	1%
Total	100%	100%
EDUCATION	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
High school or less	24%	56%
Some college	30%	24%
Trade/Vocational – No college	2%	4%
College degree	**26%**	12%
Post-graduate degree	**17%**	3%
Non-response (Refused)	1%	1%
Total	**100%**	**100%**

ETHNICITY	PERCENT OF BASE RESPONDENTS	PERCENT OF LOW-INCOME RESPONDENTS
African-American	6%	11%
Asian/Pacific Islander	5%	3%
Caucasian	**65%**	51%
Hispanic/Latino	13%	24%
Something else	6%	8%
Non-response (Refused)	5%	3%
Total	100%	100%
VOTER REGISTRATION	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
Registered	**78%**	64%
Not registered	21%	34%
Non-response (Refused)	1%	2%
Total	100%	100%
INTERNET ACCESS	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
None	27%	67%
Yes	**72%**	33%
Non-response (Refused)	1%	0%
Total	100%	100%
TYPE OF DWELLING	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
Apartment	15%	35%
Condo	2%	3%
Townhome	2%	4%
Single-family detached home	**77%**	48%
Mobile home	2%	9%
Non-response (Refused)	2%	1%
Total	**100%**	**100%**

HOME OWNERSHIP	PERCENT OF BASE RESPONDENTS	PERCENT OF LOW-INCOME RESPONDENTS
Rent or Lease	27%	51%
Own	**71%**	47%
Live with others	1%	0%
Non-response (Refused)	1%	2%
Total	100%	100%
AGE OF HOME	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
10 years or less	18%	3%
11 – 20 years	**8%**	9%
21 – 30 years	**15%**	3%
31 – 40 years	**16%**	16%
41 – 50 years	**14%**	21%
More than 50 years	**14%**	32%
Non-response (Refused)	5%	15%
Total	100%	100%
# OF HOUSEHOLD MEMBERS	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
Live alone	**21%**	44%
Two	**35%**	21%
Three	16%	7%
Four	14%	11%
Five or more	13%	16%
Non-response (Refused)	2%	1%
Total	100%	100%
HOUSEHOLD INCOME	**PERCENT OF BASE RESPONDENTS**	**PERCENT OF LOW-INCOME RESPONDENTS**
Under $20,000	10%	100%
$20,000 to less than $50,000	25%	0%
$50,000 to less than $100,000	**32%**	0%
$100,000 or more	**19%**	0%
Non-response (Refused)	14%	0%
Total	**100%**	**100%**

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

There is still much room for educating the general public about the negative effects of residential wood-burning on wintertime air quality: approximately four in ten respondents in Sacramento County felt wood-burning was not a serious cause of air pollution.

One third (33%) of all respondents in the base study were classified as "burners": they owned wood or pellet burning devices (either indoors or outdoors), and they burned wood, pellets, or manufactured logs at least once this past winter. Burners were significantly more likely than non-burners to:

- *be home owners (rather than renters,)*
- *live in single family dwellings, and*
- *be wealthier (have household incomes greater than $50,000).*

Although the majority of respondents in the general population supported mandatory curtailment restrictions, about one fifth (20%) said they "strongly" disapproved of mandatory regulation. The main reason given for the disapproval was an active dislike of being told what to do by the government.

Respondents who owned wood-burning devices were significantly more likely to say they would comply with a mandatory no-burn rule than to approve of it, indicating that prior support may not be a necessary requirement for successful implementation of a mandatory rule. In other words, respondents may not like the regulation but the majority would hypothetically comply with it.

That being said, there was some discrepancy between attitudes and actual behavior. Among owners of wood-burning devices who approved of mandatory measures, 37% actually voluntarily reduced the number of fires they burned this past winter. This was significantly higher than the 24% of respondents who complied but who disapproved of mandatory measures.

However, because the majority (63%) of even favorably-disposed respondents of a mandatory no-burn rule did not voluntarily reduce the number of fires they burned this past winter, if a mandatory restriction were to be implemented, it would probably have to be visibly and publicly enforced in order to increase levels of compliance.

The best way to let residents know whether or not they can burn wood on a particular day is via the general news media, such as TV, radio, and newspaper.

These results were based on 401 telephone interviews conducted in April, 2007 with a random sample of Sacramento County residents, representative of the population as a whole. Results are accurate to within +/- 4.9%, 19 times out of 20. A total of 139 interviews were also conducted with a group of low-income (based on federal guidelines) residents.

Appendix E
Comments and Responses

July 25th Board Meeting Oral Comments

Mary Ann Delaney (school nurse with the Folsom-Cordova district)

Comment: **Every year there are more and more students with respiratory diseases such as asthma, brochiolitis, and chronic bronchitis. In the Folsom-Cordova district, parents of 1,500 students have reported that their children have respiratory illness or asthma. Nationally, 13% of school children have asthma, and they miss school twice as often as their healthy peers. Three schools in the Folsom-Cordova district have asthma rates between 16% and 18%. Older women also experience adverse health effects from fine particulate matter. Exposing the developing lungs of children to particulate matter causes disease early in life and again later in life. I urge the Board to adopt the proposed rule to curtail wood smoke.**

Response: Thank you for your support.

Amy Ryan (Ryan Brothers Chimney Sweeping)

Comment #1: **While I applaud the District's change-out program, I am disappointed that EPA-certified devices were included in the proposed curtailment rule. People who took voluntary actions to reduce their wood smoke emissions should be rewarded for their efforts.**

Response: Special requirements for certified devices are not recommended for several reasons.

1. While certified devices and pellet stoves are designed to pollute less than fireplaces and non-certified wood stoves, their emissions are about an order of magnitude higher than gaseous fueled devices.

Comparison of Emission Factors

Technology	PM2.5 Emission Factor (lb/mmBtu)
Certified Wood Stove	1.85
Pellet Stove	0.69
Propane Fireplace	0.01
Natural Gas Fireplace	0.01
Electric	None

2. Certified devices and pellet stoves can smoke if not installed or operated properly. Prohibiting all wood smoke, whether from a certified device or uncontrolled fireplace is most appropriate for air quality and equity reasons.
3. Collectively, certified wood and pellet stoves and inserts comprise 7% of the wood burning emissions. This percentage will increase as new devices are installed or older devices replaced, particularly since no new fireplaces may

be installed after October 2007, and all new developments must use either gas fireplaces or certified equipment. All emissions reductions contribute to attainment of federal health standards.

4. Although pellet stoves are easily recognizable to the public, certified wood stoves are not easily distinguished from non-certified wood stoves. To know whether you have a certified stove you either need to know when the device was purchased (after 1992), or check the model number of the stove (located on the back or side of the device) and look it up on EPA's Web site. This may be difficult for some residents and would make enforcement more difficult.
5. Independent public opinion surveys reported that only 13% of residents rate wood smoke as a very serious cause of wintertime air pollution. Public education staff and our consultants stress the importance of creating a simple message as a key to the success of Rule 421 outreach efforts. Creating additional complexity will further burden an already difficult educational effort.
6. Although manufacturers suggest that creating special provisions for certified devices will increase compliance, no data has been provided or is available that substantiates these assertions. Compliance rates are difficult to predict and depend on a number of factors.
7. Manufacturers also suggest that not allowing certified devices to operate on some or all no burn days creates a disincentive to replace dirty devices with cleaner burning alternatives. No data has been provided to substantiate that assertion. Replacing dirty devices with cleaner burning alternatives is fairly expensive. The capital and operational costs are likely to be more significant factors in determining whether to replace dirty devices, and the choice of which devices to select. The District's incentive program provides the greatest incentive to install gaseous fueled devices. Voucher data suggests that 60% of incentive program participants choose gaseous fueled devices. Staff can track this and propose modifications to incentives or rule requirements if participation levels drop.

	Cost of Devices[14]	Thermal Efficiency	Fuel Cost	Voucher incentive	
			$ per MMBtu	Non-EJ	EJ
Wood Stove	$600-2900	63%	29.75	$250	$400
Wood Insert	$1100-3000	63%	29.75	$250	$400
Gas/Propane Stove	$1000-2700	75%	27.67	$350	$500
Gas Insert	$1400-3500	75%	15.07	$350	$500
Pellet Stove	$1200-4100	76%	20.56	$350	$500
Pellet Insert	$1400-3800	76%	20.56	$350	$500
Electric fireplace	~$300	>99%	23.39	$0	$0

[14] Installation costs are pretty similar $350-500 and additional material costs had a wide range from $250-1000 depending on the specifics of the installation. Installation and material costs for electric fireplaces are 0-$75.

Comment #2: **Ryan Brothers' own survey indicated that 78% of their customers use their fireplaces for heat, mainly because of cost. Burning wood is still a cheaper source of heat than natural gas or electricity, and people prefer the even heat that wood produces.**

Response: See response to Cynthia Marshall comment #1

Earl Withycombe

Comment #1: **Wood smoke contains many toxic air contaminants, similar to cigarette smoke and diesel particulate.**

Response: Staff agrees and has included the potential reductions from these pollutants as additional benefits from proposed Rule 421.

Comment #2: **In my experience with the Mountain Counties air basin, the Truckee area dealt with many complaints about childhood asthma due to smoke from wood combustion.**

Response: Thank you for your comments. It is an important reminder that wood combustion contributes not only to ambient PM2.5 concentrations but can also contribute to poor indoor air quality for those residents that burn wood.

Comment #3: **PM2.5 pollution forms "hot spots" that are not readily transported.**

Response: Dispersion modeling performed as part of the California Regional Particulate Air Quality Study[15] indicated that the range of influence of PM emissions ranged from 15-50 kilometers.

Note: Mr. John Crouch (representing Hearth, Patio and Barbeque Association) and Mr. Robert Cline (representing Duraflame) also testified and reiterated that testimony in subsequently provided written comments. Staff responses can be found under written comments.

Public Workshop/Open House/Stakeholder Comments

Open House Tsakopoulos Library Galleria
July 23, 2007, 6:00 pm

Attendees: Amie Ryan, Tony Hernandez, Jack Dillon, Al & Cheryl Ferguson

[15] MacDonald, C.P, McCarthy, M.C., Dye, T.S., Wheeler, N.J.M., Hafner, H.R, and Roberts, P.T., "Transport and Dispersion during Wintertime Particulate Matter Episodes in the San Joaquin Valley, California," Journal of the Air & Waste Management Association, volume 56, p. 961, July 2006.

Herman T	Mark Taviani
Mitchell Heller	Earl Withycombe
Efren Guttierrez	Jack Good
Bill Pieper	

No written comments received.

Open House La Sierra Community Center
July 24, 2007, 6:00 pm

Attendees:	Mr. & Mrs. Jacob Schales	Skip Ayres
	Jim	Tom P
	Janice Holtgrave	Scott Anderson
	PJ Mocettini	Carol Sando
	Jean & Alec McAdam	Carl & Beverly Tennis
	Francie Axtell	Rusty Savard
	Chris & Laurie Axtell	Ann Shedd
	Joyce Eastin	Terri Friedman

Comment received by e-mail from Joyce Eastin on July 30, 2007

Comment: **I believe the rule is a good idea. Sacramento has enough smog and poor air quality. Furthermore fireplaces are inefficient.**

Response: Staff agrees and appreciates your support.

Comment received by e-mail from Ann Shedd on August 7, 2007

Comment: **After attending the open house and reviewing the literature that was available, I am aware of the value of Rule 421. Hopefully, Rule 421 will be adopted.**

Response: Thank you for your support.

Comment received by e-mail from Terri Friedman on August 8, 2007

Comment: **No more government regulations are needed. Strong public outreach with voluntary restrictions on high particulate days would work, as well as limitations on all PM sources not just wood fires. Also include a max number of days per season with restrictions perhaps 8-10 days. Main goal should be development of technology to filter particulates at the chimney so restrictions on burning would not be necessary.**

Response: Sacramento County will be designated non-attainment for federal health standards for PM2.5 unless it reduced PM2.5 emissions. Because of the serious health consequences associated with nonattainment, we need to take action to reduce PM emissions. Education is a critical component of Rule 421 success. The Aurora public opinion survey reported only 27% reduction in wood burning from people hearing the voluntary request and

reducing burning. Based on the success of mandatory programs in other areas, Staff recommends Rule 421 as the most effective way to lower emissions.

Limiting the amount of curtailment days would increase the number of days the District exceeds the 24-hour PM2.5 standard, and perpetuate the serious health impacts and our non-attainment status.

Technologies to reduce particulate emissions by 85% are available, such as EPA certified wood and pellet fireplace inserts, and free standing certified wood stoves and pellet stoves. Gaseous fueled devices are >99% cleaner than certified wood stoves. The District has a program to provide financial incentives to help people replace dirty devices, and Rule 417 requires any new wood burning devices to be controlled. However, the vast majority of existing wood burning devices are not controlled at this time; an estimated 250,000 - 300,000 fireplaces and non-certified devices compared to 15,000-25,000 certified devices and pellet stoves. Because of the expense to replace or modify existing devices, replacement of dirty devices is expected to take some time. It is possible that with incentive programs, education and replacement of uncontrolled devices, with time fewer mandatory curtailment days may be called.

Open House Rancho Cordova City Hall
July 25, 2007, 6:00 pm

Attendees: Stuart & Shirley Helfland
Gary Namisulk

No written comments received

Open House SMAQMD Office
July 26, 2007, 1:30 pm

Attendees:
Armen Kamian
Steve Dulone
Yushuo Chang
Tom Orr
Nelson Fong
Amie Ryan
Jennifer Finton
Kathy Coulter
Yachun Chow
Annemarie Vincent
Patricia Velaso

Oral Comments from SMAQMD Open House

Comment #1: **Doesn't San Joaquin exempt certified devices?**

Response: San Joaquin Valley air district issues 1) voluntary no burn requests, during which wood burning is discouraged except in the use of certified devices or manufactured logs; and 2) mandatory no burn requests, during which all wood burning is prohibited even in certified devices.

Comment #2: **Doesn't this conflict with the incentive program?**

Response: There are roughly 25,000 certified wood and pellet stoves in Sacramento County, emitting over 350,000 pounds of particulate matter every year. These devices account for 7% of the emission reduction from Rule 421. On days when the weather causes smoke to collect near the ground, reducing every source of smoke improves the air quality. Staff considered several alternatives providing special consideration to certified devices. See the Staff Report discussion of Alternatives for a full discussion. Ultimately, staff decided to not recommend special provisions.

Staff has been clear that the healthiest choice for individuals and our community is to choose not to burn. People choosing to burn are encouraged to burn cleanly - the cleanest fuel is a gaseous fuel; either natural gas or propane. The District provides the greatest incentive for gaseous fueled devices. To avoid any potential confusion, we have modified the materials for our incentive program to more clearly state that individuals that choose to replace dirty devices with wood or pellet fueled alternatives will be prohibited from using those devices when weather conditions trap the pollution generated by those wood burning devices and contribute to health standard violations.

Comment #3: **How does ARB determine health impacts?**

Response: ARB sponsors health studies and relies on dozens of other health studies to estimate health impacts. A fact sheet on ARB's information can be found at: http://www.arb.ca.gov/research/health/fs/PM-03fs.pdf

EPA conducts similar reviews in setting federal PM2.5 standards. Here is a link that information: http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/06-8477.pdf

An EPA fact sheet of particulate matter health issues can be found at: http://www.epa.gov/oar/particlepollution/pdfs/pm-color.pdf

Comment #4: **What is the basis for health cost estimates?**

Response: See response to comment #3. ARB staff provided health cost data for Sacramento[16]. The effect for each health endpoint was calculated separately for each county; these county-wide values were then summed to produce aggregate Sac Metro results.

Health impact calculations were based on the methodology used in CARB's 2002 PM standard staff report, with an updated response function for premature mortality (Pope et al. 2002. Journal of the American Medical Association **287**:1132-1141).

[16] E-mail from Linda Smith to Brigette Tollstrup, January 9, 2007

Population values were taken from the year 2000 census. PM2.5 calculations were based on 1999/2000 ambient air quality data.

Comment #5: **What about night time enforcement?**

Response: The District will actively enforce compliance with the rule. Inspections will be based on both complaints and random inspections. If necessary, night time enforcement will occur.

Comment #6: **What happens to repeat offenders?**

Response: Penalties for subsequent violations would be determined according to the District's Mutual Settlement Program.

Written suggestion received at the workshop from Jennifer Finton, Breathe California

Suggestions: **Include chemical composition of wood smoke and compare to other well-known toxic emitters, use graphics to show short and long term affects of PM2.5 on the body, explain manufactured logs' contribution to PM2.5 as well as certified devices, consider targeted advertising in neighborhoods closest to PM monitors and those with similar characteristics, provide graphic illustration of combustion process, and create easy to use newsletters, PSA's, alerts.**

Response: Thank you for your suggestions and we will consider them as we form messages to the public for the educational campaign. The monitoring station locations are selected to be representative of the broader community air quality levels as well as the immediate adjacent areas. Other parts of Sacramento County are expected to observe similar air quality. Staff has and will attended events in areas with high particulate concentrations to educate and inform them on the health impacts and alternatives to burn cleanly.

Open House Laguna Creek High School
July 26, 2007, 6:00 pm

Attendees:		
	Ted & Rita Holm	Marilyn Flemmer
	John Taylor	Andrew Vaillancourt
	Faron Schmidt	Bill Thompson

Written comment received at the open house from Bill and Debbie Thompson

Comment: **We are concerned about not being able to use our wood stove on "No Burn Days". The stove is the source of heat for our home. Heating electrically is cost prohibitive for us and gas is not available. We need to be able to use our stove. Please consider our situation and the many others in similar situations.**

Response: Staff is proposing an option for the Air Pollution Control Officer to issue hardship exemptions to households where prohibiting solid fuel burning would cause economic hardship and the granting of the exemption would not have an adverse impact. If the stove is the only source of heat for a home, it will be exempt from mandatory curtailment. Unless the wood is delivered at no cost, it generally costs less to heat a home with natural gas or electricity than with wood; even propane stoves/inserts are slightly less expensive to operate than wood.

Open House Orangevale Community Center
July 30, 2007, 6:00 pm

Attendees:

Davis & Kim Tennant	Stacy Shank
Jennifer Kennedy	Carol Evans
Bob & Jeannie Kegley	Skip Ayres
Ted & Jaena Costa	

No written comments received.

Open House Chabolla Center
July 31, 2007, 6:00 pm

Attendees:

Thomas Young	Steve Frank
City Councilperson Barbara Payne	Supervisor Don Nottoli

No written comments received.

Open House Folsom Community Center
August 1, 2007, 6:00 pm

Attendees:

Sharon & Ray Reed	Bob Cline
Heather Kuklo	Karen Wilson
Karen Pitts	

Written comments received from Karen Pitts

Comment #1: **The District should allow certified wood burning devices to burn during curtailment. The District is sending a mixed message by encouraging people to switch to certified wood burning devices and not allowing their use during mandatory curtailment.**

Response: The District is currently in non-attainment of PM2.5 standards, and is committed to reductions from sources of PM2.5. Additionally, burning wood releases a variety of toxic compounds into the air.

Staff realizes that even though we discourage all burning, even when a no burn day is not in effect, some may still choose to burn wood. Staff

encourages those that choose to burn to do so as cleanly as possible. Certified wood burning devices are better than fireplaces and non-certified devices.
Staff discusses potential mandatory no burn requirements with incentive program participants. To further clarify this, staff has added a brief discussion of proposed Rule 421 requirements to the voucher and voucher application.

Replacing dirty devices with cleaner burning alternatives is expensive. The capital and installation costs are likely to be more significant factors in determining whether to replace dirty devices, and the choice of which devices to select. The District's incentive program provides the greatest incentive to install gaseous fueled devices. Voucher data suggests that 60% of incentive program participants choose gaseous fueled devices.

	Cost of Devices[17]	Thermal Efficiency	Fuel Cost $ per MMBtu	Voucher incentive	
				Non-EJ	EJ
Wood Stove	$600-2900	63%	29.75	$250	$400
Wood Insert	$1100-3000	63%	29.75	$250	$400
Gas/Propane Stove	$1000-2700	75%	27.67	$350	$500
Gas Insert	$1400-3500	75%	15.07	$350	$500
Pellet Stove	$1200-4100	76%	20.56	$350	$500
Pellet Insert	$1400-3800	76%	20.56	$350	$500
Electric fireplace	~$300	>99%	23.39	$0	$0

Comment #2: **I am on a fixed income and can not afford to replace my gas heater.**

Response: See response to comment from Laguna Creek High School workshop.

Comment #3: **Wood burning has a net zero effect on climate change since the greenhouse gas released when wood is burned would end in the air anyway through decay or burning or via chipping. I urge you to take into account the emissions rate of a wood stove, and the effects on climate change of natural gas before you make a one-size-fits-all ruling.**

Response: Rule 421 would achieve clear reductions in greenhouse gases by prohibiting wood burning in fireplaces for ambiance. Residents that use wood to supplement their central heating system may switch to another fuel source to replace the wood heat. That fuel may be natural gas, propane or electricity.

Burning wood for heat emits approximately two to five times more greenhouse gases than the replacement fuels. Some experts suggest that if the wood fuel is from a sustainable source that the wood burning

[17] Installation costs are pretty similar $350-500 and additional material costs had a wide range from $250-1000 depending on the specifics of the installation. Installation and material costs for electric fireplaces are 0-$75.

emissions may be considered "carbon neutral".

The California Air Resources Board (CARB) is conducting a public meeting in September 2007 to solicit input to develop a protocol on how to assess greenhouse gas impacts from forestry products. No approved CARB protocol is currently available. It is not clear whether the wood is obtained from a sustainable source for greenhouse gas purposes. It is also important to assess the relative impact from the immediate release of greenhouse gases from burning when compared to the longer term release of greenhouse gases if the wood were used for another purpose.

Stakeholder Meeting Health Organizations
August 6, 2007, 8:30 am

Attendees: Heidi Endstay

Comment: **"No Burn Days" should be advertised like Spare the Air Days.**

Response: If Rule 421 is approved, outreach will be similar to Spare The Air. Staff will inform the public of the rule and of the curtailment days, under a program titled "Check Before You Burn."

Comment: **There are a lot of people that want to make changes to their home to be "green." I think with an increased wood incentive program, more people would do it.**

Response: The next opening for the wood stove/fireplace change out incentive program begins September 1, 2007 and ends March 31, 2008. Depending on the device installed, the incentive available ranges from $75-$500. The highest incentive is for replacing with gaseous fueled devices in environmental justice communities. Some retailers may provide additional discounts. In addition, the District has partnered with the Community Resource Project to fully fund replacements in low-income households.

Stakeholder Meeting Outdoor Organizations
August 6, 2007, 1:30 pm

Attendees: John Blue, Buffalo Chips

Comment #4: **So PM 2.5 is different than PM 10, correct?**

Response: Yes. PM10 particles are less than 10 microns in diameter (PM10). PM2.5 is a subset of PM10 including 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 (PM2.5), to several significant health problems.

Comment: **Is this new in the last 10 years?**

Response: Yes, the first PM2.5 standards were set by EPA in 1997 and recently updated in 2006. California also has health standards for PM2.5.

Comment: **Are BBQ's included in the no burn restrictions?**

Response: No. The rule does not apply to cooking, including BBQ's.

Comment: **How much cleaner are pellet stoves?**

Response: Comparison of Emission Factors

Technology	PM2.5 Emission Factor (lb/mmBtu)
Fireplaces	33.3
Certified Wood Stove	1.85
Pellet Stove	0.69
Propane Fireplace	0.01
Natural Gas Fireplace	0.01
Electric	None

Stakeholder Meeting Business Organizations
August 8, 2007, 9:00 am

Attendees: Jon Jeisel, Cleaner Air Partnership
Lori Soldano, Asian Pacific Chamber of Commerce
Heinz Ludke, Natomas Chamber of Commerce

Comment: **South Natomas has wood burning stoves but North Natomas has a lot of gas stoves. I personally have a wood burning stove and I use it a lot, but I try to honor the no burn days.**

Response: Thank you for your support.

Comment: **Frankly, wood is very expensive. What's the number of wood burning fireplaces out there?**

Response: The number of uncontrolled fireplaces ranges from about 150,000-200,000. For more information see the Emission Inventory section of the Staff report on page 7.

Comment: **We have 700 members and we can do the online link and the newsletter, but when someone comes and speaks it really hits you. Would you come to an event?**

Response: Staff would be glad to attend one of your events.

Comment: **Have we stopped rice burning?**

Response: Rice burning is only allowed for up to 25% of the crop, and only in the case of disease.

Comment: **"Celebrate Natomas" is coming up in September, and this would be a great way for you to do some outreach. Last year we had about 3,000 people come out.**

Response: The District would be glad to have a representative attend your event.

Comment: **What are the restrictions on barbecues that burn on wood?**

Response: None, the rule does not apply to cooking, including BBQ's.

Comment: **What about backyard fire pits and those types of things?**

Response: All types of outdoor wood burning devices and wood burning fires are subject to this rule.

Comment: **Have you thought about doing outreach to students in schools?**

Response: The District does air quality education to schools.

Comment: **I know some other arguments about this rule include quality of life and also that this could go a long way to protect our transportation funding.**

Response: Thank you for your suggestions. Transportation funding issues are complex and related to nonattainment designations. See the discussion of federal mandates in the staff report for more details.

Comment: **I was surprised to learn that 45% of air pollution is wood smoke**

Response: See answer to HPBA's comment #2 on page 117

Written Comments Received

Comments Received from Andrew Steckel, EPA on July 9, 2007

Comment: **This draft rule is important for regulating wood burning devices and we have no recommended changes. If adopted and submitted to us as drafted, we would likely propose to fully approve it.**

Response: Thank you for your support.

Comments received from letter from Cynthia Marshall dated July 25, 2007

Comment #1: **Although the rule will not apply to homes whose sole heat source is a fireplace, which could only be a handful of homes, the proposed rule will affect those of us who try to offset the high cost of using**

natural gas during the winter months. A half cord of oak at $250 will heat the complete front of my 1900 sq. ft. home during the winter months using my fireplace with a heatilator insert. This not only saves me hundreds of dollars in heating costs, actually if more people were using fireplaces, it would help save one of our waning natural resources which SMUD and PG & E have made quite clear we need to conserve!

Response: If wood is the only source of heat to a home, then wood burning will be permitted. Residents who want to supplement their central furnace heat and reduce costs are encouraged to replace wood burning devices with gas or propane inserts and/or electric fireplaces. When you compare the fuel costs on a heat delivery basis, the fuel costs for these units are less than burning wood. The mandatory no burn rule would not apply to gas and electric fireplaces, but will affect certified wood and pellet stoves and inserts.

	Thermal Efficiency	Fuel Cost per MMbtu
Fireplace	7%	$267.76
Certified Wood Stove	63%	$29.75
Pellet Stove	76%	$20.56
Propane Fireplace	75%	$27.67
Natural Gas Fireplace	75%	$15.07
Electric Fireplace	>99%	$23.39

Assumptions used in calculation: used as primary source of heat, PG&E rates for natural gas (2007), SMUD rates for electricity (2006), average cost of cord of wood = $215, average cost of pellets = $250/ton, and Cost of propane = $1.899/gallon

There will be a version of the rule under consideration that includes an economic hardship exemption from the rule. If this version is adopted then the Air Pollution Control Officer will consider applications for such exemption and consider both the economic circumstances of the applicants and the health of neighboring residents when deciding whether to grant the exemption.

Comment #2: **I have considered purchasing and having an insert installed to help curtail the PM from my fires, but until they are more affordable or there are significant rebates, they are not feasible at this time.**

Response: In your letter, you indicated that you have considered purchasing an EPA-certified insert to reduce PM emissions from your fireplace. Staff urges you to consider using a cleaner burning alternative, including a gas insert for your fireplace. There are a number of different options that you could consider to help supplement the heat for you house, as shown below. The costs in the table are reflective of the cost for the heating device. Depending on other factors in your home there would be installation costs and additional materials costs.

The District has a program to provide financial incentives for those who choose to replace their older wood burning devices with new, cleaner devices. The next phase of this program will start September 1, 2007 and continue through March 31, 2008. The table below shows some approximate cost information and voucher funding available. Also, depending on the retailer you use, there may be additional retailer/manufacturer incentives.

	Cost of Devices[18]	Thermal Efficiency	Fuel Cost $ per MMBtu	Voucher incentive	
				Non-EJ	EJ
Wood Stove	$600-2900	63%	29.75	$250	$400
Wood Insert	$1100-3000	63%	29.75	$250	$400
Gas/Propane Stove	$1000-2700	75%	27.67	$350	$500
Gas Insert	$1400-3500	75%	15.07	$350	$500
Pellet Stove	$1200-4100	76%	20.56	$350	$500
Pellet Insert	$1400-3800	76%	20.56	$350	$500
Electric fireplace	~$300	>99%	23.39	$0	$0

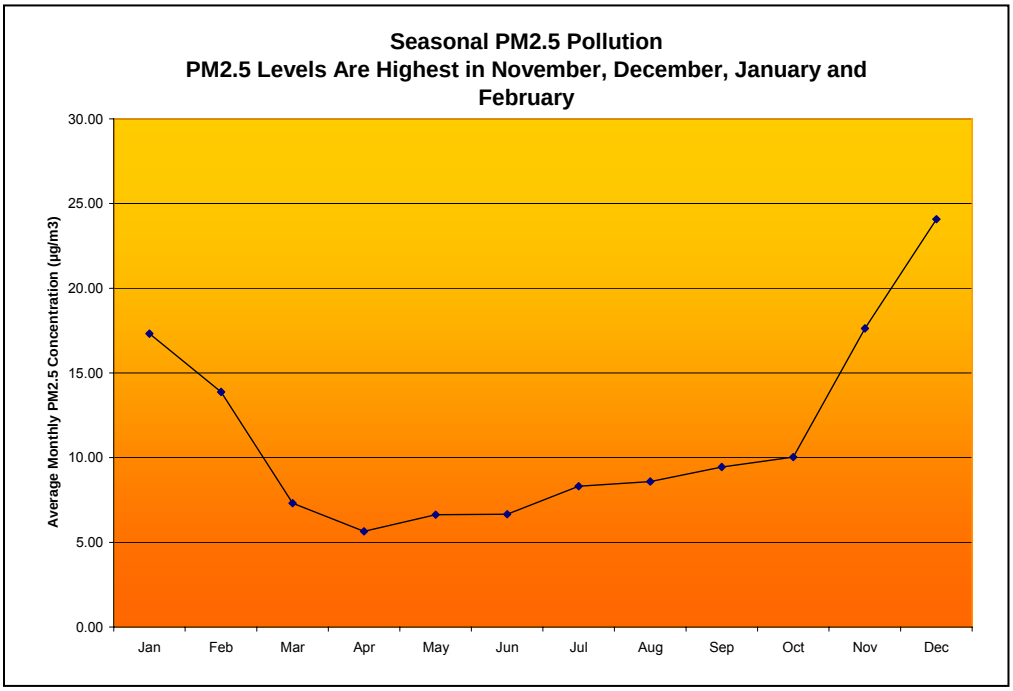
In addition, the District has partnered with the Community Resource Project to fully fund replacements in low-income households. You can find out more about the incentive program on the District's Web site at http://www.airquality.org/woodstove/index.shtml.

Comment #3: **Sacramento's air quality is 1000 times worse in the summer months when we are experiencing an inversion layer and that certainly can't be blamed on wood burning fires. In fact, your entire list of significant health problems from PM are caused by year round poor air quality, not solely from wood burning fireplaces as your report would suggest.**

Response: The air quality problems in our county are different in the summer and winter seasons. Poor air quality in the summer season is due to high concentrations of ground-level ozone, while the air quality problems in the winter season are caused by high concentrations of particulate matter (PM). The graph below illustrates the average monthly concentration of fine PM through out the year and as can be seen, the PM levels are the highest during the winter months. We agree that summertime ozone has serious health consequences. Many studies report that there are serious health consequences, aggravated asthma, heart attack, and even premature death, shortening lives by as much as 14 years, from particulate matter. Ozone's impact on premature death is only recently being identified. Clearly, the combined health effects of both pollutants

[18] Installation costs are pretty similar $350-500 and additional material costs had a wide range from $250-1000 depending on the specifics of the installation. Installation and material costs for electric fireplaces are 0-$75.

require attention.



The largest source of PM in the winter months is the burning of wood, and the proposed rule is the most effective control measure to reduce PM concentrations. Voluntary curtailment will not result in emission reductions sufficient for Sacramento County to achieve federal and state air quality standards for PM.

Comment received from e-mail from Laurie Pirini on July 31, 2007

Comment #1: **I am a hearth retailer from South San Francisco and I would like learn more about how I can help the counties in my area learn about the incentive funds you have developed to change out old and dirty wood stoves to cleaner wood stoves.**

Response: Only Sacramento County residents are eligible for our incentive funds. Information about our program can be found at: http://www.airquality.org/woodstove/index.shtml

The Bay Area Air Quality Management District covers the San Francisco area. You can reach them at

Bay Area Air Quality Management
939 Ellis Street
San Francisco, CA 94109
(415) 771-6000
http://www.baaqmd.gov/

Comment #2: **When you have "No- burn" days, should it only apply to those folks with non-EPA certified devices?**

Response: See response to Comment #1 from Karen Pitts on page 106.

Comment received from e-mail from Scott Waldmire on July 31, 2007

Comment #7: **I support the adoption of the rule. I have complained about smoky winters for at least 15 years. Wood smoke irritates my eyes, nose, and lungs.**

Response: Thank you for your support. In addition to the health concerns noted above, people with heart problems are also at risk. Serious health effects, including premature death have been attributed to particulate matter pollution, including wood smoke, have been identified through a number of health studies. Young children and the elderly are particularly at risk, but healthy people are also impacted.

Comment received from e-mail from Al Bradley on July 31, 2007

Comment: **Many folks in Oak Park have limited income and their homes are modest in size and their fireplaces do provide a way to heat their home. Proposed Rule 421 unfairly targets those who are poor or who need their money for other needs. Perhaps an exception from the rule could be included for those who have furnaces but choose to use wood to balance their budget.**

Response: The Aurora study reported that low income residents are less likely to own wood burning devices or to burn wood. Our study shows it costs less to use other fuel sources. However, Staff has included in the proposed rule a hardship exemption for qualified candidates as an option for the Board of Directors to consider.

Comment received from e-mail from Dan Jacobson on August 1, 2007

Comment: **I am against the rule going into effect. People should be allowed to burn in their fireplaces as well as make popcorn and cook. If you want to cut down on this type of pollution, do not allow anymore homes to be built with fireplaces!**

Response: The District adopted Rule 417 in 2006 that banned the installation of uncertified wood burning devices in homes and business in Sacramento county beginning on October 26, 2007.

Comment received from e-mail from Ross Westpaal on August 2, 2007

Comment: **We don't need more government regulations; find another way to solve this problem!**

Response: The District is mandated to reduce the amount of particulates in the air. There in no one solution to the problem and many other sources including cars and trucks are already controlled. However, the PM2.5 levels in the county are still above the federal guidelines because wood burning is largely unregulated. Staff recommends this rule as the most effective way to achieve a significant reduction in ambient PM2.5 levels with the least impact.

Comment received from Alex Krichevsky, CARB on August 2, 2007

Comment: **ARB Staff has reviewed the rule and, based on the information available to us at this time, we have no comments.**

Response: Thank you. We have appreciated having ARB health staff available at public meetings to answer health questions.

Comment received from e-mail from Kathie Schievelbein on August 3, 2007

Comment: **I am opposed to the implementation of Rule 421. I purchased a wood stove two years ago to reduce my winter heating bills. I did considerable research before deciding to go with a wood stove to help heat my home and still give me the ambiance a fire brings on a winter day. There has been a significant reduction in the cost of my heating bill. I conserve energy where possible, car pool to work and telecommute once per week. When a notice is issued to not burn, I comply without hesitation.**

Response: Staff appreciates your efforts to conserve energy and reduce pollution. Sacramento County is not in compliance with federal 24-hour PM2.5 standards, and state PM10 and PM2.5 standards. Accordingly, we must reduce emissions, particularly on days with the highest PM concentrations. Staff believes this rule is the most effective measure to do so.

Comment: **I found the Aurora research report inconclusive. Education should be the driving force to change public attitudes not mandatory no-burn regulation. Enforcement programs are ineffective. Please keep the voluntary no-burn days in effect and implement awareness programs to educate and fully encourage voluntary no-burn days.**

Response: District staff has, and will continue to educate the public on the wood smoke issues and what people can do. However, the District violates the federal 24-hour PM2.5 standard, and is therefore obligated to consider rules to reduce particulate emissions. The Aurora study reported that 27% reduction in wood smoke emissions resulted from voluntary program last year. That is not sufficient to meet air quality standards.

Mammoth Lakes and the San Joaquin Valley are two examples of areas reporting air quality improvements after implementing mandatory no burn programs.

Comment received from e-mail from Charlea Moore on August 3, 2007

Comment: **I would really appreciate having a workshop closer to Elverta, Ca.**

Response: Staff contacted the commenter to share the information that was available to the public at the open houses.

Comment received from Andrew Gwin on August 7, 2007

Comment: **I'm an elderly with seasoned wood available to me at no charge. Tour buses, by the dozens leave California daily to casinos; up to 10,000 can travel to Arco, thousands of cars can travel all for their recreation. Let me have my fireplace. Let's all "play on a level field."**

Response: Buses and cars have been regulated for many years to reduce the particulate matter emissions. Wood burning emissions are largely unregulated. Reducing wood burning only on those days that air quality exceeds the health standards can protect your health and the health of the community. Staff is proposing an option for the Air Pollution Control Officer to grant hardship exemptions to households where prohibiting solid fuel burning would cause economic hardship and the granting of the exemption would not have an adverse impact.

Comment received by e-mail from Simon and Cathy Sucharski on August 9, 2007

Comment: **We are concerned about the application of Rule 421 to certified wood burning and pellet fireplace inserts. We installed a wood burning insert two years ago to burn wood more efficiently and to reduce the emissions from our fireplace. We believe it is unfair that those of us that have installed such devices will be restricted as if we were burning an open fireplace. We request that the board include a provision to allow the use of certified devices and pellet stoves/inserts.**

Response: See response to Comment #2 from the oral comments at the July 26, 2007 open house at the SMAQMD office on page 104.

Comment received from John Ryan on August 10, 2007

Comment: **If the AQMD is going to have monetary incentives for people to change out their old appliances, and then ask them not to burn this becomes a disincentive. The Board should consider exempting EPA certified and pellet stoves from the rule.**

Response: See response to Comment #2 from the oral comments at the July 26, 2007 open house at the SMAQMD office on page 104.

Comments received by e-mail from John Crouch, HPBA on August 10, 2007

Comment #1: **We believe that stating the rule "might" help avoid designation is spurious.**

Response: The Legal Mandates section (page 3) of this staff report has been revised to clarify the options for avoiding certain requirements that would come with a designation of nonattainment.

Comment #2: **We do not believe the percentage of PM2.5 attributed to wood smoke is accurate. If it is, does the rule go far enough?**

Response: The California Air Resources Board is responsible for preparing the wood burning emission inventory for Sacramento County. CARB estimates are based on a 1987 survey conducted in Healdsburg, California that suggested that 0.28 cords of wood is burned per household per year. More recent surveys[19] in Sacramento indicate usage is 0.92 cords per year. If this data were used the contribution would be 72%. To properly compare Sacramento's wood smoke emissions to other areas, it's necessary to convert inventory percentages, which can be affected by emissions in other categories, and total emissions in tons/day to a per person or per housing unit emission rate. The table below summarizes the emission rates for several areas. The comparison shows that Sacramento's emissions are reasonable given its population and climate[20]

County	Total Wintertime Emissions Inventory	Wood Smoke Wintertime Emissions (tons/day)	Wood Smoke Emissions per capita (lbs/person-day)	Wood Smoke Emissions per housing unit (lbs/housing unit-day)	% PM2.5 Inventory from Wood Smoke
Butte County	10.12	4.77	0.044	0.120	47%
Sacramento County	17.09	8.37	0.012	0.032	49%
Fresno County	29.28	4.98	0.011	0.034	17%
Placer County	11.96	6.53	0.040	0.094	55%
Seattle (King County) Washington	n/a	9.32	0.010	0.024	63%[21]
Nevada County	11.96	9.54	0.193	0.394	80%
Kern County	29.92	3.90	0.010	0.031	13%
Contra Costa County	15.92	4.72	0.009	0.025	30%
San Joaquin County	12.77	3.19	0.010	0.030	25%

Additionally, data collected[22] from the air monitoring stations on a small

[19] Houck, James. 2003. "Results of Wood Burning Survey – Sacramento, San Joaquin, and San Francisco Areas, University of California Berkeley/California Air Resources Board – GIS Study"
[20] Emission information for California counties came from PM2.5 2006 winter emissions from 2007 CARB Almanac at www.arb.ca.gov/app/emsinv/fcemssumcat2007.php. 2006 population data and 2005 housing units came from Census data, www.quickfacts.census.gov/qfd/states/06/06007.html
[21] Puget Sound area, "Next Ten Years Fact Sheet – Fine Particulate Matter"
[22] "Final Staff Report SB 656 Assessment and Control Measure Evaluation", SMAQMD, July 28, 2005

sample of high particulate matter days suggests that the directly emitted portion of the ambient filter samples is 37%. Some unknown fraction portion of the aerosol components (ammonium nitrate and ammonium sulfate) cannot be ascribed to any individual source category, but would include some fraction of NOx from wood burning.

The District is committed to achieving all federal and state PM standards. This rule is not the only measure being considered to reduce PM2.5 emissions. SB 656 measures included other wood burning reduction strategies. This rule is expected to have the most impact, and may achieve enough reductions by itself. If it does not, additional wood smoke measures and other PM measures will be considered.

Duraflame comments

Comment #1: **Targeted Rule Compliance is overstated. Rule will likely result in curtailment every weekend and major holiday in the winter. This will cause non-compliance. The stated 78% compliance rate is flawed, as it is drawn from all household capable of burning wood and not from "burners".**

Response: The historical data does not indicate any pattern that would indicate that curtailment days would occur in any greater concentration on weekends or holidays. Roughly 56% of the days over the threshold were weekdays, while 44% were on weekend days. There was no discernable pattern concerning holidays. The largest contributing factors to PM levels are temperature and weather patterns, which are subject to much fluctuation.

As was noted in Aurora's report, although levels of support for the adoption of a mandatory no burn rule were different between burners and non-burners, the levels of hypothetical compliance were relatively the same between burners and non-burners. When San Joaquin Valley APCD adopted their mandatory no burn rule they assumed a compliance rate of 80%. Staff has taken the 78% compliance rate from Aurora's phone survey. The rule estimates have been based on the number of households that would have a wood burning device and an average wood usage per home. Some households burn very little wood and some households burn significantly more wood than the average. It is appropriate to use the Aurora hypothetical compliance rate for households that own a wood burning device. The commenter did not provide an alternative rationale or data source for compliance rates.

Comment #2: **Promoting increased use of natural gas, as a substitute for wood burning, will result in a dramatic increase of non-renewable green house gas emissions. Since the State of California has recently mandated significant decrease in green house emissions over the next ten years, the district's current policy to promote an increase in natural**

gas fireplaces and heating stoves is flawed policy that is likely to face further limitation or regulation in the near future.

Response: State law, AB32, California Global Warming Solutions Act of 2006 requires[23] the state board to consider the time period for the emissions,

> *"If applicable, the greenhouse gas emission reduction occurs over the same time period and is equivalent in amount to any direct emission reduction required pursuant to this division"*

and ensure that greenhouse gas regulations do not interfere with efforts to achieve health-based air quality standards. AB32[24] specifically states that the state board shall,

> *"Ensure that activities undertaken pursuant to the regulations complement, and do not interfere with, efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions."*

Therefore, AB32 health-based requirements are consistent with Rule 421 objectives since reduction in wood burning contributes significantly to PM2.5 air quality problems and Rule 421 is necessary to attain federal and state ambient air quality standards for PM2.5.

See also the response to Comment #3 from Karen Pitts for a discussion of greenhouse gas emissions in general.

Comment #3: **The District should offer compliance incentives, such as allowing clean burning devices to be used during curtailment. Other districts have been able to offer two stage programs, and advocate use of manufactured fire logs.**

Response: See response to Comment #2 from the oral comments at the July 26, 2007 open house at the SMAQMD office on page 104.

Based on the analysis done during the Rule 417 adoption, staff does not endorse manufactured fire logs. If Duraflame feels their new products have changed their burning profile, they may submit emission test results for the new products for additional consideration.

Comment #4: **The emissions inventory is incorrect. Why is the 2007 survey not used to calculate emissions?**

Response: Staff has revised the staff report to better describe the emissions calculations including using data from the 2007 Wood Burning Survey. Sacramento specific survey results suggest that the emissions inventory is

[23] Health and Safety Code Section 38652(d)(3)
[24] Health and Safety Code Section 38562(b)(4)

higher than prior CARB estimates.

See also response to Comment #2 from John Crouch, HPBA, page 117

Comment #5: **Further analysis is required. It is unrealistic to assume that this rule alone will meet the federal PM2.5 standard.**

Response: Mammoth Lakes and SJVUAPCD reported 30% improvements in air quality following implementation of similar mandatory no burn rules. A 30% improvement in air quality is needed for Sacramento to attain. This data and the significant contribution from wood smoke indicate that reductions in wood smoke are critical to Sacramento's attainment efforts in the near term. Air quality is determined by complex interaction between weather conditions and emissions. It is impossible to project the future of those variables with certainty. As to whether this rule alone is successful enough to result in attainment, that remains to be seen, but if one strategy can do it, information currently available to staff suggests that this is it.

Comment #6: **A higher threshold will raise compliance rates. SJVAPCD uses a higher threshold and exempts manufactures logs from curtailment on voluntary days.**

Response: Staff would welcome information that substantiates this assertion. However, a threshold higher than 35 $\mu g/m^3$ will mean that some days that are predicted to exceed the federal air quality standards will not benefit from reduced wood burning and may result in Sacramento being designated non-attainment. SJVACPD's curtailment program was developed to help attain the federal PM10 standards (but used the 1997 PM2.5 standards for 65 ug/m^3 health standard as a basis for the threshold.) The SJVAPCD does exclude manufactured logs from voluntary no burn days, but prohibits burning manufactured logs on mandatory no burn days.

Comment Received by e-mail from David Smith on August 28, 2007

Comment: **While I understand the need to manage particulate matter on certain cold days, I find it highly deceptive to publish your notice of the hearing to address what is essentially the curtailment of using one's wood burning fireplace during periods of low air quality. While I understand the that Board is attempting to cover other, lesser known devices other than a fireplace, the Notice should have at least included wording illustrating the most common example: the wood burning fireplace. At least tell the public what's really being done, and don't hide the purpose in some bureaucratic euphemism that is meaningless to many.**

Response: Staff re-titled the rule to make it clear that the rule applied to more than just wood burning but also included pellets and manufactured logs. However, in response to this comment, staff proposes to revise the rule title to "wood and other solid fuel" burning.

Comment Received by e-mail from LJ Laurent on August 28, 2007

Comment: **Excellent idea to curtail burning as required for air quality. I think this rule should be extended to more months because the air quality is a health issue during more months than November through February. Please recommend extending the times this rule applies. We need it.**

Response: Thank you for your support. Staff proposes to address only late fall and winter months only because data shows this is when particulate matter is at its highest. In addition, see the graph of monthly air quality data provided in response to Comment #3 for Cynthia Marshall's comment dated July 25, 2007 on Page 112.

Comment Received by e-mail from Lea Brooks on September 3, 2007

Comment: **I strongly support this rule. I am a longtime bicycle commuter and am very concerned about the health effects of particulate air pollution from wood burning. The pollution is very noticeable during my commute to and from work on the American River Parkway bike trail and in my neighborhood during the winter months. I very much appreciate the AQMD's efforts to control this pollution.**

Response: Thank you for your support and contributions to reduce pollution through your commuting choice.

Comment received by mail from Sacramento Area Bicycle Advocates on September 5, 2007

Comment: **The Sacramento Area Bicycle Advocates strongly supports measures to combat particulate and all other forms of air pollution year round. Engaging in frequent and long durations of physical activity, cyclists experience poor air quality first hand. Poor air quality not only turns existing cyclists into victims, it discourages potential cyclists.**

Response: Thank you for your support and contributions to reduce pollution through your commuting choice.