Spare the Air in the Bay Area

Santa Clara County Woodsmoke Rebate Program

(Important changes apply)

SWITCH FROM BURNING WOOD TO USING GAS

Upgrade your Woodburning stove or fireplace and SAVE!

Santa Clara County residents can make a clean air choice and save money too! The Bay Area Air Quality Management District is offering rebates when you replace your woodburning appliance with one that uses natural gas instead. Switching from burning wood to using gas will reduce air pollution and improve air quality in your neighborhood.

Available rebates are:

- **$100** to retrofit an existing fireplace by installing a new gas log set or a new insert.

- **$300** to replace an existing woodburning stove or fireplace insert (must be 1990 or older) with a new gas appliance. Your old woodstove must be scrapped at Pick Your Part yard in Milpitas.

Please Note: Effective August 26, 2004, the former rebate program, which distributed $500 and $300 rebates, has been discontinued. The following important changes apply:

- New rebate values of $300 and $100.

- You do not need to install a new gas line to order to be eligible. A pre-plumber fireplace is OK.

- Santa Clara residents may purchase their new gas appliance anywhere.

- One rebate per household. No retroactive rebates available.

- Rebates will be distributed on a first come - first served basis. Funding is limited, therefore rebates are not guaranteed. To check availability call(1-800) HELP-AIR

Rebate Program Terms

- This rebate offer is only available for homes in Santa Clara County.

- To receive the $300 rebate amount, your pre-1990 woodstove must be scrapped at Pick Your Part - Milpitas. Please remove the stove doors separately or make the stove un-viable in some way before delivery to Pick Your Part. They are located at 595 Trade Zone Blvd. in Milpitas. Tele. (408) 262-4500.

DOCKET
06-AFC-6
DATE DEC 20 2007
RECD. DEC 20 2007

• You must complete the installation of the new gas appliance before sending in the application for processing. The rebate is not available to replace existing gas appliances.

• Participants are limited to receiving one rebate per household.

• Rebates are processed in the order received. Rebates will be distributed on a first come - first served basis. Funding is limited, therefore rebates are not guaranteed. To check availability call (1-800 HELP-AIR).

Application Instructions

• Download the rebate application PDF.

• Complete all sections of the application on the reverse side.

• Retain a copy of this application and the receipt for your records. The Rebate Program is not responsible for materials lost by mail.

• Attach both the **original payment receipt** and the **original retail invoice** to this application. Copies will not be accepted.

• Attach the **original** UPC code from the box, or the make and model description from the box.

UPC

• In order to receive the $300 rebate you must also recycle your pre-1990 woodstove. Please include the **original** proof of recycling receipt that will be given to you at Pick Your Part yard in Milpitas.

• Agree to the terms of the Rebate Program listed below and sign the application.

• The new gas appliance must be purchased and installed at the address listed beginning August 26, 2004 and extending through November 30, 2006. These dates may end earlier if allocated funds are depleted. ***(Note: As of November 30, 2006, there is still limited funding available. Interested applicants should purchase and install their gas appliances and submit their applications and paperwork right away. At this point, funds are not guaranteed.)***

• The new gas appliance, for which a rebate is issued, may be subject to on-site installation verification. If the new gas appliance cannot be verified, the customer will reimburse the Rebate Program for funds issued and other costs associated with processing the rebate.

• As of August 26, 2004 you will no longer be required to install a new gas line in order to apply for a rebate or to purchase the appliance from an authorized retailer. This rebate does apply to pre-plumbed fireplaces, and you may purchase the appliance where you wish. Requirements of the previous program are no longer applicable.

• No retroactive rebates available.

• Please allow 6 - 8 weeks for processing.

Mail to: BAAQMD Woodsmoke Rebate
939 Ellis Street
San Francisco, CA 94109

For more information call (1-800) HELP-AIR.

The Santa Clara Woodstove Rebate Program is co-sponsored by Silicon Valley Power as part of an air quality mitigation program required by the California Energy Commission for the new Donald Von Raesfeld Power Plant in Santa Clara. The Bay Area Air Quality Management District manages the program locally.

SANTA CLARA COUNTY WOODSMOKE REBATE PROGRAM APPLICATION

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Mail to: BAAQMD Woodsmoke Rebate • 939 Ellis Street • San Francisco, CA 94109 • Tele. (1-800) HELP-AIR

[redacted]

- Complete all sections of the application on the reverse side.
- Retain a copy of this application and the receipt for your records. The Rebate Program is not responsible for materials lost by mail.
- (1) Attach both the **original payment receipt** and the **original retail invoice** to this application. Copies will not be accepted.
- (2) Attach the **original** UPC code from the box, or the make and model description from the box.

- In order to receive the $300 rebate you must also recycle your pre-1990 woodstove. Please include the **original** proof of recycling receipt that will be given to you at Pick Your Part yard in Milpitas.
- Agree to the terms of the Rebate Program listed below and sign the application.

[redacted]

Important! Please Read Carefully! In signing you are agreeing to the following provisions.

- This rebate offer is only available for homes in Santa Clara County.
- To receive the $300 rebate amount, your pre-1990 woodstove must be scrapped at Pick Your Part – Milpitas. Please remove the stove doors separately or make the stove un-viable in some way before delivery to Pick Your Part. They are located at 595 Trade Zone Blvd. in Milpitas. Tele. (408) 262-4500.
- I understand that I must complete the installation of the new gas appliance before sending in this application for processing. The rebate is not available to replace existing gas appliances.
- I understand that participants are limited to receiving one rebate per household.
- I understand that rebates are processed in the order received. Rebates will be distributed on a first come – first served basis. Funding is limited, therefore rebates are not guaranteed. To check availability call (1-800 HELP-AIR).
- I understand that the new gas appliance must be purchased and installed at the address listed on the reverse side beginning August 26, 2004 and extending through November 30, 2006. These dates may end earlier if allocated funds are depleted.
- I understand that the new gas appliance, for which a rebate is issued, may be subject to on-site installation verification. If the new gas appliance cannot be verified, the customer will reimburse the Rebate Program for funds issued and other costs associated with processing the rebate.
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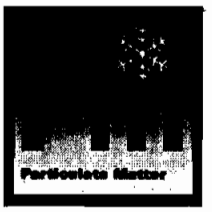
- No retroactive rebates available.
- Please allow 6 – 8 weeks for processing.

SPARE THE AIR TONIGHT STUDY

2006-2007 WINTER WOOD SMOKE SEASON



CONDUCTED FOR THE

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

MARCH 2007

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INTRODUCTION

The Bay Area Air Quality Management District (BAAQMD) was established in 1955 by the California State Legislature as the first multi-county agency in the State to address the problem of air pollution on a regular basis. The BAAQMD's primary regulatory authority covers stationary sources of air pollution such as factories, industrial facilities, manufacturing operations, gasoline stations and dry cleaners. The BAAQMD is also responsible for transportation control measures to reduce emissions from mobile sources of air pollution in its Clean Air Plan.

Serving the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, and the western half of Solano and southern half of Sonoma, one of the BAAQMD's primary charges is to increase public awareness of positive air quality choices. To facilitate this effort, the Spare the Air Program was established by the BAAQMD in 1991 to educate residents about air pollution and to encourage them to modify their behavior to reduce and prevent it. During the summer ozone season (May to October), the BAAQMD conducts episodic public education campaigns designed to encourage the public to reduce their driving and use of certain household products on days that are expected to violate ozone air quality standards. During the winter season (November to February), the focus of the Program shifts to reducing the impact of wood burning on air quality by encouraging the public to *not* burn wood and to replace their wood-burning fireplaces and stoves with cleaner alternatives, such as natural gas fireplaces.

Although today many air quality management districts throughout the country administer similar programs, the Spare the Air program in the Bay Area was the first of its kind.

MOTIVATION FOR STUDY The primary motivation for this study was to better understand the public's attitudes and behavior with respect to burning wood, their awareness of the Spare the Air Tonight Program, as well as the impact that the Program has had on awareness, opinions and behavior relevant to burning wood and air quality. In this respect, this study is quite similar to past surveys conducted for the BAAQMD in 2001, 2002, 2003, 2004 and 2005.

The passage of California Senate Bill 656 to reduce public exposure to particulate matter (PM10 and PM2.5) was another key motivation for the study.[1] SB 656 requires the California Air Resources Board (ARB), in consultation with local air districts, to develop and adopt a list of the most readily available, feasible and cost-effective control measures that could be used to reduce PM10 and PM2.5—with the goal of making progress in the near-term toward attainment of State and Federal PM10 and PM2.5 standards. Although the Bay Area is currently in attainment for the Federal PM10 and PM2.5 standards, like almost every other area in California it does not meet the stricter State standards.

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1. Particulate matter (PM) consists of very small liquid and solid particles suspended in the air, and includes particles smaller than 10 microns (PM10) as well as finer particles smaller than 2.5 microns (PM2.5). Ambient PM is made up of particles that are emitted directly—such as soot and fugitive dust—as well as secondary particles that are formed in the atmosphere from reactions involving precursor pollutants such as oxides of nitrogen, sulfer oxides, volatile organic compounds, and ammonia. Exposure to PM is linked to increased frequency and severity of asthma attacks and even premature death in people with pre-existing cardiac or respiratory disease. Infants and children, the elderly, and persons with heart and lung disease are the most sensitive to PM pollution. For more on particulate matter, SB 656 and the BAAQMD's implementation schedule, see the *Particulate Matter Implementation Schedule* staff report prepared by the Planning and Research Division of the BAAQMD, November 9, 2005.

With a greater emphasis placed on reducing particulate matter in the Bay Area, the 2005 survey was the first step in developing a more detailed, up-to-date profile of wood burning behavior in the Bay Area that would allow for statistically reliable estimates within each of the nine member counties. The 2006 survey continues this effort by collecting an additional 988 interviews that can be pooled with the 2,625 interviews completed in 2005. Prior to 2005, the most recent inventory was conducted in 1988.[2]

OVERVIEW OF METHODOLOGY A full description of the methodology used for this study is included later in this report (see *Methodology* on page 54). A total of 988 randomly selected residents within the District's boundaries participated in a telephone survey on one of thirty-seven interviewing dates between December 2, 2006 and February 12, 2007. Probability-based sampling techniques and monitoring of the demographics resulted in a sample that is representative of the adult population within the District.

When compared to the past surveys conducted for the District on wood burning and the Spare the Air Tonight Program, there are several methodological changes worth noting at the outset of this report. In the interest of improving the *validity* and *reliability* of select opinion and behavior measures, the 2006 study continued several questionnaire changes that were first implemented in the 2004 season. The most notable of these changes addressed how the questionnaire measured the impacts of the Spare the Air Tonight Program. The changes were made so that the impacts of the winter program on wood burning behavior would be measured using the same basic methodology employed by the BAAQMD—and recommended by CARB and EPA[3]—to measure the impacts of the summer Spare the Air Program on driving behavior.[4]

Based on the 2005 results, several additional refinements were made to the 2006 questionnaire with respect to measuring ownership of wood-burning heating devices and the practice off-season burning. Because these improvements occasionally involved changing the wording, format and/or response options for a particular question, in some cases it is not possible to statistically compare the results of the 2006 survey with previous surveys for select measures. Where such comparisons are possible, however, this report presents the results from past surveys.

STATISTICAL SIGNIFICANCE Many of the figures and tables in this report present the results of questions asked in 2006 alongside the results found in prior years for identical questions. In such cases, True North conducted the appropriate tests of statistical significance to identify changes that likely reflect actual changes in public opinion or behavior over time—as opposed to being due to chance associated with selecting two cross-sectional samples indepen-

2. *The California Residential Wood Consumption Survey.* Report prepared by Northern California Research Associates for the California Air Resources Board, 1988.
3. The CARB/EPA Method is summarized in the Transportation Research Board's (TRB) journal—*Transportation Research Record*—for 2004 in an article entitled *Development of a Quantification Method for Measuring the Travel and Emissions Impacts of Episodic Ozone Alert Programs* (pages 153-159). It is described in detail in the following air resources guidance report: CARB, "Quantification Method Reference Manual: A Method to Measure Travel and Emissions Impacts of Ozone Action Public Education Programs," April 2003. In addition to Eric Schreffler, Dr. Timothy McLarney and Richard Sarles, the TRB paper and guidance report were co-authored by Joann Lu and Jeff Weir of CARB, as well as Thomas Higgins and Dr. Will Johnson of K.T. Analytics.
4. For a detailed description of the updated CARB/EPA Method and its application to the BAAQMD's summer Spare the Air Program, see the *Spare the Air Study: 2005 Summer Ozone Season* report prepared for the BAAQMD by True North & ESTC.

dently and at random. Differences between studies are identified as *statistically significant* if we can be 95% confident that the differences reflect an actual change in public opinion or behavior between the two studies. Statistically significant differences within response categories over time are denoted by the † symbol which appears in the figure next to the appropriate response value for 2006.

ORGANIZATION OF REPORT This report is designed to meet the needs of readers who prefer a summary of the findings, as well as those who are interested in the details of the results. For those who seek an overview of the findings, the sections titled *Just the Facts* and *Conclusions* are for you. They provide a summary of the most important factual findings of the survey in bullet-point format and a discussion of their implications. For the interested reader, this section is followed by a more detailed question-by-question discussion of the results from the survey by topic area (see *Table of Contents*), as well as a description of the methodology employed for collecting and analyzing the data. And, for the truly ambitious reader, the questionnaire used for the interviews is contained at the back of this report, and a complete set of crosstabulations for the survey results is contained in Appendix A.

ACKNOWLEDGEMENTS True North would like to thank Ralph Borrmann, Dr. David Fairley and Luna Salaver of the BAAQMD, as well as Eric Schreffler of ESTC, for their valuable input during the design and reporting stages of this study. Their expertise and insight improved the overall quality of the research presented here.

DISCLAIMER The statements and conclusions in this report are those of the authors, Dr. Timothy McLarney and Richard Sarles at True North Research, Inc. (True North), and not necessarily those of the BAAQMD. Any errors or omissions are the responsibility of the authors.

ABOUT TRUE NORTH True North is a full-service survey research firm that is dedicated to providing public agencies with a clear understanding of the values, perceptions, opinions and behaviors of their residents and customers. Through designing and implementing scientific surveys, focus groups and one-on-one interviews, as well as expert interpretation of the findings, True North helps its clients to move with confidence when making strategic decisions in a variety of areas—such as planning, policy evaluation, performance management, and developing effective public information campaigns.

During their careers, Dr. McLarney (President) and Mr. Sarles (Principal Researcher) have designed and conducted over 400 survey research studies for public agencies—including dozens of studies related to air quality and Spare the Air public education programs.

JUST THE FACTS

The following is an outline of the main factual findings from the 2005 study. For the reader's convenience, we have organized the findings according to the section titles used in the body of this report. Thus, to learn more about a particular finding and how it may compare to findings from prior surveys (where applicable), simply turn to the appropriate report section.

WINTER WOOD BURNING BEHAVIOR

- Forty-five percent (45%) of households in the District contain at least one wood-burning fireplace, pellet stove or wood stove.
- Nineteen percent (19%) of households in the District contain at least one fireplace that primarily burns natural gas or propane.
- Among households with a wood-burning fireplace or wood stove, the most commonly used type of wood was natural wood logs (42%), followed by manufactured logs (26%), and scrap wood (1%). Less than 1% of respondents indicated that they use pallets or some 'other' type of wood, 3% were not sure of the type of wood they primarily burn.
- Twenty percent (20%) of respondents who primarily burn natural wood logs were unable to identify the type of wood that they burn. Of the specific woods mentioned, oak was the most common (51%), followed by pine (9%), almond (8%), and fruitwood (4%).
- When households that primarily burn natural wood logs were asked how they typically acquire their wood, respondents were split between those who gather their own (44%), those who purchase the wood from a local store (13%), and those who rely on a wood supplier (33%). Five percent (5%) mentioned an alternative source, and 4% were unsure of where their household acquires the wood that they burn.
- Among households that primarily burn natural wood logs, 92% stated that they burn dry, seasoned wood, 4% reported that they typically burn fresh-cut wood, and 5% were not sure.
- Half (50%) of all households that burn wood indicated that they *primarily* do so for ambiance rather than heat.
- Eighty-one percent (81%) of households that contain a wood stove indicated that they would use the device this winter. The rate of use was somewhat lower for pellet stoves (68%) and natural gas/propane fireplaces (72%), and markedly lower for wood-burning fireplaces (56%).
- Overall, 9% of households district-wide reported that they would not use their wood-burning heating device *at all* during the winter due to the Spare the Air Tonight campaign.
- Overall, 30% of households with a wood-burning heating device expected to burn wood weekly, 27% expected to burn wood less frequently than once per week, and 43% indicated that they do not expect to burn wood this winter.
- Fifty-one percent (51%) of respondents whose household includes at least one wood-burning fireplace, pellet stove and/or wood stove *and* expected to burn wood during the winter months indicated that they had burned wood during the week prior to the interview. Approximately 22% had burned wood the day prior to the interview.
- On a typical burn day, wood-burning households averaged 3.82 hours of burning time.

- On a typical burn day, wood-burning households consumed an average 5.12 logs.

OUTDOOR & OFF-SEASON BURNING

- Nine percent (9%) of households in the District indicated that they possess an outdoor fireplace, firepit or chiminea *and* they have used the device to burn wood in the past 12 months.
- Eighty-five percent (85%) of households reported that they do not burn wood in non-winter months, whereas 15% indicated that they do burn wood in the off-season.
- Off-season wood burning was most commonly reported for the months of July and August.
- Among households that reported burning wood in non-winter months, 13% indicated that they burn wood on a weekly basis in the off-season.

CHANGES IN WOOD BURNING BEHAVIOR

- Overall, 65% of households that own a wood-burning heating device and expected to burn wood this season reported that they anticipated burning wood at about the same frequency this season as last.
- Thirty-seven percent (37%) of respondents who have a wood-burning fireplace, wood stove and/or pellet stove *and* expected to burn wood during the 2006-2007 winter season indicated that—on at least one occasion—they refrained from burning wood.
- When asked *why* they chose not to burn wood on these occasions, 10% specifically mentioned the Spare the Air campaign and an additional 6% offered an air quality or health-related reason.
- Among all households with a wood-burning fireplace, pellet stove or wood stove, nearly 9% chose not to burn *at all* during the winter season because of the Spare the Air Tonight campaign, and an additional 9% refrained from burning on at least one occasion for the same reason.

RECALL AND AWARENESS OF SPARE THE AIR TONIGHT MESSAGING

- Overall, 56% of adults in the Bay Area recalled being exposed to news stories, advertisements or public service announcements related to the Spare the Air Tonight Program during the three months prior to the interview.
- When asked to indicate where they obtained the information about the Spare the Air Tonight Program, the most commonly cited sources were television (57%) and radio (40%).
- Sixteen percent (16%) of respondents interviewed on the day after a Spare the Air Tonight episode were aware of the advisory for the prior day.

ATTITUDES ABOUT WOOD SMOKE

- Approximately three-quarters (74%) of Bay Area adults perceive that there are negative health effects associated with breathing wood smoke.

- When asked in an open-ended manner to identify some of the specific negative health effects associated with breathing wood smoke, most respondents focused on lung disease in general (32%) or made a specific reference to asthma (28%).
- One-quarter (24%) of Bay Area adults perceive that their neighborhood periodically experiences air pollution from wood smoke. Fourteen percent (14%) stated that the problem was a small one, 7% indicated it was a moderate or medium problem, and 3% felt that air pollution due to wood smoke was a big problem in their neighborhood.

CHANGING HEATING DEVICES

- Among individuals who own a wood stove or a pellet stove, 54% indicated that their stove is EPA certified.
- One-third (33%) of respondents who owned a wood-burning fireplace and/or non-EPA certified wood stove or pellet stove were willing to replace their current device -- *without a financial incentive* -- with a gas fireplace.
- Thirty-eight percent (38%) of respondents who owned a wood-burning fireplace and/or non-EPA certified wood stove or pellet stove were willing to replace their current device -- *without a financial incentive* -- with an EPA certified wood stove or pellet stove.
- Seven percent (7%) of those who were initially unwilling to replace their heating device for a cleaner alternative were willing to do so if a $200 rebate were offered. As the amount of the rebate increased to $300, $400 and $500, the proportion of respondents who indicated that they would participate in the program increased to 11%, 17% and 22%, respectively.
- Sixty-four percent (64%) of Bay Area adults support a policy that would require all new housing construction to use only gas fireplaces or EPA certified fireplace inserts, wood stoves or pellet stoves.
- Seventy-seven percent (77%) of Bay Area adults support a policy that would prohibit wood burning on nights when air pollution is expected to reach unhealthy levels.
- Half (51%) of Bay Area adults support a policy that would require older wood stoves to be removed or replaced with a cleaner burning model when a home is sold to a new owner.

PERCEPTIONS OF ENTITIES

- Prior to taking the survey, 59% of respondents had heard of the Bay Area Air Quality Management District and 52% had heard of the Spare the Air Tonight Program.
- Among respondents who had heard of the BAAQMD, more than half (55%) held a favorable opinion of the agency, whereas 32% held a neutral opinion or weren't sure of their opinion, and just 8% held an unfavorable opinion.
- Among respondents who had heard of the Spare the Air Tonight Program, 72% held a favorable opinion of the Program, whereas 20% held a neutral opinion or weren't sure of their opinion, and 5% held an unfavorable opinion.
- Forty-six percent (46%) of respondents recalled hearing, reading or seeing a news story, advertisement or public service announcement in the six months prior to taking the interview that pertained to the BAAQMD. The corresponding figure for the Spare the Air Tonight campaign was 65%.

CONCLUSIONS

As noted in the *Introduction*, this study was designed to provide a better understanding of the public's attitudes and behavior with respect to burning wood, their awareness of the Spare the Air Tonight Program, as well as the impact that the Program has had on awareness, opinions and behavior relevant to wood burning and air quality. Whereas subsequent sections of this report are devoted to conveying the detailed results of the study, in this section we attempt to 'see the forest through the trees' and note how the collective results answer some of the key questions that motivated the research.

What is the profile of wood burning behavior in the Bay Area?

Overall, 45% of households in the Bay Area own at least one *wood-burning* fireplace, wood stove or pellet stove, and (26%) burned wood in the 2006-2007 winter months. Fifteen percent (15%) of households also reported burning wood in non-winter months. Although the type of wood burned varies considerably, as does the source from which the wood is obtained, the vast majority (92%) of households report that they burn dry, seasoned wood.

Wood burning behavior varies considerably depending on how frequently a household burns. Wood-burning households can easily be divided between the 53% that burn at least once per week (frequent burners) and those that burn less often (infrequent burners). Not only do frequent burners build fires more often, then tend to burn significantly more hours per burn day (4.58 hours on average) and consume more wood per burn day (5.78 logs on average) when compared to infrequent burners. Their reasons for burning wood are also different. Whereas frequent burners primarily build fires for heat, infrequent burners primarily build fires for ambiance.

Wood burning behavior also varies considerably across the nine-county District. In the predominately rural counties of Marin, Sonoma, Solano and Napa, the proportion of households with a heating device that burn wood at least once per week was substantially greater in 2005 than in the rest of the District.[5] For example, whereas 43% of Sonoma County households with a heating device burned wood at least once per week during the winter, the corresponding figure for San Francisco County was just 21%. For more information about wood burning behavior in the Bay Area, see *Winter Wood Burning Behavior* on page 10 and *Outdoor & Off-Season Burning* on page 25.

5. 2005 survey results are used here for conclusions regarding frequency of burning by county because the larger sample size in 2005 provides for more reliable estimates at the county level among households that own a wood-burning heating device.

How effective was the Spare the Air Tonight Campaign during the 2006-2007 winter?

The Spare the Air Tonight campaign seeks to shape public awareness and opinions about the District and air quality issues, as well as change behavior with respect to burning wood. Accordingly, the survey sought to measure the impacts that the campaign had on each of these dimensions.

By virtually every measure, the 2006-2007 Spare the Air Tonight campaign was the BAAQMD's most successful to date. From a messaging standpoint, the campaign set new high-water marks in terms of awareness and positive attitudes about the Spare the Air Tonight campaign. Put simply, more residents were aware of the Spare the Air Tonight program, recalled being exposed to Spare the Air Tonight messaging during the winter season, and held positive opinions about the Spare the Air Tonight program than has been recorded since the study began asking these questions in 2002. Moreover, the magnitude of the positive changes between 2005 and 2006 was often substantial. For example, the proportion of residents who recalled hearing, reading or seeing Spare the Air Tonight related stories in the past six months increased by 22% to 65%, and the proportion who held a favorable opinion of the Program increased by 9% to 72%.

With respect to attitudes about wood smoke, the Program has also succeeded in raising public recognition of the negative health impacts of breathing wood smoke by 25% since 2002. Residents were also significantly more likely to perceive wood smoke as being a problem in their neighborhood in 2006 when compared to prior years.

The increased awareness of the health-related problems caused by wood smoke arguably underpins what is broad support for the adoption of new policies designed to improve the air quality in the region. Nearly two-thirds (64%) of adults favor requiring all new housing construction to use only gas fireplaces or EPA certified fireplace inserts, wood stoves or pellet stoves, and more than three-quarters (77%) favor prohibiting wood burning on evenings when air pollution is forecast to reach unhealthy levels.

So how did these positive changes in attitudes and awareness translate to actual changes in wood burning behavior? Based on the survey data, it is estimated that among all households with a wood-burning fireplace, pellet stove or wood stove, nearly 9% chose not to burn *at all* during the winter season because of the Spare the Air Tonight campaign, and an additional 9% refrained from burning on at least one occasion for the same reason. Collectively, the Spare the Air Tonight campaign influenced nearly 18% of households to reduce their wood burning during the 2006-2007 winter season. This represents a dramatic increase of more than 15% when compared to the comparable figure in 2005 (2.4% impacted).

Is the Spare the Air Tonight program shaping behavior throughout the season?

Although the Spare the Air Tonight program focuses on reducing wood burning on specific days that are forecast to have unhealthful concentrations of small particle pollution (PM), one of the clear patterns to emerge from the 2006 survey is that the campaign is shaping wood burning behavior ***throughout*** the season. Approximately 9% of households reported that they refrained from burning wood the entire season in response to the Spare the Air Tonight campaign.

Are there any opportunities that the Program can take advantage of to be more successful in the future?

The survey results suggest a clear opportunity for the Program to further reduce air pollution due to wood smoke by helping to establish and promote rebate programs for the replacement of traditional fireplaces and non-EPA certified wood stoves and pellet stoves. More than 40% of respondents who owned a wood-burning fireplace and/or a non-EPA certified wood stove or pellet stove indicated that they were willing to replace the device if offered a modest incentive ($200), yet only two counties (Santa Clara and Marin) have offered such programs in the past, and based on prior surveys public awareness of the programs was poor.

A second opportunity for the program is to increase awareness of specific air quality advisories. Although general awareness of the Spare the Air Tonight Program was high and the program succeeded in reducing wood burning among 18% of households at one or more points throughout the season, awareness of *specific* Spare the Air Tonight advisories was modest at 16%. This is likely to be an ongoing challenge as the number of advisories reached 30 for the 2006-2007 winter season.

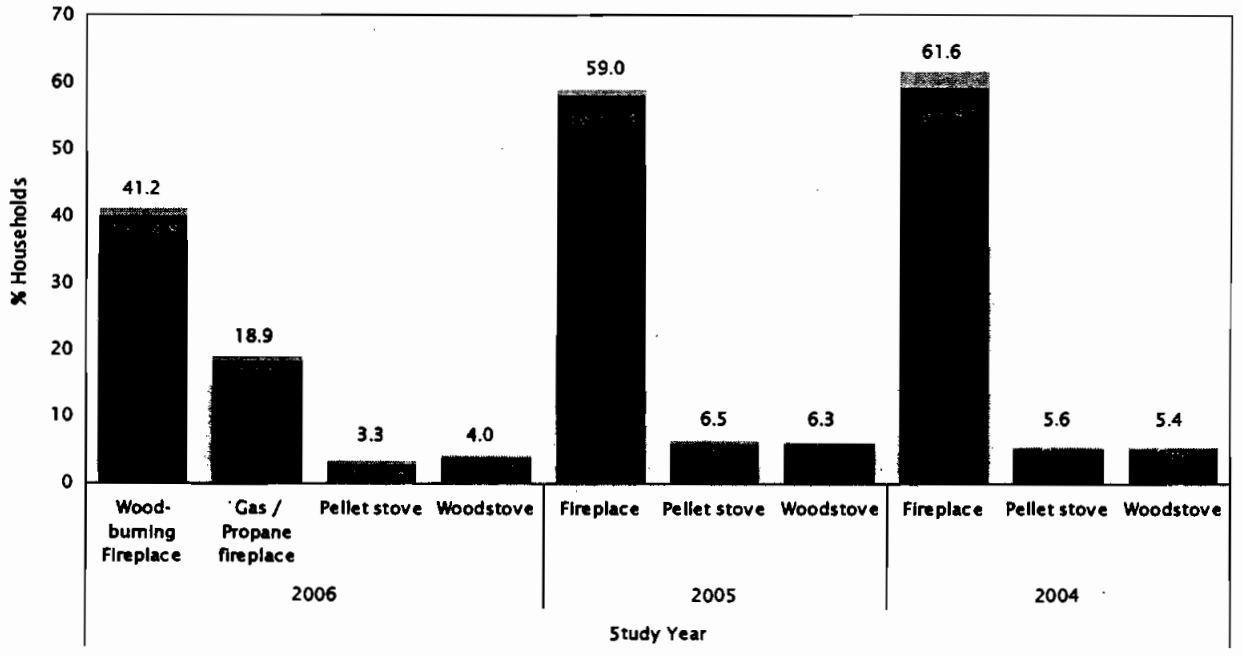
WINTER WOOD BURNING BEHAVIOR

One of the key objectives of the survey was to profile respondents' use of wood-burning heating devices, including fireplaces, pellet stoves and wood stoves. Accordingly, the first series of questions in the survey asked respondents about the types of wood-burning heating devices they have in their home, as well as their use of these devices during the 2006-2007 winter months of November through February. Whereas in prior years the surveys did not distinguish between wood-burning fireplaces and those that use natural gas or propane at the outset of the interview, as shown in Figure 1 this distinction was added to Question 1 in the 2006 survey.

HEATING DEVICES The first question in this series simply asked respondents to identify how many wood-burning fireplaces, natural gas/propane burning fireplaces, wood stoves and pellet stoves their household contains. As shown in Figure 1, 41% of households contain at least one wood-burning fireplace, 19% contain at least one fireplace that burns natural gas or propane, 3% contain at least one pellet stove, and 4% contain at least one wood stove. Collectively, 45% of respondents reported that their household contained at least one *wood-burning* fireplace, pellet stove or wood stove, whereas 55% of respondents indicated that their household does not contain a wood-burning heating device (see Figure 2 on page 11).[6]

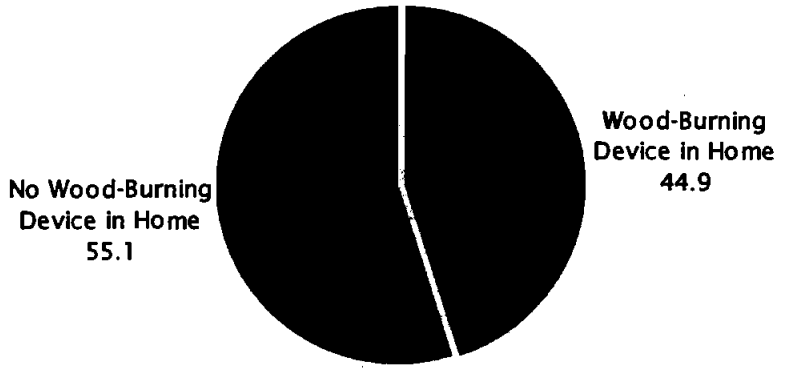
Question 1 *Do you have a _____ in your home? If yes, ask: How many: _____s do you have in your home?*

FIGURE 1 HEATING DEVICES IN HOME: 2004 ~ 2006 (N = 988)[7]



6. Because some households contained more than one type of heating device—e.g., a fireplace *and* a wood stove—one can not simply add the percentages shown in Figure 1 to determine the percentage of households that have at least one type of heating device.
7. The n = 988 refers to the number of respondents who received this question. This convention will be followed throughout the report to allow the reader to identify how many respondents are included in each figure.

FIGURE 2 WOOD-BURNING DEVICE IN HOME (N = 988)



For the interested reader, the following figures show how the presence of wood-burning fireplaces, wood stoves and pellet stoves varied by county (Figure 3), home type, and age of home (see Figure 4).

FIGURE 3 WOOD-BURNING DEVICE IN HOME BY COUNTY (N = 988)

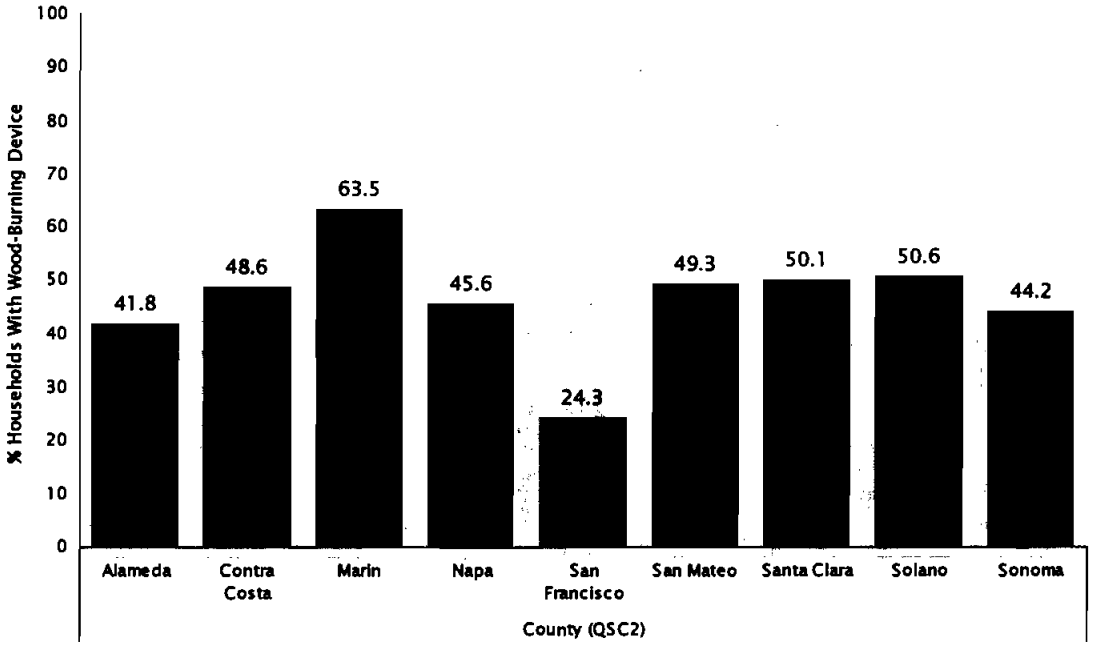
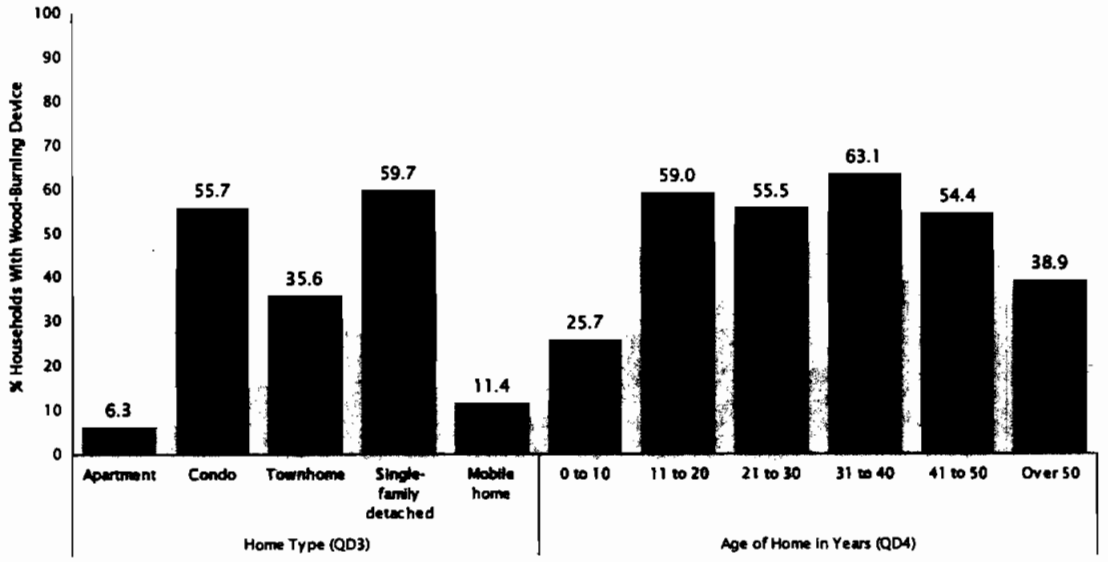


FIGURE 4 WOOD-BURNING DEVICE IN HOME BY COUNTY HOME TYPE & AGE OF HOME IN YEARS (N = 988)



FUEL TYPE & SOURCE For the 43% of respondents who reported that their household contains a wood-burning fireplace or wood stove, the survey next inquired as to the type of wood that they *primarily* use in the fireplace or stove (see Figure 5). The most commonly used wood was natural wood logs (42%), followed by manufactured logs (26%), and scrap wood (1%). Less than 1% of respondents indicated that they use pallets or some 'other' type of wood, 3% were not sure of the type of wood they primarily burn, and 27% volunteered that they never use their wood-burning fireplace or wood stove. Figure 6 on the next page displays how the proportional use of natural wood versus manufactured logs varied by county.

Question 2 *What type of wood do you primarily use in your wood-burning fireplace or wood stove: natural wood logs, manufactured logs such as Duraflame or Presto, scrap wood, pallets, or some other fuel?*

FIGURE 5 TYPE OF WOOD BURNED (N = 424)

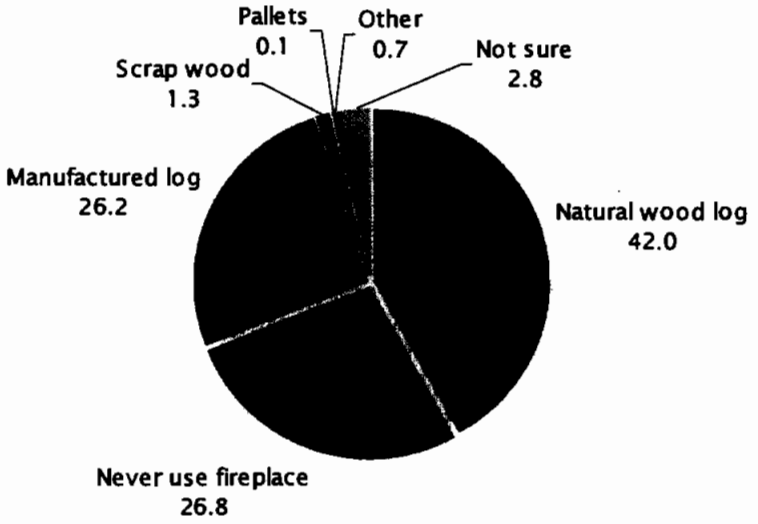
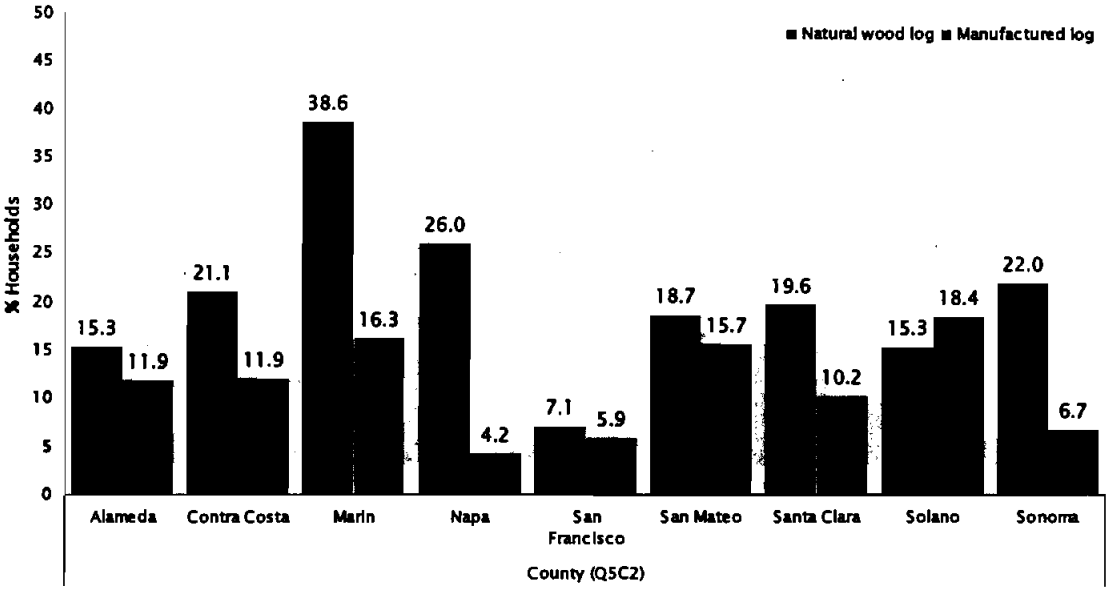


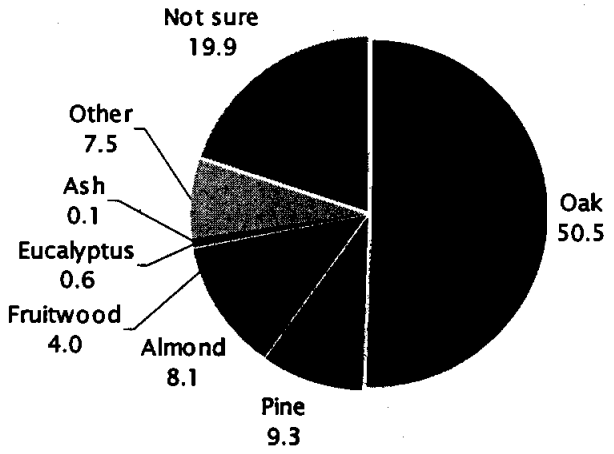
FIGURE 6 TYPE OF WOOD BURNED BY COUNTY (N = 424)



Households that reported that they primarily burn natural wood logs were next asked a series of questions about the *type* of natural wood they burn (Question 3), from where they purchase their wood (Question 4), and the state of the wood they burn (Question 5).

Question 3 *What type of natural wood do you typically burn?*

FIGURE 7 TYPE OF NATURAL WOOD BURNED (N = 178)



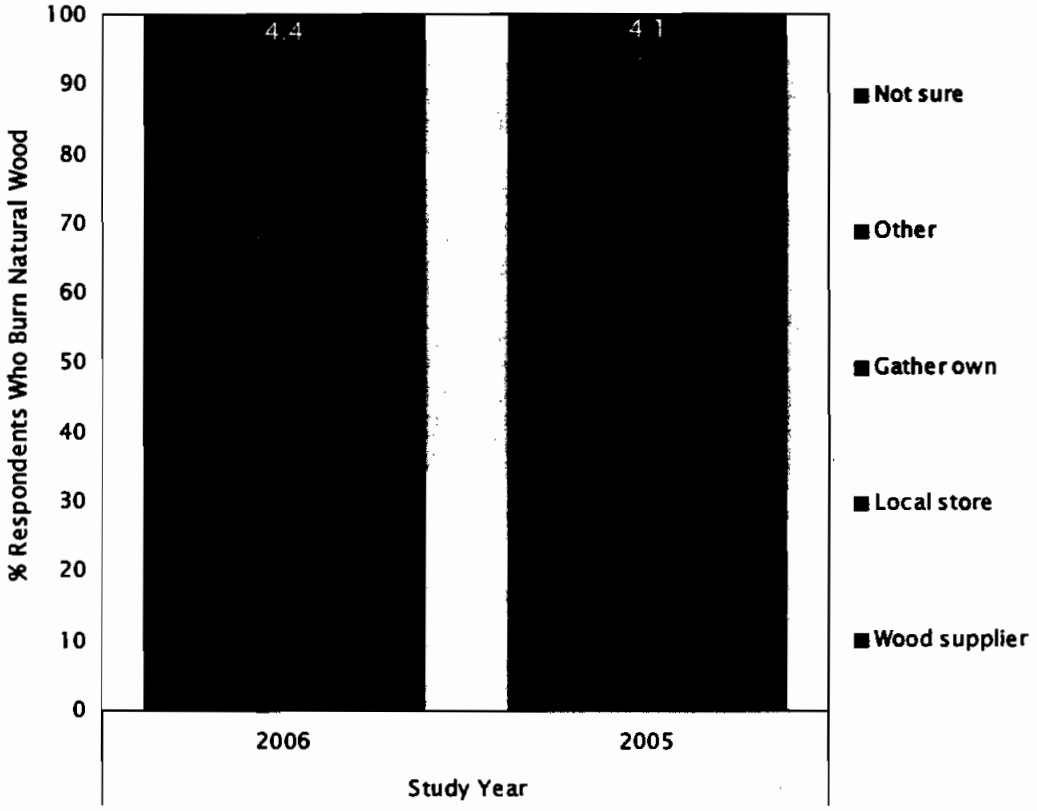
As shown in Figure 7, 20% of respondents were unable to identify the type of wood that they burn. Of the specific woods mentioned, oak was the most common (51%), followed by pine (9%), almond (8%), and fruitwood (4%).

When asked how they typically acquire their wood, respondents were split between those who gather their own (44%), those who purchase the wood from a local store (13%), and those who

rely on a wood supplier (33%). Five percent (5%) mentioned an alternative source, and 4% were unsure of where their household acquires the wood that they burn (Figure 8). When compared to the 2005 results, the percentage of households that reported gathering their own wood or relying on a wood supplier increased significantly, whereas the proportion that purchased their wood from a local store decreased significantly.

Question 4 *Do you typically purchase your wood from a wood supplier, the local store, or do you gather your own wood?*

FIGURE 8 SOURCE FOR NATURAL WOOD: 2005 ~ 2006 (N = 178)

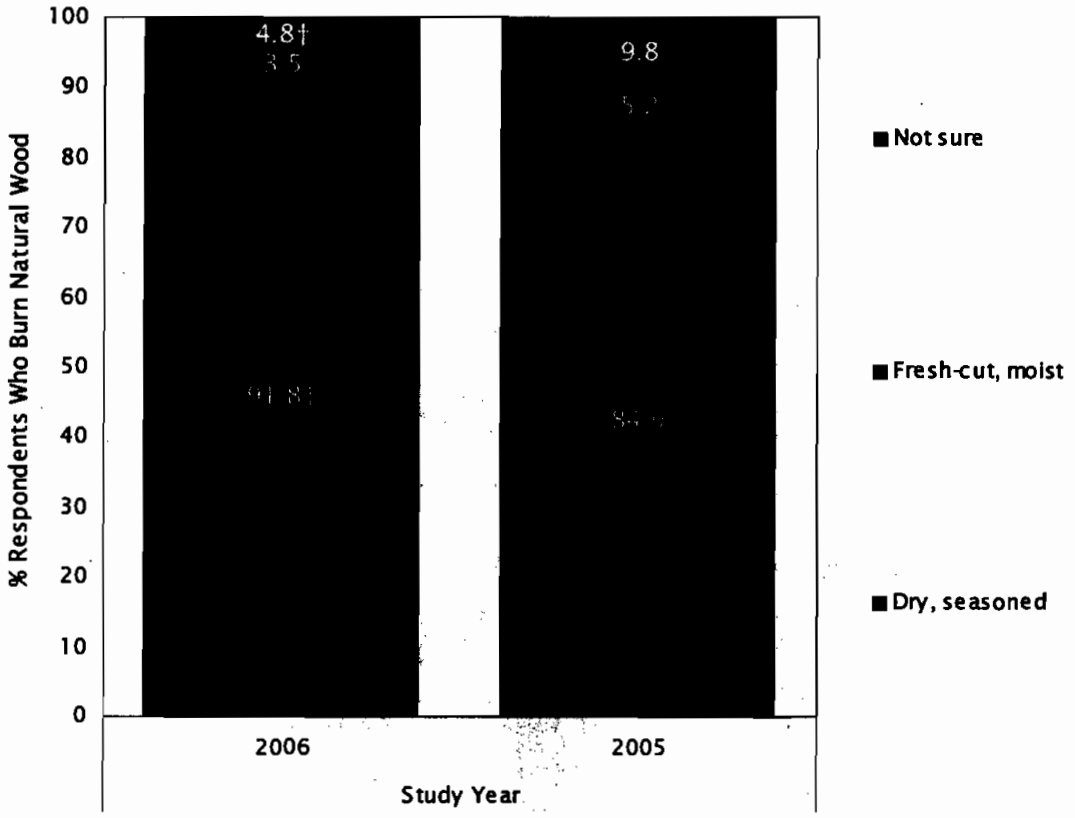


† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

The survey next inquired as to whether the respondent typically burns dry, seasoned wood or wood that is fresh-cut and somewhat moist. As shown in Figure 9 on page 15, 92% of respondents stated that they burn dry, seasoned wood, 4% reported that they typically burn fresh-cut wood, and 5% were not sure. When compared to 2005, the proportion of respondents who indicated that they burn dry, seasoned wood increased significantly, whereas the proportion who were unsure decreased significantly.

Question 5 *Do you tend to burn dry, seasoned wood or wood that is fresh-cut and somewhat moist?*

FIGURE 9 CONDITION OF WOOD TYPICALLY BURNED: 2005 ~ 2006 (N = 178)

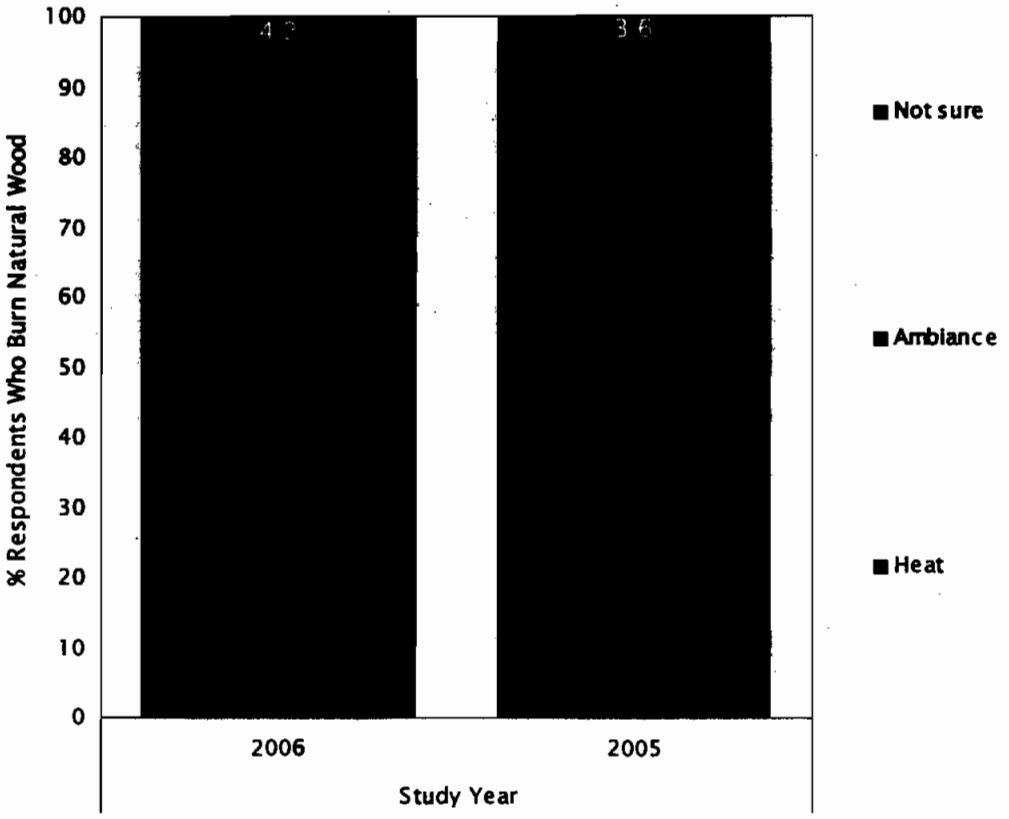


† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

PRIMARY REASON FOR BURNING WOOD Households that have a wood-burning fireplace or wood stove and expected to use it during the winter were next asked to indicate the *primary* reason for why they use the device—to heat their home, or for the ambiance of having a fire? Figure 10 on page 16 shows that residents, as a whole, were rather evenly divided between those who primarily burn for heat (46%) and those who primarily burn for ambiance (50%). The results for 2006 on this question are nearly identical to those found in 2005.

Question 6 *When you use your fireplace or wood stove, which of the following would you say is the primary reason you do so? For heating your home or for the ambiance of having a fire?*

FIGURE 10 PRIMARY PURPOSE OF WOOD BURNING: 2005 ~ 2006 (N = 178)



USE OF FIREPLACE, WOOD STOVE OR PELLET STOVE Respondents whose household contained at least one wood-burning fireplace, natural gas/propane fireplace, pellet stove or wood stove were next asked—for each device they own—whether they have or intend to use the device this winter between the months of November through February. As shown in Figure 11 on page 17, 81% of households that contain a wood stove indicated that they would use the device this winter. The rate of use was somewhat lower for pellet stoves (68%) and natural gas/propane fireplaces (72%), and markedly lower for wood-burning fireplaces (56%). The results for the 2005 and 2004 surveys are presented for comparison, but note that wood-burning fireplaces are combined with natural gas/propane devices in the figure for prior years.

Figure 12 on page 17 provides a useful summary of the presence and expected use of wood-burning heating devices for the District as a whole, as well as by the nine member counties. Among all households in the District, 45% own a wood-burning fireplace, pellet stove or wood stove, 19% own a natural gas/propane fireplace, and 26% expected to use their wood-burning device this winter. Ownership (64%) and use (52%) of a wood-burning device was highest in Marin County.

Question 7 *Will you use your _____ this winter?*

FIGURE 11 HEATING DEVICE USAGE THIS WINTER: 2004 ~ 2006 (WOOD-BURNING FIREPLACE N = 407; GAS FIREPLACE N = 187; PELLET STOVE N = 32; WOOD STOVE N = 39)

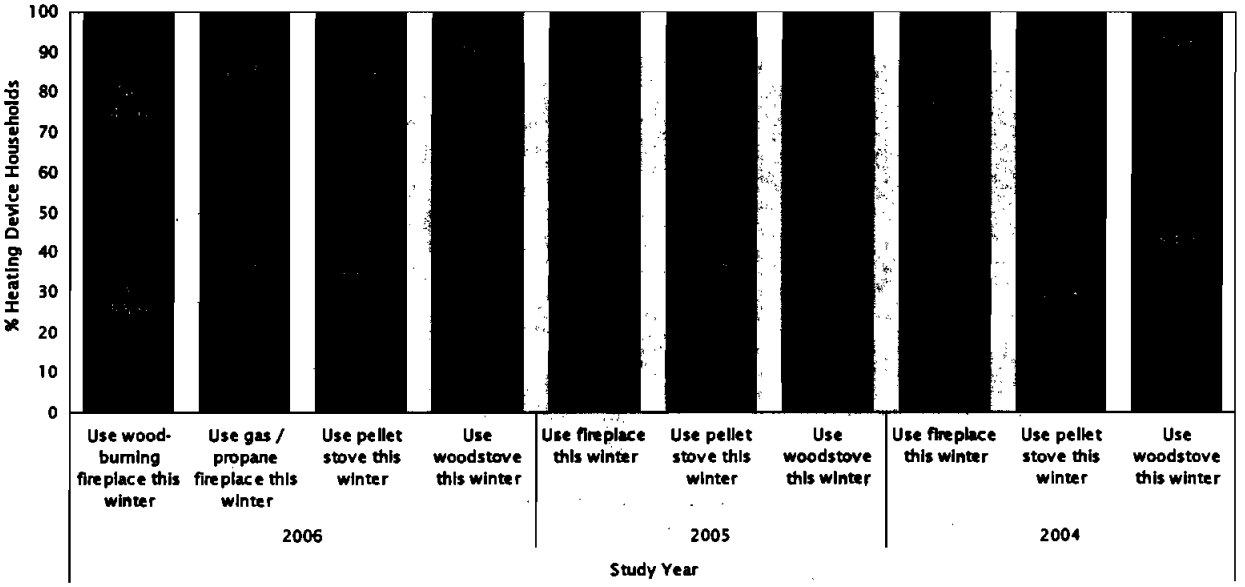
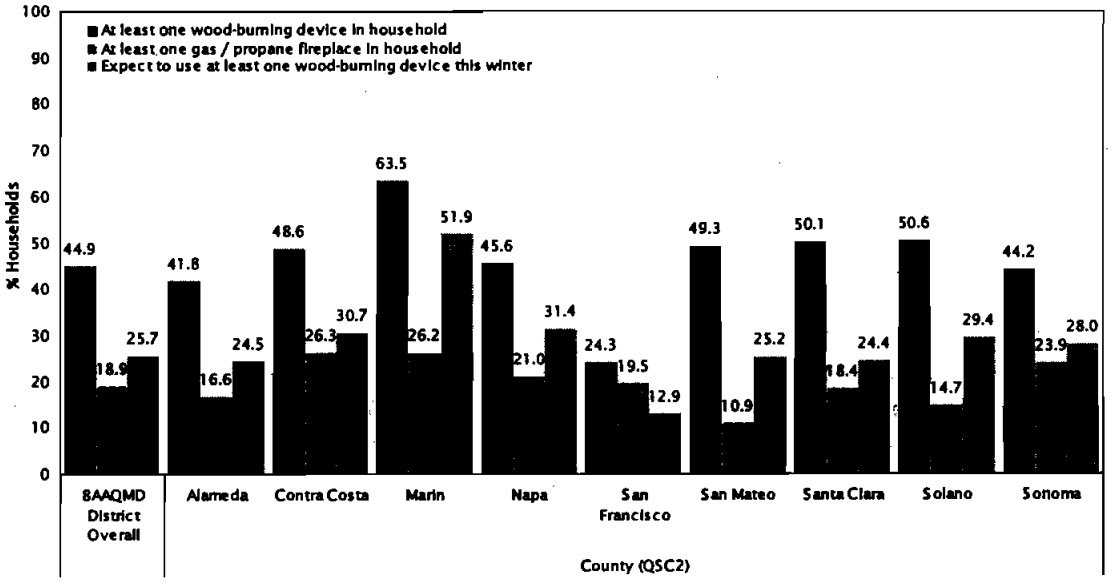


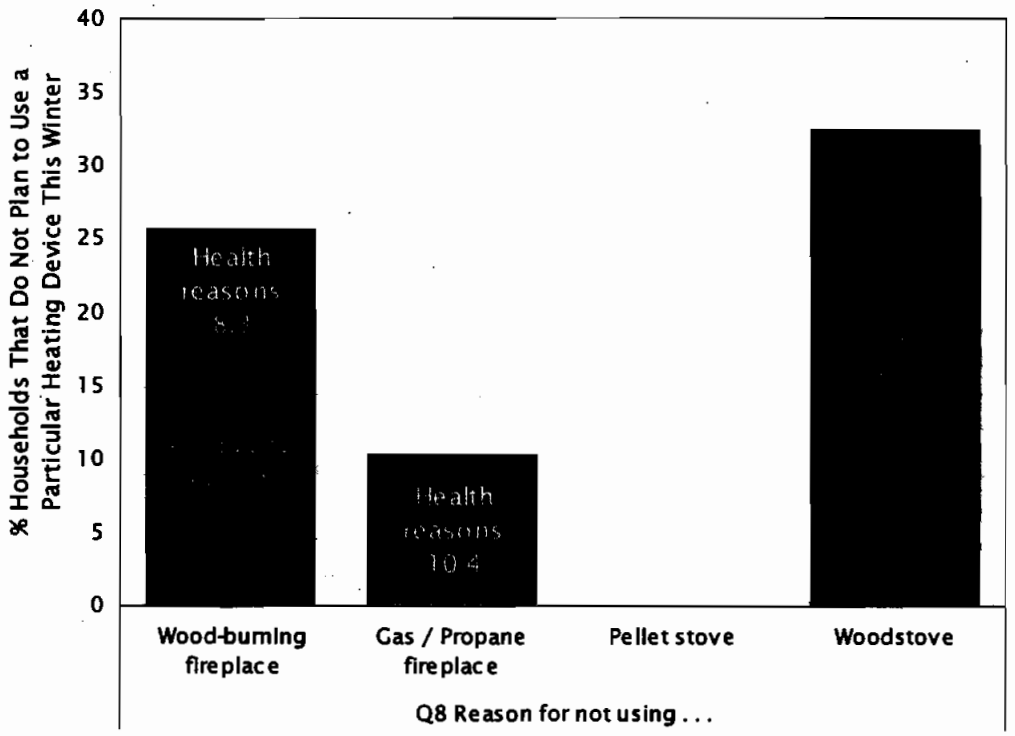
FIGURE 12 WOOD-BURNING DEVICE USAGE THIS WINTER BY COUNTY (N = 988)



Respondents who indicated that they do not expect to use their fireplace, wood stove or pellet stove this winter in Question 7 were next asked to indicate *why* they do not intend to use the device. As shown in Figure 13, approximately 17% of wood-burning fireplace owners who did not intend to use the device this winter offered a reason related to air quality and an additional 8% mentioned a specific health-related reason. Approximately 10% of natural gas/propane fireplace owners mentioned health-related reasons, and one-third (33%) of wood stove owners who did not intend to use their stoves also mentioned air quality as a reason for not using the device this winter. The remaining respondents offered a reason unrelated to air quality or health.

Question 8 *Why do you not expect to use your _____ this winter?*

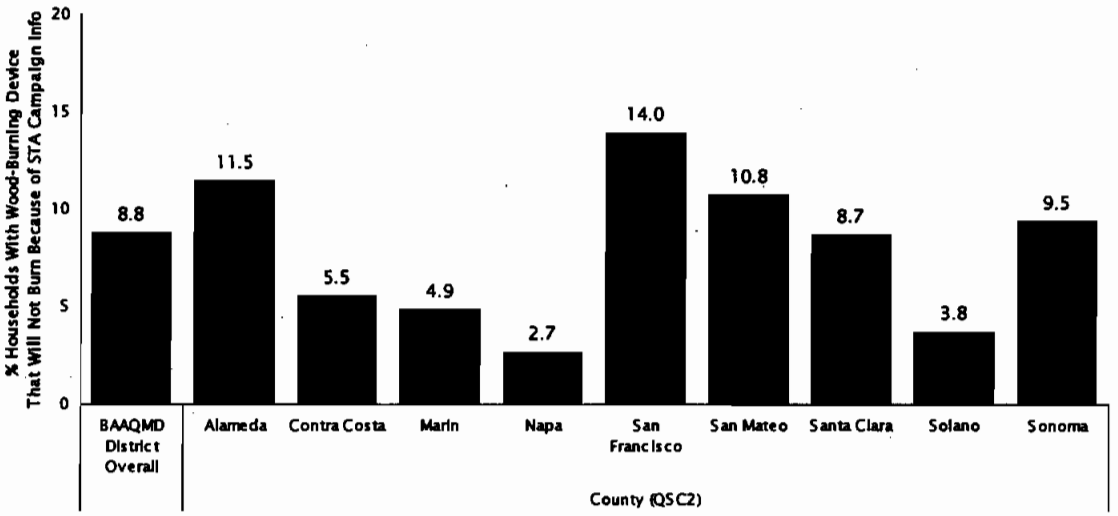
FIGURE 13 REASON FOR NOT USING HEATING DEVICE THIS WINTER (WOOD-BURNING FIREPLACE N = 173; GAS FIREPLACE N = 50; PELLET STOVE N = 10; WOOD STOVE N = 6)



For the interested reader, Figure 14 displays the percentage of households that own a wood-burning fireplace, wood stove or pellet stove and indicated that they will not use the device this winter for reasons that can be attributed to the Spare the Air Tonight campaign.[8] Overall, 9% of households District-wide reported that they would not use their wood-burning heating device at all during the winter due to the campaign. Among the nine member counties, San Francisco had the highest percentage of wood-burning device-owning households that fit this description, whereas Napa had the lowest (3%).

8. That is, they mentioned air quality and/or health-related reasons for not using the wood-burning device this winter *and* they were aware of the Spare the Air Tonight campaign. Note that this figure does not include households that intend to use their wood-burning device, but did refrain from burning wood on at least one occasion due to the campaign (see Figure 32 on page 32 for figure on full campaign impacts).

FIGURE 14 NOT BURNING WOOD THIS WINTER BECAUSE OF SPARE THE AIR TONIGHT CAMPAIGN BY COUNTY (N = 441)



SEASONAL WOOD BURNING BEHAVIOR The next series of questions were only asked of respondents who owned at least one wood-burning fireplace, pellet stove or wood stove *and* indicated that they will burn wood during the 2006-2007 winter months.

The first question (Question 9) asked each respondent how often they expected that they would burn wood this winter—at least once per week or less often? Respondents who indicated that they expected to burn wood less often than once per week were next asked to be more specific as to how often they expected to burn wood—two to three times per month, once per month, or less often than once per month? For respondents who indicated that they expected to burn wood weekly, Question 11 asked how many days they expected to burn wood in a typical winter week. The results to all three questions are combined in Figure 15 on page 20.

Overall, just over half (53%) of respondents indicated that they expected to burn wood on a weekly basis, although most (35%) stated that they would burn wood three days or less per week. Overall, 15% indicated that they expected to burn wood two to three times per month, 15% once per month, and 16% expected to burn wood less often than once per month.

When compared to 2005, there was a statistically significant increase in the percentage of households that indicated they expect to burn an average two days per week, as well as a significant increase in the percentage who expect to burn less than once per month (see Table 1 on page 20).

Question 9 *How often do you expect to burn wood this winter? At least once per week or less often than that?*

Question 10 *Would you say that you will burn wood about two to three times per month, once per month, or less often than once per month?*

Question 11 *In a typical winter week, how many days do you expect to burn wood?*

FIGURE 15 FREQUENCY OF WOOD BURNING THIS WINTER (N = 252)

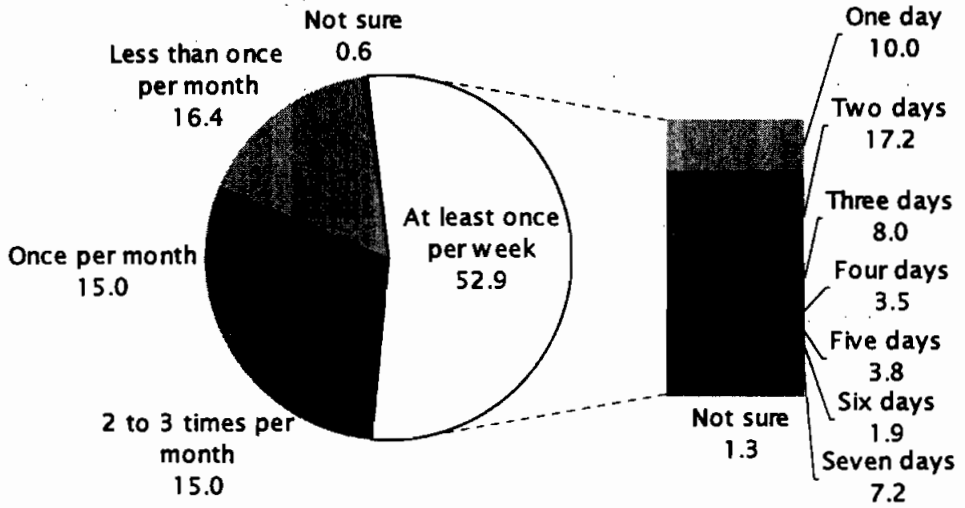


TABLE 1 FREQUENCY OF WOOD BURNING THIS WINTER: 2004 ~ 2006

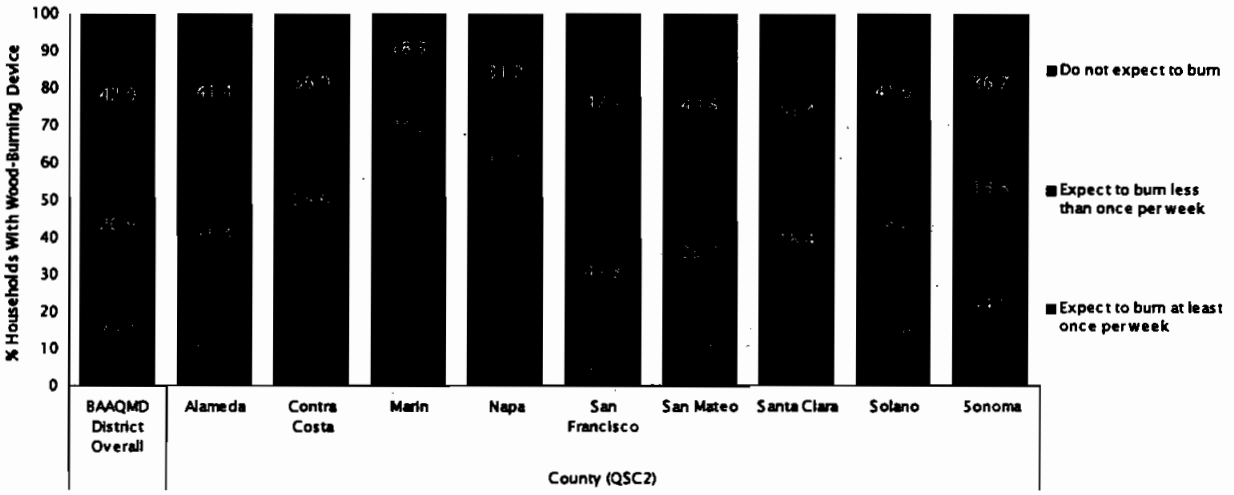
	Study Year		
	2006	2005	2004
At least once per week	52.9%	48.9%	34.2%
One day	10.0%	9.3%	11.2%
Two days	17.2%†	11.5%	5.6%
Three days	8.0%	10.4%	6.1%
Four days	3.5%	4.3%	1.0%
Five days	3.8%	3.2%	2.6%
Six days	1.9%	0.8%	1.5%
Seven days	7.2%	7.2%	6.1%
Not sure # of days	1.3%	2.2%	0.0%
2 to 3 times per month	15.0%	18.5%	28.1%
Once per month	15.0%	17.0%	15.8%
Less than once per month	16.4%†	11.7%	18.4%
Not sure of frequency	0.6%	4.0%	3.6%

† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

Figure 16 provides a useful summary of wood burning behavior among households that own a wood-burning heating device in the District overall, as well as by county. Overall, 30% of households expected to burn wood weekly, 27% expected to burn wood less frequently than once per week, and 43% own a wood-burning heating device but indicated that they do not expect to burn wood this winter. Among the nine member counties, Marin County had the highest percentage of

wood-burning device-owning households that expected to burn wood weekly (58%), whereas San Francisco had the lowest (9%).

FIGURE 16 FREQUENCY OF WOOD BURNING THIS WINTER AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY COUNTY (N = 441)

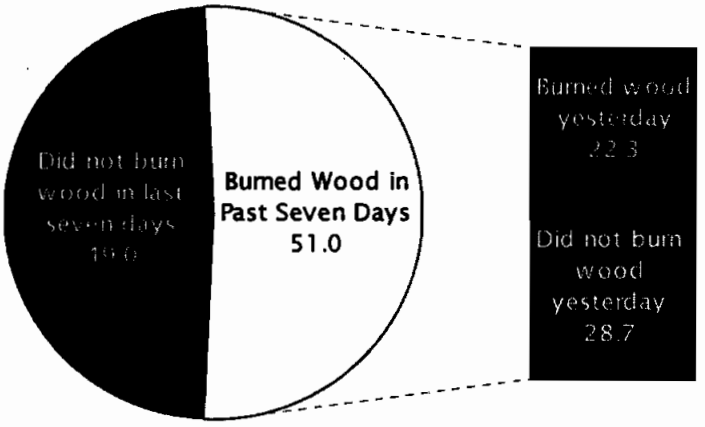


WOOD BURNING BEHAVIOR IN PAST WEEK Respondents were also asked whether they burned wood in the past week and—if yes—if they burned wood the day or evening prior to the interview. The results to these two questions are combined in Figure 17. Fifty-one percent (51%) of respondents whose household includes at least one wood-burning fireplace, pellet stove and/or wood stove *and* expected to burn wood during the winter months indicated that they had burned wood during the week prior to the interview. Moreover, approximately 22% had burned wood the day prior to the interview.

Question 12 *Did you burn wood in the past seven days?*

Question 13 *Did you burn wood yesterday or last night?*

FIGURE 17 BURNED WOOD IN PAST SEVEN DAYS (N = 252)



When compared to the 2005 season, a significantly higher percentage of households reported that they had burned wood in the week prior to the interview, but the percentage who did not burn the day prior also increased significantly and represents a substantially larger proportion of those who burned in the past week. This is likely an indication of the impact of the 2006 Spare the Air Tonight campaign, as the vast majority of the 2006 interviews were conducted the day after a Spare the Air Tonight episode. In 2005, there were no Spare the Air Tonight episodes, whereas there were 30 episodes in 2006.

TABLE 2 BURNED WOOD IN PAST SEVEN DAYS 2004 ~ 2006

	Study Year		
	2006	2005	2004
Burned wood in past seven days	51.0%†	43.0%	32.1%
Burned wood yesterday	22.3%	21.7%	12.8%
Did not burn wood yesterday	28.7%†	21.1%	19.4%
Not sure of burning yesterday	0.0%	0.2%	0.0%
Did not burn wood in last seven days	49.0%†	56.6%	67.3%
Not sure of burning in past seven days	0.0%	0.4%	0.5%

† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

The following two figures show the percentage of wood-burning device-owning households that burned wood in the seven days prior to the interview (Figure 18) and on the day prior to the interview (Figure 19) for the District as a whole, as well as by the nine member counties. Consistent with prior measures of wood burning frequency, Marin and Napa County residents reported the highest rates of wood burning behavior.

FIGURE 18 BURNED WOOD IN PAST SEVEN DAYS AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY COUNTY (N = 441)

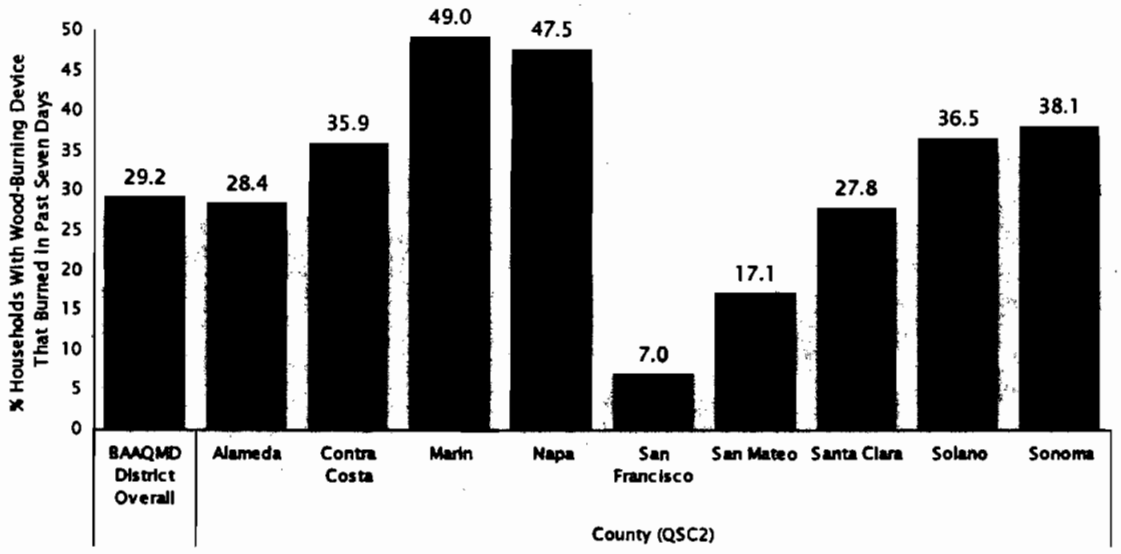
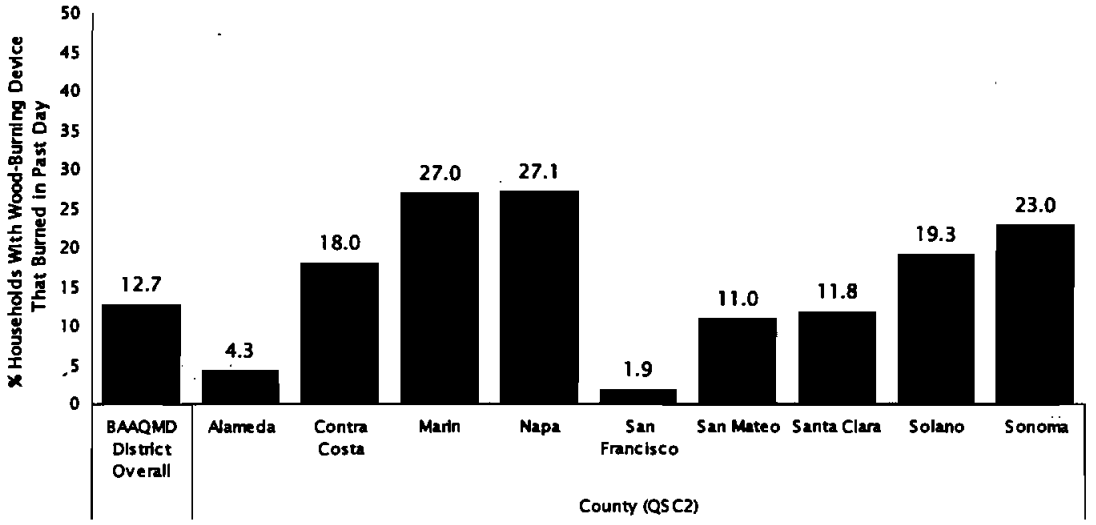


FIGURE 19 BURNED WOOD YESTERDAY AMONG ALL WOOD-BURNING DEVICE HOUSEHOLDS BY COUNTY (N = 441)

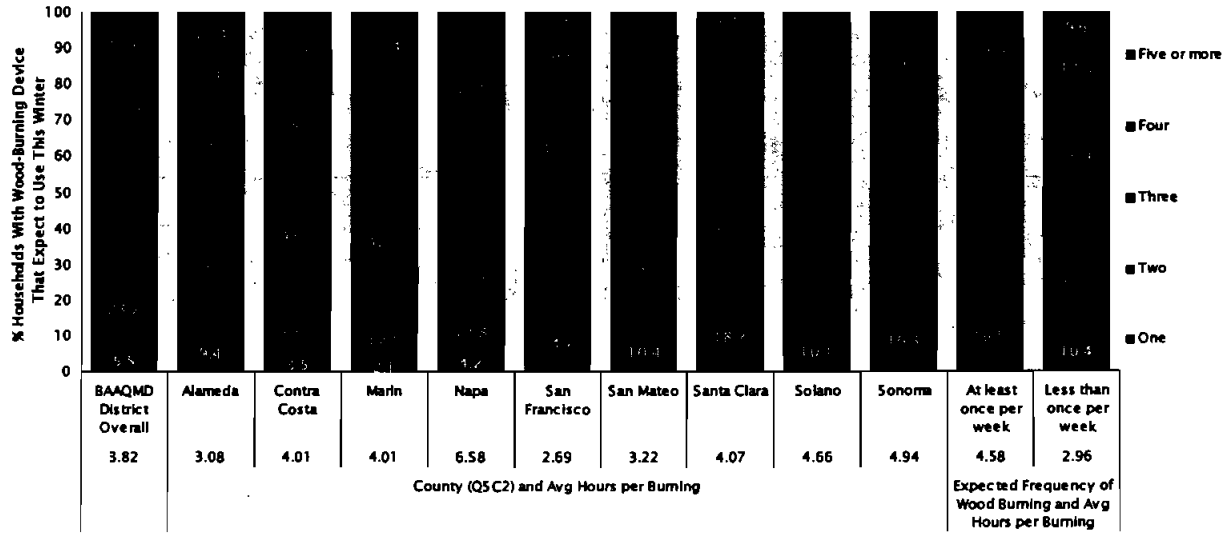


DURATION & VOLUME OF WOOD BURNING

Questions 14 and 15 asked respondents with wood-burning devices who also expected to use the device this winter to estimate the number of hours they have a fire burning—as well as the number of logs they burn—on a typical day that they burn wood. In terms of hours, respondents were rather evenly split between those who burn at least four hours on a typical day (38%), those who burn approximately three hours per day (33%), and those who burn less than three hours (29%). The average duration among all respondents who received this question was 3.82 hours. Among the nine member counties, respondents from Napa County reported the highest average hours burned per burn day at 6.58 hours (Figure 20). Frequent burners also reported a longer duration (4.58 hours) for a typical burn day when compared to those who burn less than once per week (2.96 hours).

Question 14 *In a typical day that you burn wood, how many hours of the day do you have a fire burning?*

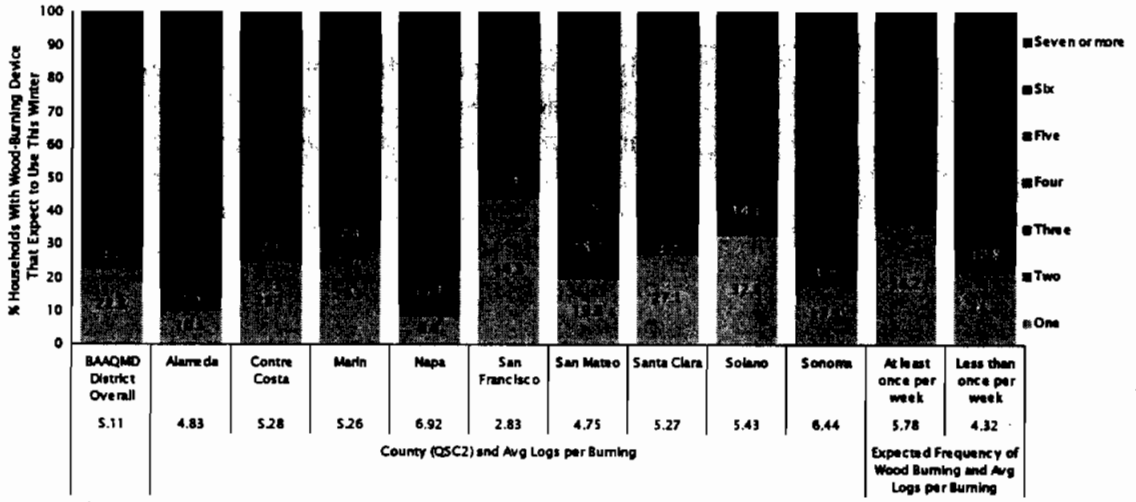
FIGURE 20 DISTRIBUTION AND AVERAGE HOURS OF BURNING IN TYPICAL DAY OF WOOD-BURNING BY COUNTY & EXPECTED FREQUENCY OF WOOD BURNING (N = 252)



In terms of volume, respondents were rather evenly split between those who burn one or two logs per typical burn day (31%), those who estimated that they burn three to five logs (37%), and those who reported burning more than five logs per day (32%). The average number of logs reported per burn day was 5.11 (Figure 21). As shown in Figure 21, counties that reported longer than average burn durations on a typical burn day also tended to report higher than average volumes of logs burned per burn day. Frequent burners also reported a higher number of logs burned (5.78) per burn day when compared to their counterparts (4.32) who burn less frequently than once per week.

Question 15 *In a typical day that you burn wood, how many logs do you burn throughout the entire day?*

FIGURE 21 DISTRIBUTION AND AVERAGE NUMBER OF LOGS BURNED IN TYPICAL DAY OF WOOD-BURNING BY COUNTY & EXPECTED FREQUENCY OF WOOD BURNING (N = 244)



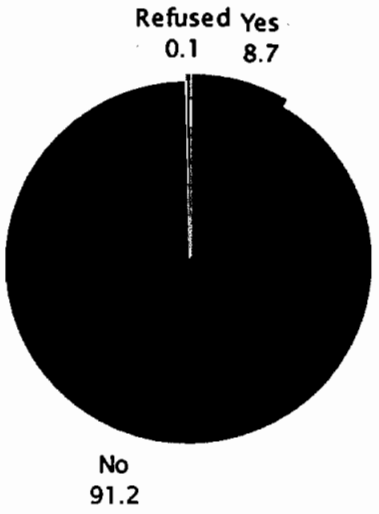
OUTDOOR & OFF-SEASON BURNING

Whereas the bulk of the questions on wood burning focused on indoor wood burning during the winter season, respondents were also asked about their wood burning behavior during non-winter months and in outdoor settings. This line of inquiry was administered to *all* respondents—not just those with a heating device in the home—in order to capture wood burning that occurs at campfires and beaches, in chimineas and at other locations in addition to their home.

OUTDOOR FIREPLACE, FIREPIT OR CHIMINEA The first question in this series simply asked respondents if they possess an outdoor fireplace, firepit or chiminea that they have used to burn wood in the past 12 months. Overall, 9% of respondents answered Question 37 in the affirmative (Figure 22).

Question 37 *Do you have an outdoor fireplace, firepit or chiminea that you've used to burn wood in the past 12 months?*

FIGURE 22 OUTDOOR WOOD-BURNING DEVICE USED IN PAST 12 MONTHS (N = 988)



When compared to their respective counterparts, ownership and use of an outdoor fireplace, firepit or chiminea was most commonly reported by residents in Marin County (Figure 23), those who reside in homes that were built between 11 and 20 years ago, and households that earn between $75,000 and $99,999, or more than $200,000 per year (see Figure 24 on page 26).

FIGURE 23 OUTDOOR WOOD-BURNING DEVICE USED IN PAST 12 MONTHS BY COUNTY (N = 988)

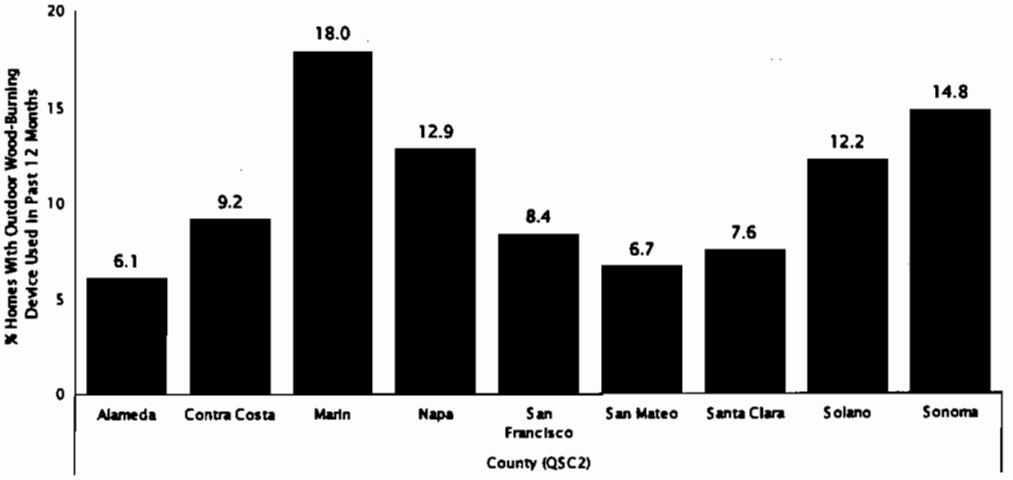
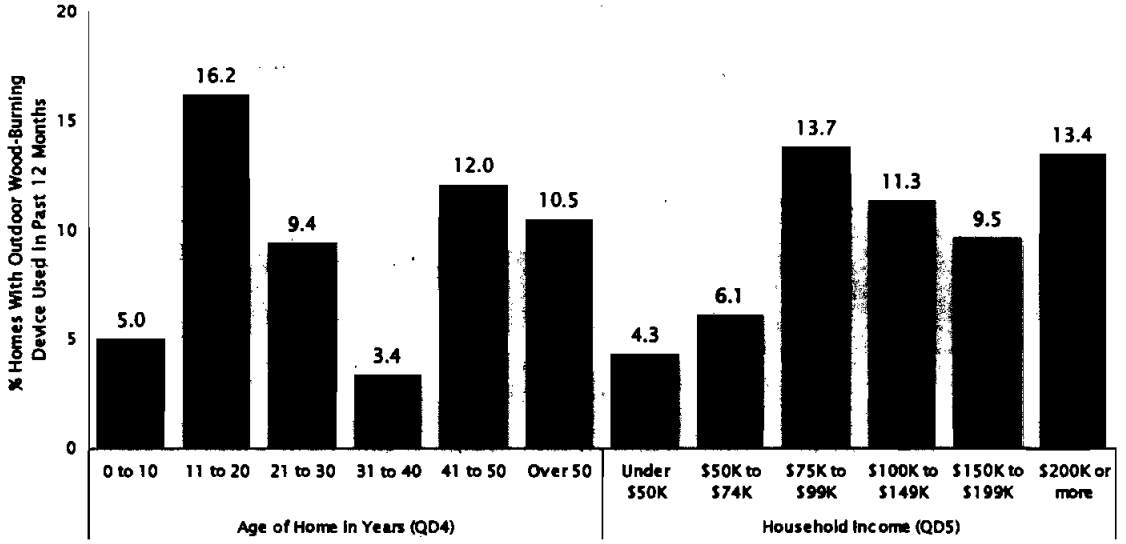


FIGURE 24 OUTDOOR WOOD-BURNING DEVICE USED IN PAST 12 MONTHS BY AGE OF HOME IN YEARS & HOUSEHOLD INCOME (N = 988)



OFF-SEASON BURNING The vast majority of households (85%) reported that they do *not* burn wood in non-winter months. Figure 25 also displays the percentage of respondents that indicated they do burn wood in each non-winter month overall. The percentage of households the burn wood in non-winter months was highest in Sonoma County (22%), and lowest in San Mateo County (7%), as shown in Figure 26 on page 27.

Question 38 *Do you ever burn wood indoors or outdoors in non-winter months, between March and October?*

FIGURE 25 NON-WINTER WOOD BURNING (N = 988)

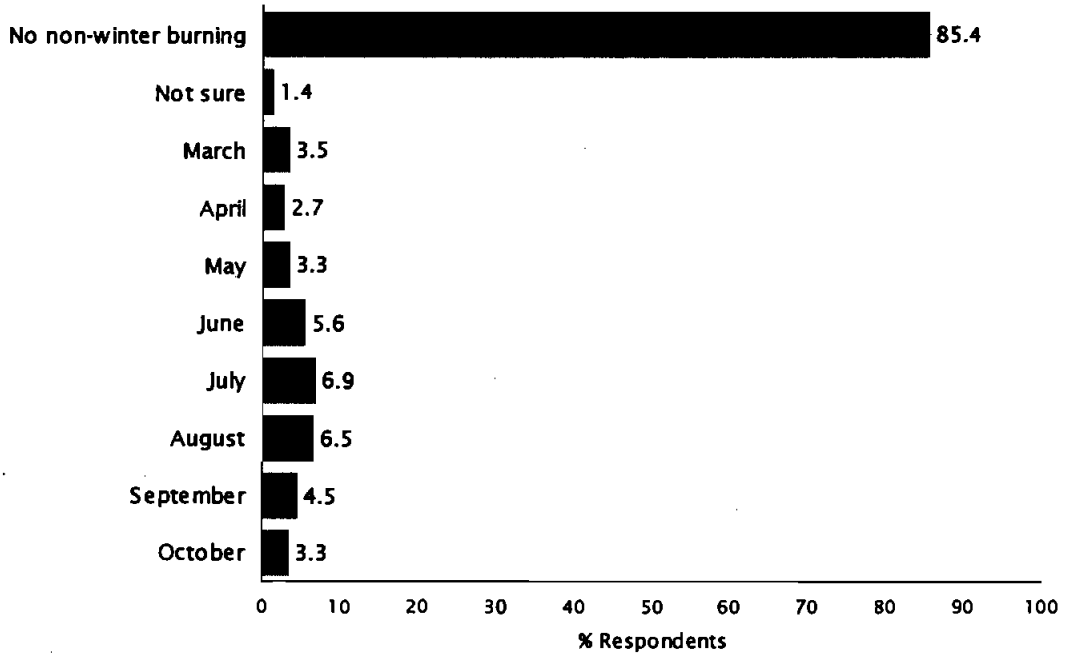
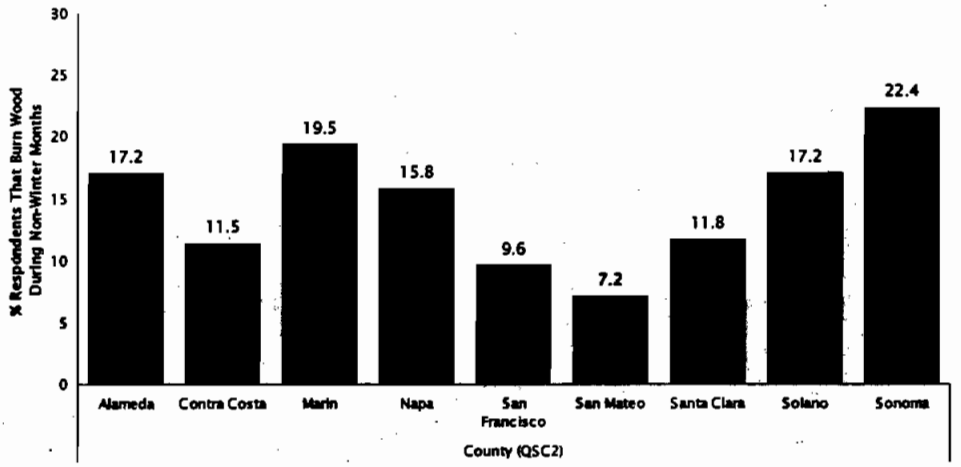


FIGURE 26 NON-WINTER WOOD BURNING BY COUNTY (N = 988)



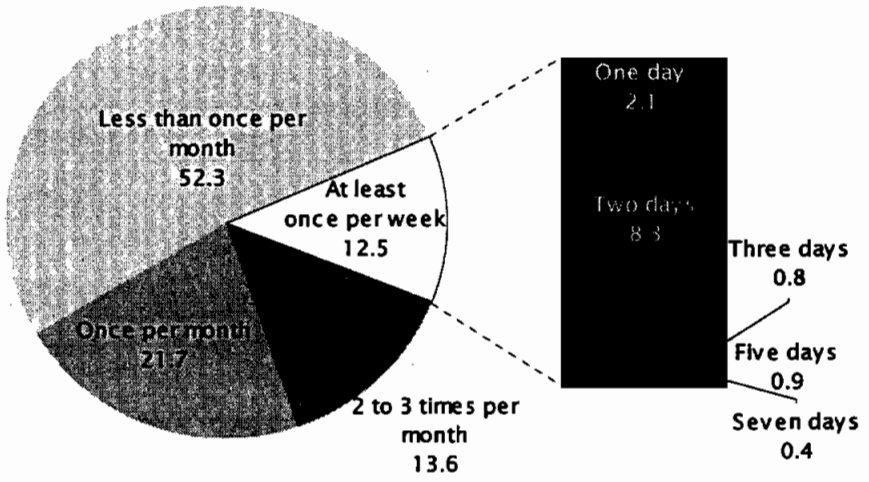
The next series of questions were only asked of respondents who indicated that they burn wood during non-winter months. The first question (Question 39) asked each respondent how often they burn wood in non-winter months—at least once per week or less often? Respondents who indicated that they burn wood less often than once per week were next asked to be more specific as to how often they burn wood in non-winter months—two to three times per month, once per month, or less often than once per month? For respondents who indicated that they burn wood weekly during non-winter months, Question 41 asked how many days they burn wood in a typical non-winter week. The results to all three questions are combined in Figure 27.

Question 39 *How often do you burn wood in non-winter months? At least once per week or less often than that?*

Question 40 *In non-winter months, would you say that you burn wood about two to three times per month, once per month, or less often than once per month?*

Question 41 *In a typical week during non-winter months, how many days do you expect to burn wood?*

FIGURE 27 FREQUENCY OF WOOD BURNING DURING NON-WINTER MONTHS (N = 130)



Among households that reported burning wood in non-winter months, 13% indicated that they burn wood on a weekly basis, although most (10%) of these respondents stated that they would burn wood two days or less per week in non-winter months. Overall, 14% indicated that they burn wood two to three times per month, 22% once per month, and 52% burn wood less often than once per month in the off-season.

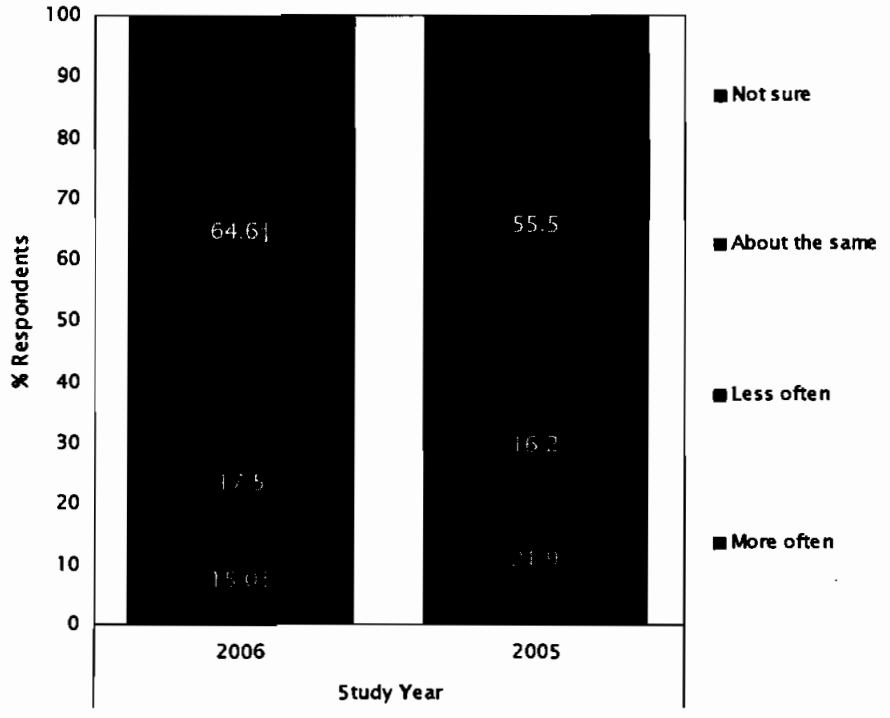
CHANGES IN WOOD BURNING BEHAVIOR

Having measured respondents' basic wood burning behavior, the survey next focused on whether respondents had made changes in their wood burning behavior during the 2006-2007 winter season in response to the Spare the Air Tonight campaign or other factors such as the higher cost of natural gas and propane this season.

SEASONAL CHANGES IN WOOD BURNING BEHAVIOR The first question in this series simply asked the respondent if they expected that they would burn wood more frequently, less frequently, or at about the same frequency as the prior winter season. Overall, 65% of households that own a wood-burning heating device and expected to burn wood this season reported that they anticipated burning wood at about the same frequency this season as last (Figure 28), which is a significant increase when compared to the 2005 results. Approximately 18% expected to burn less often this season, whereas 15% expected to burn more frequently. The percentage that expected to burn more frequently also decreased significantly when compared to 2005. Among the nine member counties, Contra Costa contained the highest proportion of households that expected to burn more frequently this season, whereas San Francisco contained the largest percentage who expected to burn less frequently (see Figure 29 on page 30).

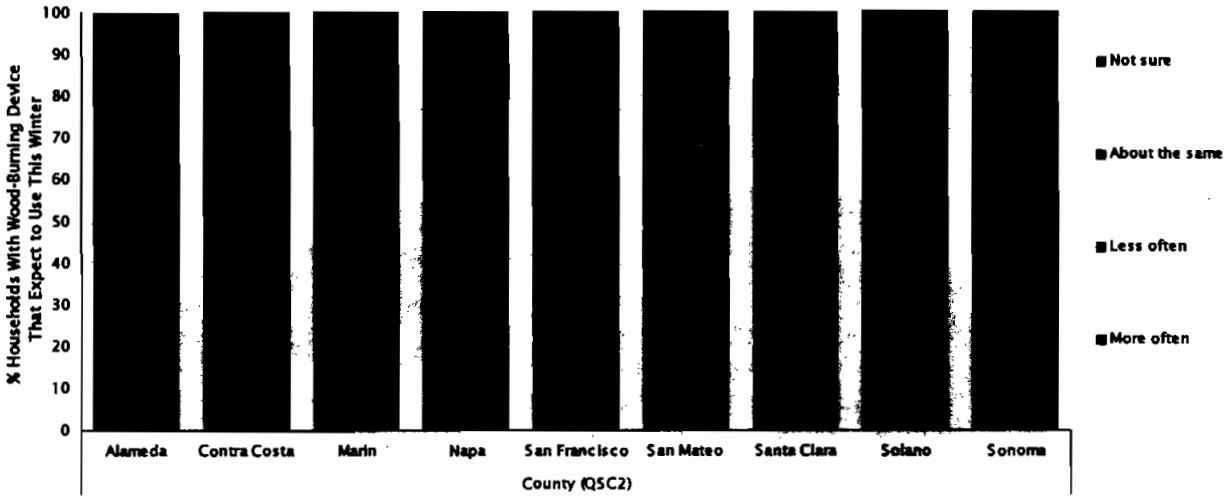
Question 16 *This winter, do you expect that you will burn wood more often, less often, or about the same frequency as you did last winter?*

FIGURE 28 EXPECTED FREQUENCY OF WOOD BURNING THIS WINTER COMPARED TO LAST WINTER: 2005 ~ 2006 (N = 252)



† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

FIGURE 29 EXPECTED FREQUENCY OF WOOD BURNING THIS WINTER COMPARED TO LAST WINTER BY COUNTY (N = 252)



EPISODIC CHANGES IN WOOD BURNING BEHAVIOR Households that burned wood this winter (or anticipated doing so) were next asked whether there were occasions when they normally would have burned wood, but refrained from doing so. For those who answered in the affirmative, the survey next asked in an open-ended manner *why* they decided not to burn wood on these occasions.

The manner in which these questions were asked, as well as their placement in the survey relative to specific questions about the Spare the Air Tonight Campaign, was changed in 2004 from prior surveys. Previous surveys first introduced the Spare the Air Tonight Program and then asked if individuals responded to the Program by reducing the amount of wood they burned. Asking the question in this manner is likely to prompt a *socially desirable* response from some respondents that they had reduced their wood burning even if they had not—which leads to artificially high estimates of the campaign's impact. To more accurately measure reductions in wood burning that can be attributed to the campaign, the 2004, 2005 and 2006 surveys employed an indirect approach similar to that used in the CARB/EPA Method for estimating reductions in driving due to the summer Spare the Air Campaign.

As shown in Figure 30, 37% of respondents who have a wood-burning fireplace, wood stove and/or pellet stove *and* expected to burn wood during the 2006-2007 winter season indicated that—on at least one occasion—they refrained from burning wood. When asked *why* they chose not to burn wood on these occasions, 10% specifically mentioned the Spare the Air campaign and an additional 6% offered an air quality or health-related reason.[9] For the interested reader, the proportion of respondents who mentioned the campaign or air quality and/or health reasons as a reason for not burning wood at least once this winter is shown by county in Figure 31 on page 31.

9. Among those who refrained from burning wood due to Spare the Air Tonight, air quality and/or health-related reasons, the average number of occasions they refrained from burning wood during the season prior to taking the interview was 3.92.

Question 17 *Were there occasions this winter when you normally would have burned wood, but decided not to?*

Question 18 *Why did you decide not to burn wood on these occasions?*

FIGURE 30 CHOSE NOT TO BURN THIS WINTER (N = 252)

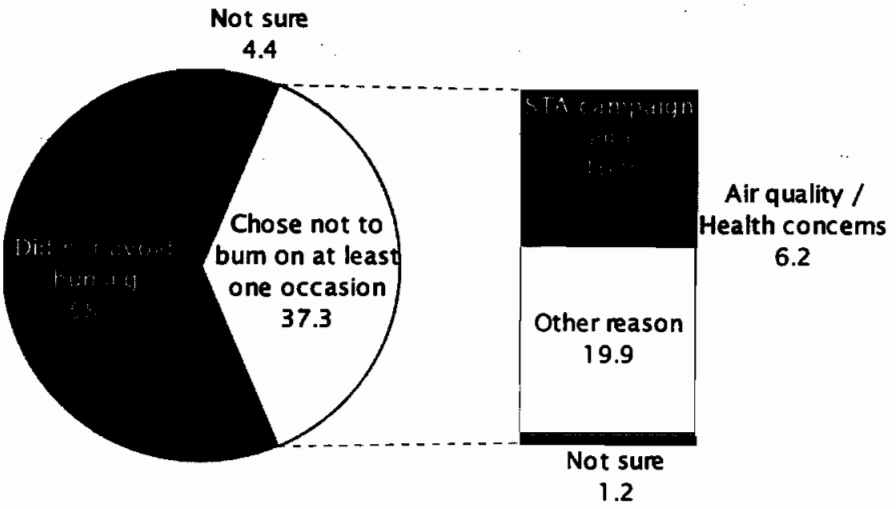
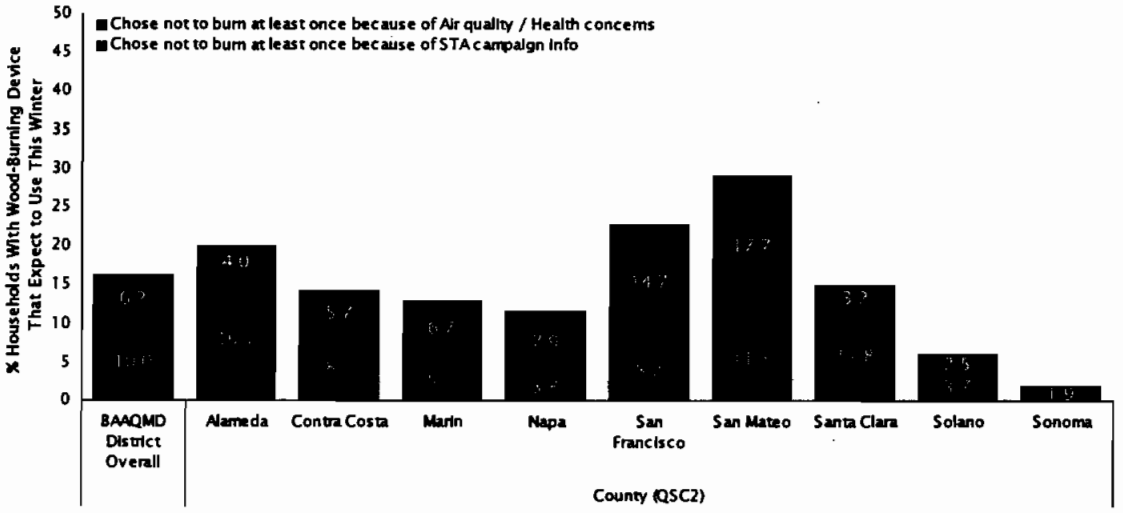


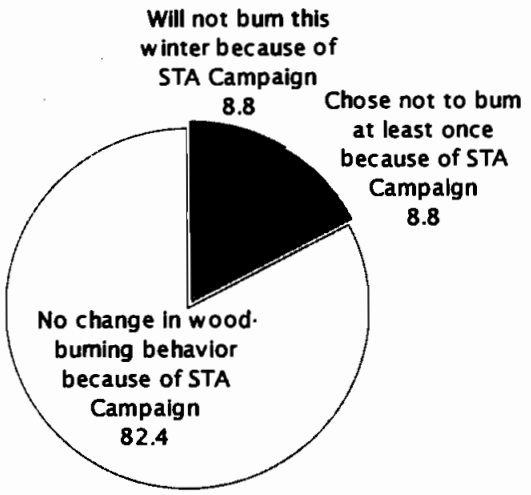
FIGURE 31 CHOSE NOT TO BURN THIS WINTER BECAUSE OF SPARE THE AIR TONIGHT CAMPAIGN INFO OR AIR QUALITY / HEALTH CONCERNS BY COUNTY (N = 252)



CAMPAIGN IMPACTS ON WOOD BURNING To estimate the proportion of adults in the District who reduced the amount of wood that they burned during the winter season in response to the campaign, one must combine the responses from several questions in the survey. Naturally, respondents who do not live in a household that contains a wood-burning fireplace, wood stove or pellet stove (Question 1) should not be included in the analysis since they could not respond to the campaign by reducing their wood burning behavior. Respondents who

chose not to burn wood *at all* during the winter (Question 7), did so because of air quality or health related reasons (Question 8), *and* were aware of the Spare the Air Tonight Program (Question 34) can be considered a Spare the Air (STA) reducer. So too can respondents who indicated that although they did burn wood, they refrained from doing so on occasion (Question 17), did so because of the campaign and/or for air quality/health reasons (Question 18), *and* were aware of the Spare the Air Tonight Program (Question 34).

FIGURE 32 SPARE THE AIR REDUCERS (N = 441)



Among all households with a wood-burning fireplace, pellet stove or wood stove, nearly 9% chose not to burn *at all* during the winter season because of the Spare the Air Tonight campaign, and an additional 9% refrained from burning on at least one occasion for the same reason. Collectively, the Spare the Air Tonight campaign influenced nearly 18% of households to reduce their wood burning during the 2006-2007 winter season (Figure 32).

Table 3 shows that of the 441 respondents in the survey who were eligible to respond to the campaign, 78 (17.6%) reduced their wood burning behavior on at least one occasion during the 2006-2007 winter in response to the Spare the Air Tonight Program.[10] This represents 273,090 households out of the estimated 1,094,466 households with a wood-burning heating device. In terms of the reliability of the estimate, we can be 95% confident that the actual proportion of Spare the Air Tonight reducer households this season was between 14.01% and 21.11%.

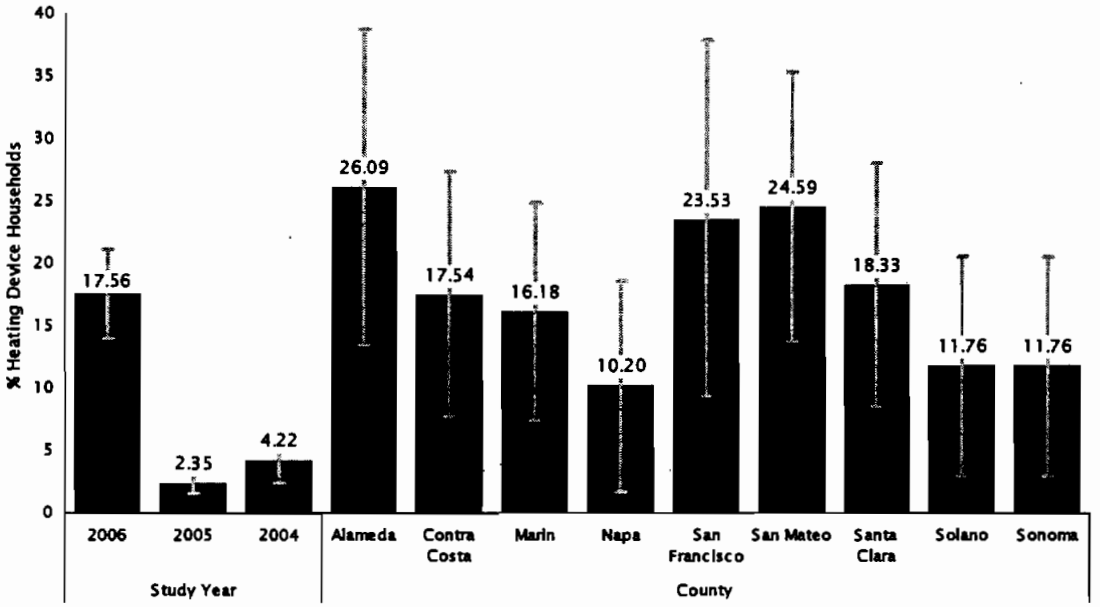
TABLE 3 SPARE THE AIR REDUCERS: CONFIDENCE INTERVAL

Winter Spare the Air Tonight Reducers		
Universe Estimate (households with heating device)		1,094,466
Sample Size (surveyed households with heating device)		441
STA Reducers		78
Non-STA Reducers		364
Proportion of STA Reducers		17.56%
Proportion of Non-STA Reducers		82.44%
Maximum Margin of Error (95% confidence)		3.55%
Confidence Interval for Proportion of	Lower Bound	14.01%
Winter STA Reducers	Upper Bound	21.11%

10. The survey included a follow-up question (Question 19) which asked respondents who refrained from burning wood for campaign-related reasons (Question 18) how many times they refrained from burning wood for air quality or health-related reasons during the winter season. The average response was 3.92 times, although the small sample size for this question means that the statistical margins of error around the estimate are large. Moreover, respondents who did not burn wood at all during the winter were not asked this question, so the figure represents the average reduction among individuals who normally burn wood.

Figure 33 displays the estimated percentage of wood-burning fireplace, wood stove and pellet stove owning households that reduced their wood burning on at least one occasion due to the Spare the Air Tonight Program by study year (2006, 2005 and 2004), as well as by county for 2006. For reference, the confidence intervals are also shown to provide a sense for the reliability of the estimates.[11] The most striking result in the figure is the dramatically larger impact that the Spare the Air Tonight campaign had in 2006 when compared to the prior two years. Whereas 2.35% and 4.22% of eligible households reduced their wood burning in response to the campaign in 2005 and 2004, respectively, the corresponding value in 2006 was 17.6%—an increase of over 15% in the past year.

FIGURE 33 SPARE THE AIR REDUCERS BY STUDY YEAR & COUNTY SHOWING CONFIDENCE INTERVALS (N = 441)



11.The confidence intervals indicate the range within which one can be 95% confident that the true value exists.

RECALL AND AWARENESS OF SPARE THE AIR TONIGHT MESSAGING

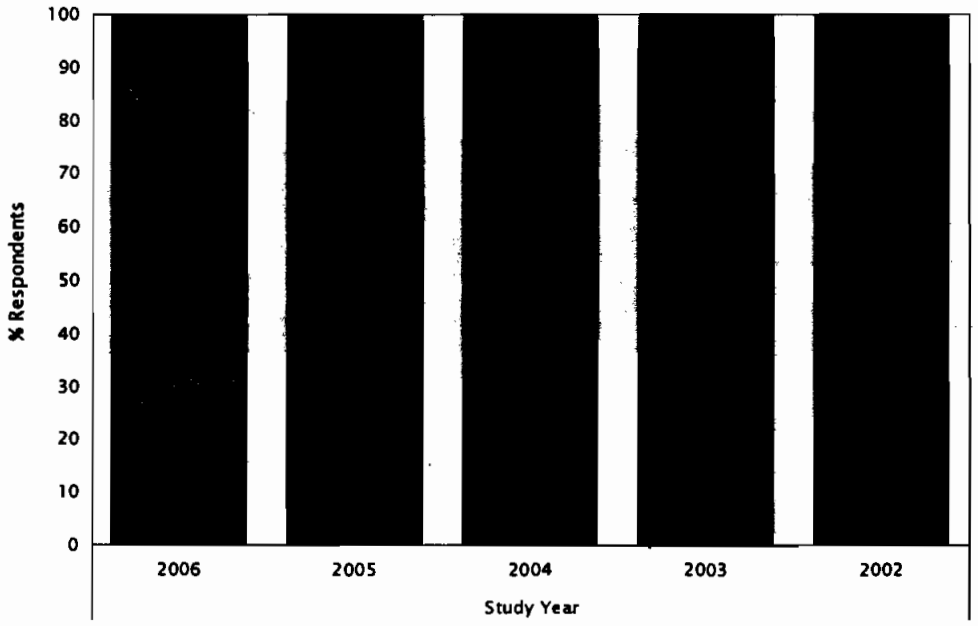
Although the ultimate goal of the Spare the Air Tonight Campaign is to persuade individuals to reduce the amount of wood that they burn and to replace wood-burning devices with cleaner alternatives, there are a series of related objectives which must be met in order for this to occur. For example, regardless of how compelling the message may be, if the message does not reach the target audience then the campaign can not succeed in its primary goal. Thus, an instrumental objective of the campaign is to simply increase awareness of the Spare the Air Tonight Program and related events.

RECALL EXPOSURE TO SPARE THE AIR MESSAGING Accordingly, a series of questions was asked of respondents about their recall of Spare the Air Tonight messaging. The first of these questions asked: *During this winter, have you heard, read, or seen any new stories, advertisements or public service announcements about Spare the Air Tonight, poor air quality, or requests not to use your fireplace, pellet stove or wood stove?*

Figure 34 presents the results to this question for the study years 2002 through 2006. In 2006, 56% of respondents recalled being exposed to news stories, advertisements or public service announcements related to the Spare the Air Tonight Program during the winter months. Recalled exposure was significantly higher in 2006 when compared to recent prior winters, which is likely a reflection of the greater number of Spare the Air Tonight episodes this season.

Question 20 *During this winter, have you heard, read, or seen any news stories, advertisements, or public service announcements about Spare the Air Tonight, poor air quality, or requests not to use your fireplace, pellet stove, or wood stove?*

FIGURE 34 ENCOUNTERED SPARE THE AIR TONIGHT INFORMATION: 2002 ~ 2006 (N = 988)



† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

For the interested reader, Figures 35 and 36 display the percentage of respondents who recalled being exposed to news stories, advertisements or public service announcements related to the Spare the Air Tonight Program during the winter months by county, gender, age and household income. When compared to their respective counterparts, those who reside in Marin County, females, those 55 years of age or older, and those who enjoy annual family incomes of $100,000 to $149,999 were the most likely to recall being exposed to the Spare the Air Tonight Program.

FIGURE 35 ENCOUNTERED SPARE THE AIR TONIGHT INFORMATION BY COUNTY (N = 988)

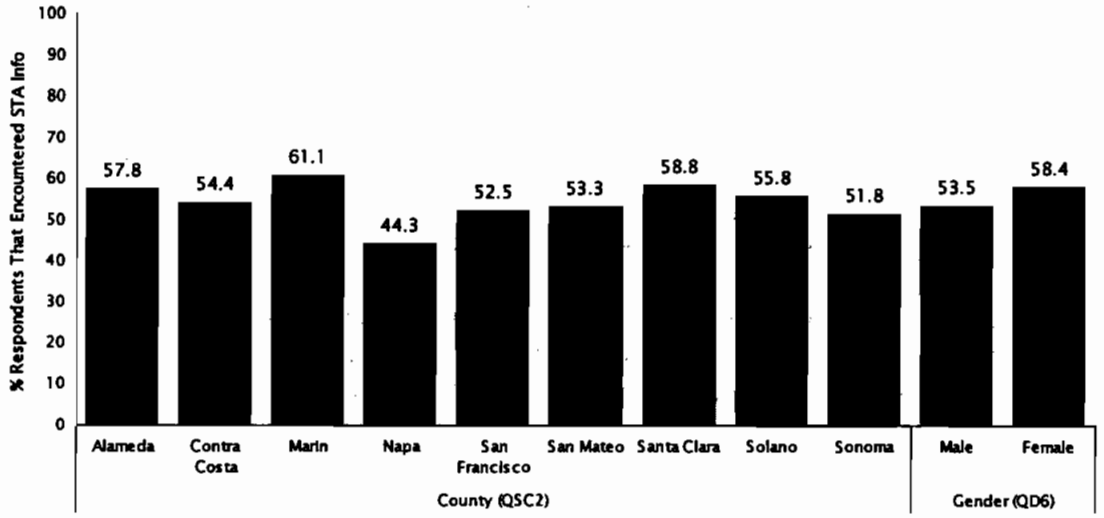
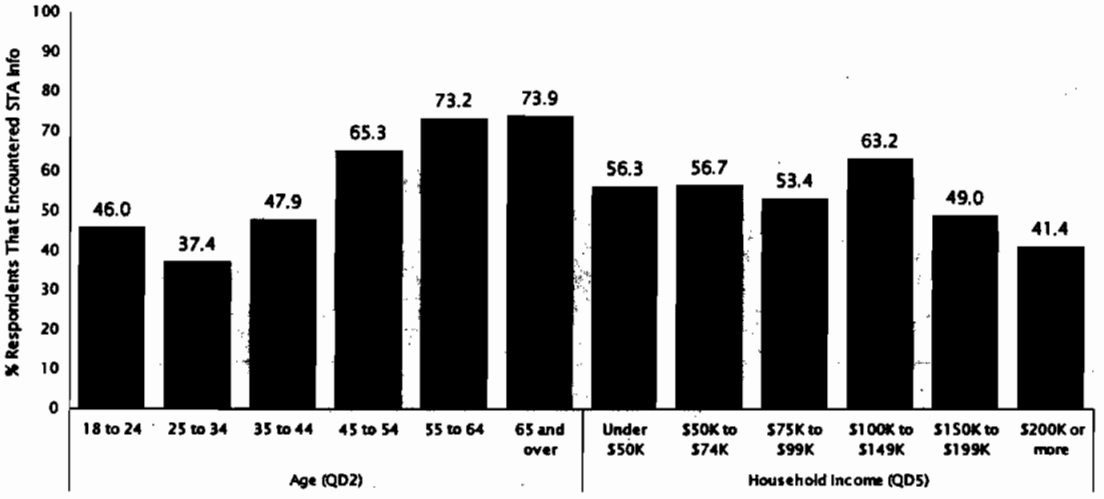


FIGURE 36 ENCOUNTERED SPARE THE AIR TONIGHT INFORMATION BY AGE & HOUSEHOLD INCOME (N = 988)

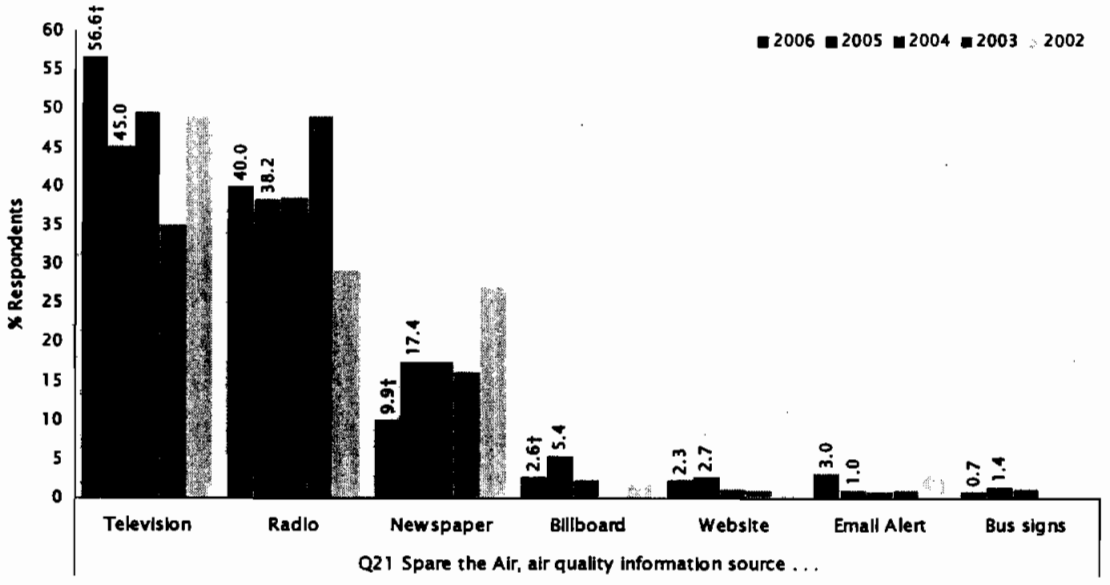


INFORMATION SOURCE Those who indicated that they recalled hearing, reading, or seeing Spare the Air Tonight related information during the winter were next asked where they obtained the information. Multiple responses to the question were allowed, so the percentages shown in Figure 37 represent the percentage of respondents who mentioned a particular source and thus add to more than 100%. Because this question was asked in an identical manner in past surveys dating back to 2002, the results from these surveys are also included in Figure 37 for comparison.

As in the previous surveys, the most popular methods of obtaining information related to Spare the Air Tonight and air quality during the winter of 2006-2007 were television (57%) and radio (40%). Within these two sources, however, the trend toward a greater reliance on television continued as there was a statistically significant increase in the proportion of respondents who cited television as their source for Spare the Air Tonight related messages. Newspapers, meanwhile, declined significantly as a source for air quality messages, from 17% in 2005 to 10% in 2006. No other single sources were mentioned by at least 10% of respondents, respectively.

Question 21 *Where did you see or hear the news story, advertisement or public service announcement?*

FIGURE 37 SOURCE FOR SPARE THE AIR TONIGHT INFORMATION: 2002 ~ 2006 (N = 552)



AWARE OF SPARE THE AIR DAY The final question in this series asked all respondents who received the interview on the day after a Spare the Air Tonight episode if, prior to taking the survey, they were aware that a Spare the Air Tonight advisory had been issued the day before. As shown below in Figure 38 on page 37, 16% of respondents answered this question in the affirmative. When compared to their respective counterparts, awareness was highest among Marin County residents, females, seniors, and individuals whose households earn between $75,000 and $99,999 annually (see Figures 39 and 40).

Question 22 *Prior to taking this survey, were you aware that there was a "Spare the Air Tonight" advisory yesterday?*

FIGURE 38 AWARE OF SPARE THE AIR TONIGHT ADVISORY (N = 762)

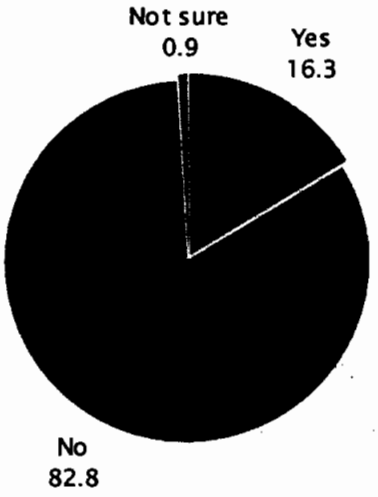


FIGURE 39 AWARE OF SPARE THE AIR TONIGHT ADVISORY BY COUNTY & GENDER (N = 762)

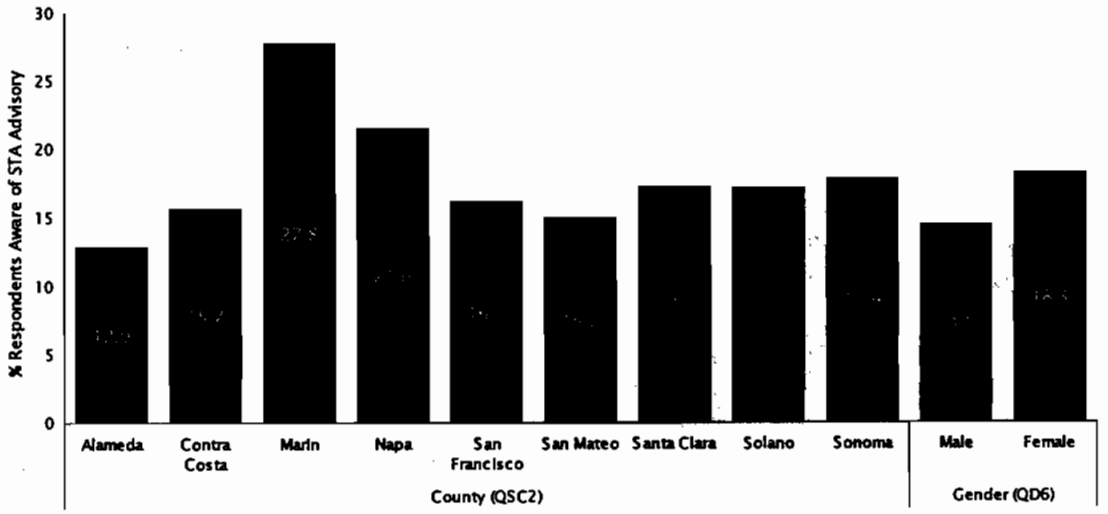
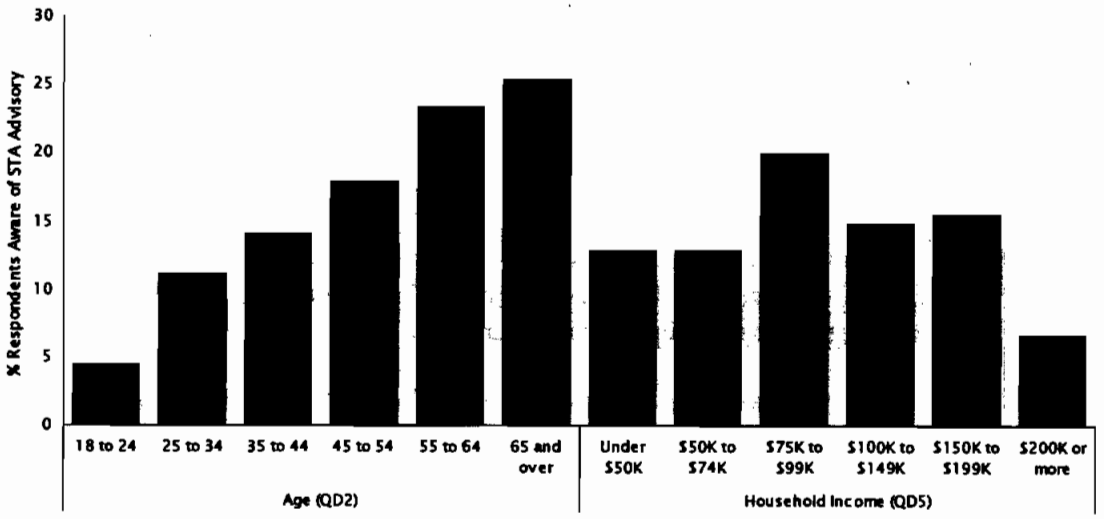


FIGURE 40 AWARE OF SPARE THE AIR TONIGHT ADVISORY BY AGE & HOUSEHOLD INCOME (N = 762)



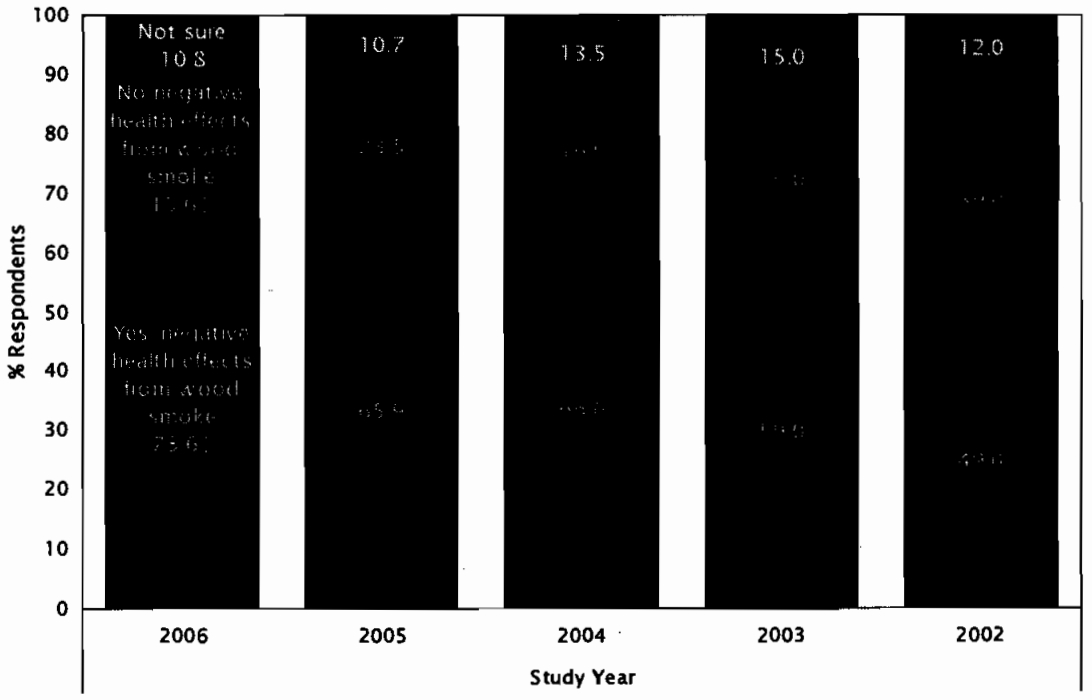
ATTITUDES ABOUT WOOD SMOKE

In addition to changing wood burning behavior, one of the goals of the Spare the Air Tonight Program is to change how residents think about wood smoke and its impact on public health. To track how effective the Program has been in achieving this goal, the survey included several measures of residents' opinions and perceptions about wood smoke.

The first of these questions simply asked the respondent whether they think there are any negative health effects associated with breathing wood smoke. As shown in Figure 41, approximately three-quarters (74%) of adults in the Bay Area do perceive wood smoke to have negative health impacts. Moreover, public opinion on this matter has changed substantially in the past five years—in part due to the Spare the Air Tonight Program. The proportion of adults that perceive wood smoke to have negative health impacts has increased by nearly 25% since 2002.

Question 23 *Do you think there are any negative health effects associated with breathing wood smoke?*

FIGURE 41 PERCEIVE NEGATIVE HEALTH EFFECTS ASSOCIATED WITH WOOD SMOKE BY STUDY YEAR (N = 988)



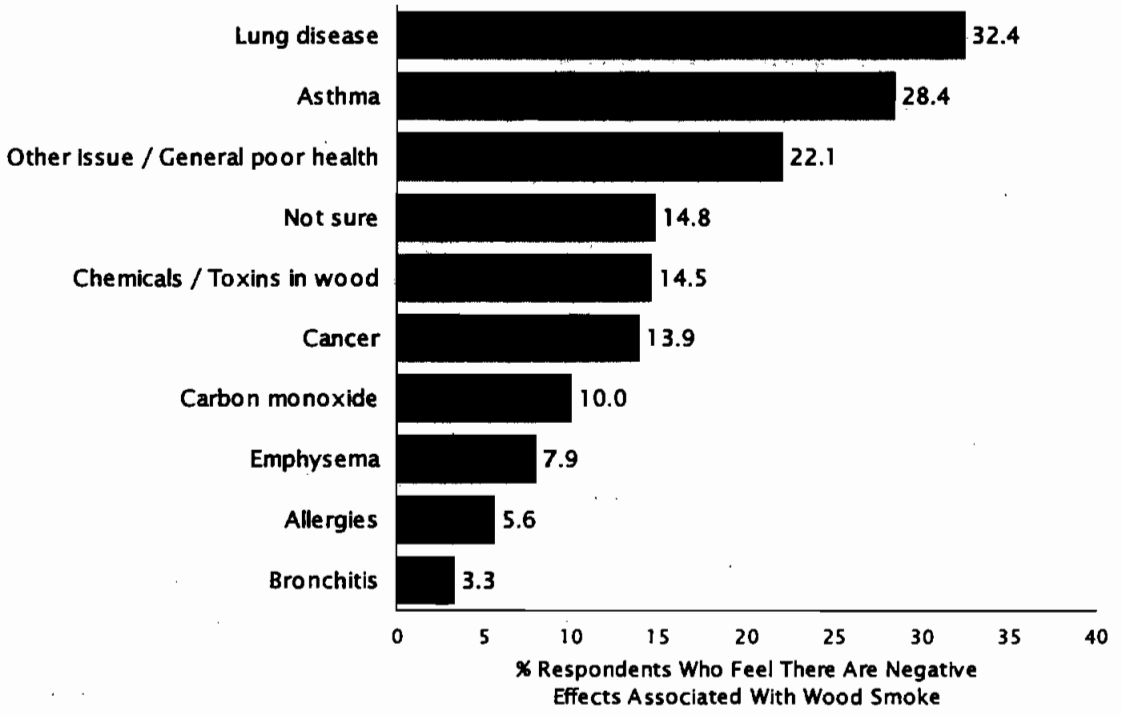
† Statistically significant change ($p < 0.05$) between the 2005 and 2006 studies

Respondents who perceived wood smoke to have negative health impacts (Question 23) were next asked to identify what the specific health effects are of breathing wood smoke. This question was asked in an open-ended manner which allowed respondents to mention any health impact that came to mind without being prompted by—or restricted to—a particular list of options. Multiple responses were also allowed for this question, so the percentages shown in Figure 42 represent the percentage of respondents who mentioned a particular health effect. The most common response (32%) was a general reference to lung disease, followed by a spe-

cific reference to asthma (28%). Approximately 22% of respondents mentioned some other general health impact, and 15% mentioned properties of wood—chemicals, carcinogens and toxins—that are released when burned. Overall, 15% of those who perceived that wood smoke had negative health impacts could not name a specific impact.

Question 24 *What are the negative health effects associated with breathing wood smoke?*

FIGURE 42 PERCEIVED NEGATIVE HEALTH EFFECTS ASSOCIATED WITH WOOD SMOKE (N = 728)



WOOD SMOKE A NEIGHBORHOOD PROBLEM? Most adults recognize that there are negative health impacts due to wood smoke. But do they think that *their* neighborhood has a wood smoke problem? To answer this question, the survey first informed respondents that different neighborhoods in the Bay Area experience different levels of air pollution from wood smoke. Respondents were then asked to indicate whether, in their opinion, their neighborhood periodically experiences air pollution from wood smoke. Those who perceived their neighborhood to have an occasional wood smoke problem were asked in a follow-up question to identify the magnitude of the problem. The answers to both of these questions are combined in Figure 43 on page 41.

Overall, nearly one-quarter (24%) of adults surveyed indicated that their neighborhood periodically experiences air pollution from wood smoke. Fourteen percent (14%) stated that the problem was a small one, 7% indicated it was a moderate or medium problem, and 3% felt that air pollution due to wood smoke was a big problem in their neighborhood. When compared to 2005, the proportion of respondents who perceived that their neighborhood has a big or moderate wood smoke problem increased significantly, whereas the proportion who perceived that their neigh-

borhood does not have a wood smoke problem diminished significantly (see Figure 44). Residents in Contra Costa County and San Mateo County were the most likely to perceive that their neighborhood has a wood smoke problem in 2006-2007.

Question 25 *Different neighborhoods in the Bay Area experience different levels of air pollution from wood smoke. In your opinion, does your neighborhood periodically experience air pollution from wood smoke?*

Question 26 *Would you say that periodic air pollution from wood smoke in your neighborhood is a big problem, medium problem, or a small problem?*

FIGURE 43 PERCEPTION OF PERIODIC WOOD SMOKE PROBLEM IN NEIGHBORHOOD (N = 988)

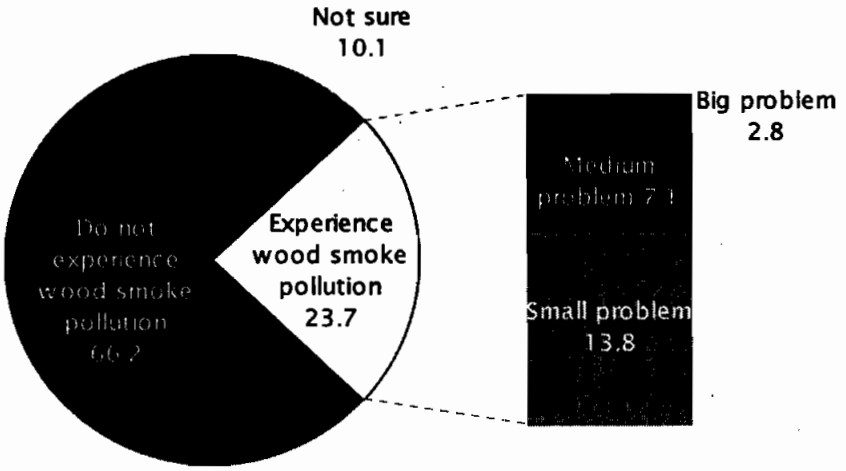
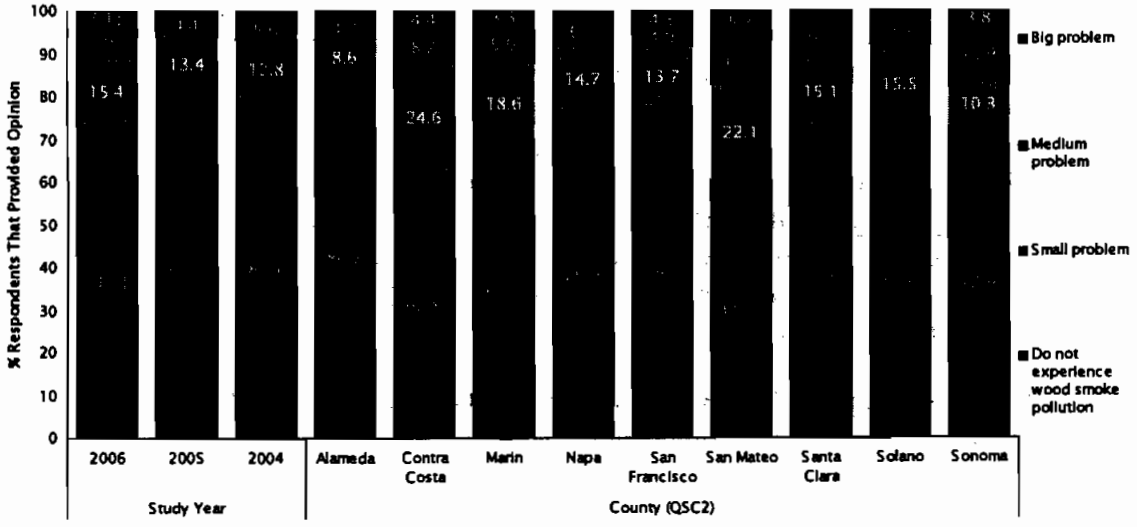


FIGURE 44 PERCEPTION OF PERIODIC WOOD SMOKE PROBLEM IN NEIGHBORHOOD BY STUDY YEAR & COUNTY (N = 988)



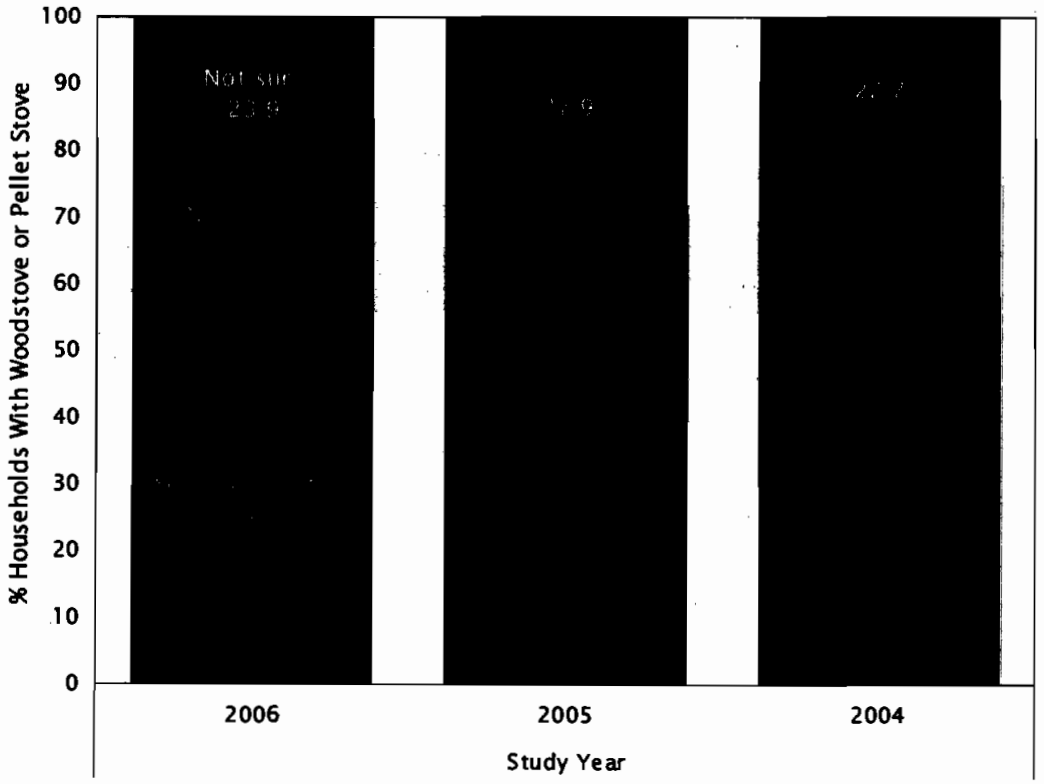
CHANGING HEATING DEVICES

Reducing the amount of air pollution caused by wood burning is the ultimate goal of the Spare the Air Tonight Program. Toward this end, the Program adopts both direct and indirect strategies. Direct strategies encourage individuals to simply not use their fireplace, wood stove or pellet stove—or to use it less frequently. For respondents who depend on their fireplace or stove for heat, however, this strategy may not be practical or effective. For these and other individuals, the Program also employs strategies to reduce wood smoke pollutants indirectly—that is, by changing the type of fuel burned and/or the efficiency of the heating device, rather than the frequency of burning.

To understand the potential impact that these indirect strategies may have on air pollution from wood smoke, the first task is to develop a profile of the specific type of heating devices that are owned by Bay Area residents. In addition to understanding the *number* of fireplaces, wood stoves and pellet stoves that are owned by respondents (see *Heating Devices* on page 10) and the type of fuel that they burn (see *Fuel Type & Source* on page 12), respondents with wood stoves or pellet stoves were also asked to identify whether their stove is EPA certified. Figure 45 shows that in 2006 most respondents (54%) thought that their stove was EPA certified, whereas 22% indicated that it was not and 24% were unsure. The 2004 and 2005 results are also shown in Figure 45 for comparison.

Question 27 *Is your wood stove or pellet stove EPA certified?*

FIGURE 45 WOOD STOVE OR PELLET STOVE EPA CERTIFIED: 2004 ~ 2006 (N = 68)

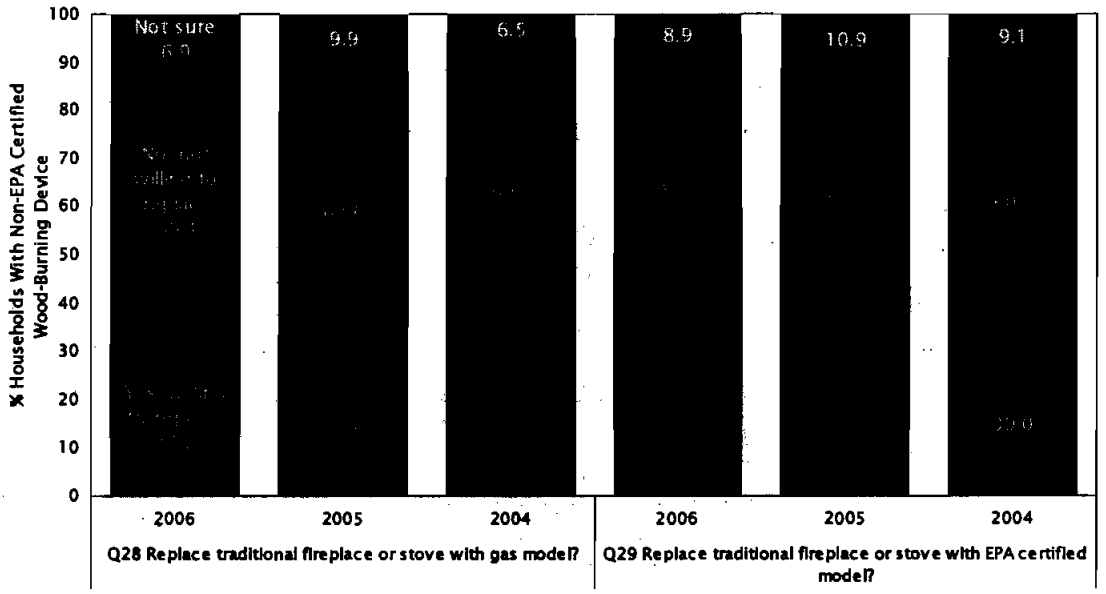


WILLINGNESS TO CHANGE HEATING DEVICE For respondents who owned a wood-burning fireplace and/or a non-EPA certified wood stove or pellet stove, the survey next inquired as to whether the respondent would be willing to replace their current device with a gas fireplace (Question 28) or EPA certified wood stove or pellet stove (Question 29) that would burn much cleaner and be less polluting. The responses to both of these questions are presented in Figure 46. Overall, 33% of respondents in 2006 were willing to replace their current device with a gas fireplace, whereas a slightly higher percentage (38%) were willing to replace their device with an EPA certified wood stove or pellet stove. The results are statistically similar to those found in 2005.

Question 28 *Gas fireplaces and EPA certified wood stoves, inserts or pellet stoves burn much cleaner and are less polluting than traditional fireplaces or old wood stoves. Would you be willing to replace your traditional fireplace, non-EPA certified wood stove or pellet stove with a gas fireplace?*

Question 29 *Would you be willing to replace your traditional fireplace, non-EPA certified wood stove or pellet stove with an EPA certified wood stove or pellet stove?*

FIGURE 46 WILLINGNESS TO REPLACE FIREPLACE OR STOVE WITH EPA CERTIFIED MODEL: 2004 ~ 2006 (N = 405)



Figures 47 and 48 show the proportion of respondents who were administered these questions that were willing to replace their fireplace or non-EPA certified stove, respectively, with a cleaner burning model by county and age.

FIGURE 47 WILLINGNESS TO REPLACE FIREPLACE OR STOVE WITH EPA CERTIFIED MODEL BY COUNTY (N = 405)

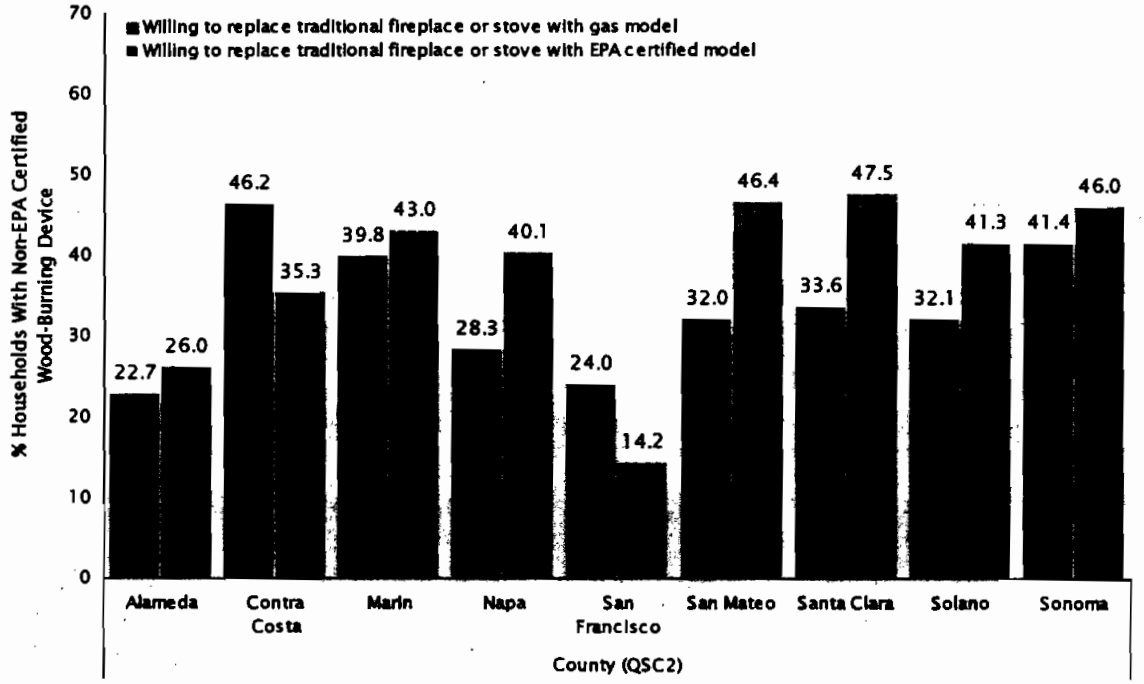
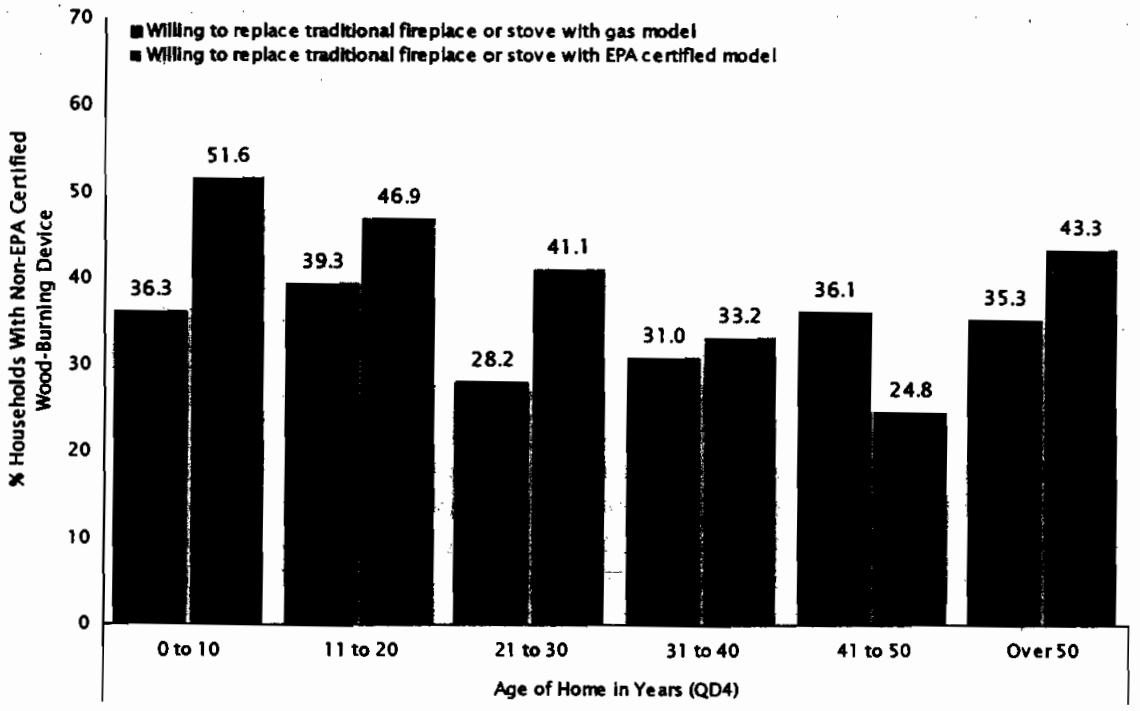


FIGURE 48 WILLINGNESS TO REPLACE FIREPLACE OR STOVE WITH EPA CERTIFIED MODEL BY AGE OF HOME IN YEARS (N = 405)

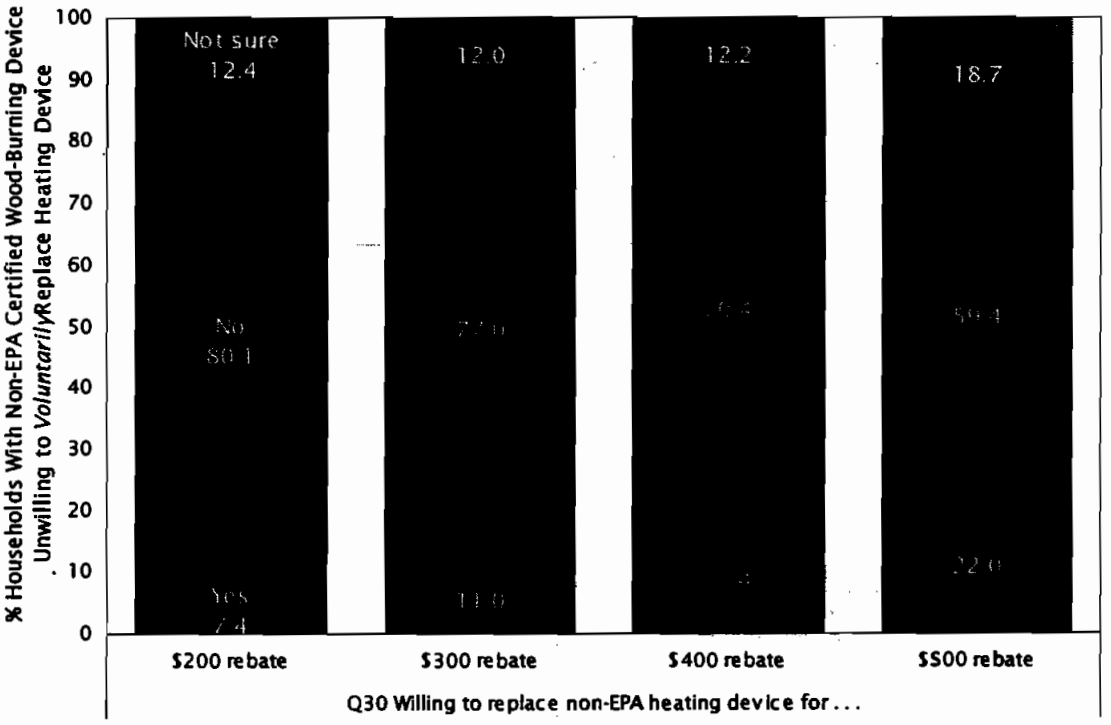


Questions 28 and 29 measured respondents' willingness to replace their current heating devices *in the absence* of a financial incentive to do so. For those respondents who were unwilling to replace their current device in this context, the survey next inquired as to whether they would do so if they were offered a financial incentive.

In Question 30, respondents who indicated that they were unwilling to replace their current heating device for a cleaner alternative (Questions 28 and 29) were first informed that there is a government sponsored program that offers rebates to residents who replace their traditional fireplace or non-EPA certified stove with a gas fireplace or EPA certified wood stove or pellet stove. They were then asked if they would participate in this program knowing that they would receive a $200 rebate. For those who remained unwilling at $200, rates of $300, $400 and $500 were tested in sequential order.

Question 30 *There is a government sponsored program that offers rebates to residents who replace their traditional fireplace or non-EPA certified wood stove or pellet stove with a gas fireplace or EPA certified wood stove or pellet stove. If you knew you could receive a rebate of $_____, would you participate in this program?*

FIGURE 49 WILLINGNESS TO PARTICIPATE IN GOVERNMENT-SPONSORED REBATE PROGRAM (N = 219)



As shown in Figure 49, 7% of those who were initially unwilling to replace their heating device for a cleaner alternative were willing to do so if a $200 rebate were offered. As the amount of the rebate increased to $300, $400 and $500, the proportion of respondents who indicated that they would participate in the program increased to 11%, 17% and 22%, respectively. Combining residents who are willing to replace their current devices without a financial incentive (see Figure

46) with those who require $200 suggests that 40% to 45% of the target population would be receptive to a modest rebate program.

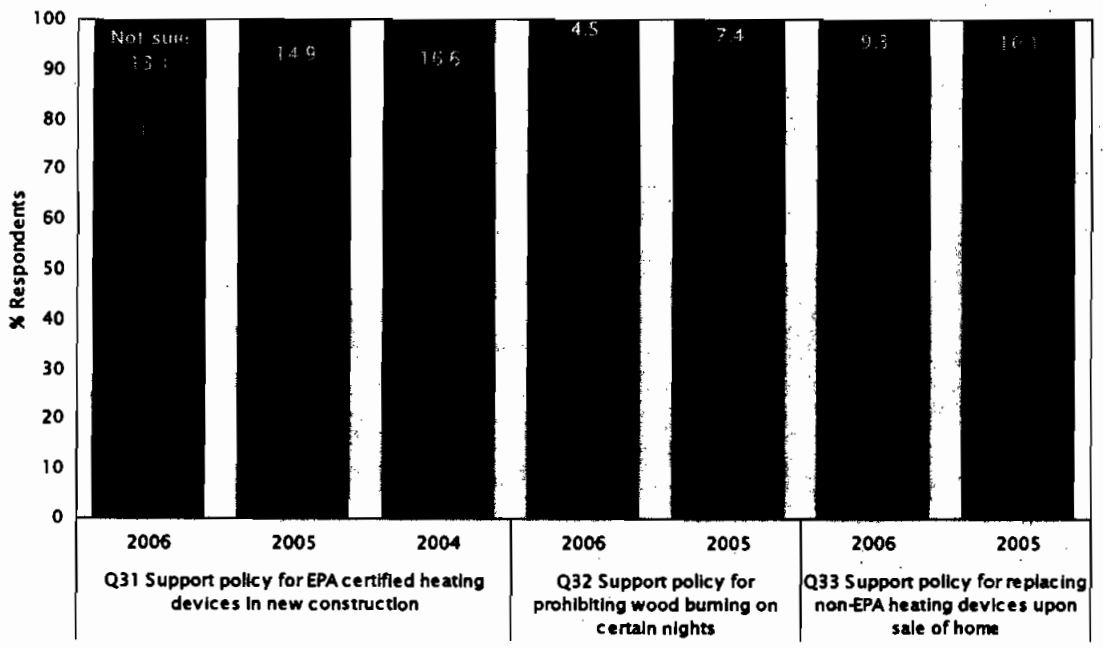
POLICY ATTITUDES The final three questions in this series measured residents' support for several policy changes designed to improve the air quality in the region. In Question 31, all respondents were asked whether they would support a local policy that would require all new housing construction to use only gas fireplaces or EPA certified fireplace inserts, wood stoves or pellet stoves. Question 32 measured respondent support for a local policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels. Finally, Question 33 inquired as to residents' willingness to support a policy that would require older wood stoves to be removed or replaced with a less polluting model when a home is sold to a new owner. The answers to all three questions have been combined in Figure 50.

Question 31 *Local governments throughout the Bay Area are considering a policy that would require all new housing construction to use only gas fireplaces or EPA certified fireplace inserts, wood stoves or pellet stoves. Would you support or oppose this policy?*

Question 32 *In some areas, local governments have a policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels. Would you support or oppose a policy like this in your area?*

Question 33 *some areas, local governments require that when a home that contains an older wood stove is sold to a new owner, the stove must be removed-or replaced with a new stove or fireplace that causes less pollution. Would you support or oppose a policy like this in your area?*

FIGURE 50 SUPPORT FOR PROPOSED POLICY CHANGES: 2004 ~ 2006 (N = 988)



For each of the policies tested, the predominant position was one of support for the policy. Sixty-four percent (64%) supported requiring all new housing construction to use only gas or EPA certified models, 77% favored prohibiting wood burning on nights when air pollution is expected to reach unhealthy levels, and 51% favored requiring the replacement of older wood stoves with a cleaner burning model when a home is sold to a new owner (see Figure 50). The public's support for these policies has not changed significantly since 2005. For the interested reader, Figures 51-53 display how support for each policy varied by county, age, and household income.

FIGURE 51 SUPPORT FOR PROPOSED POLICY CHANGES BY COUNTY (N = 988)

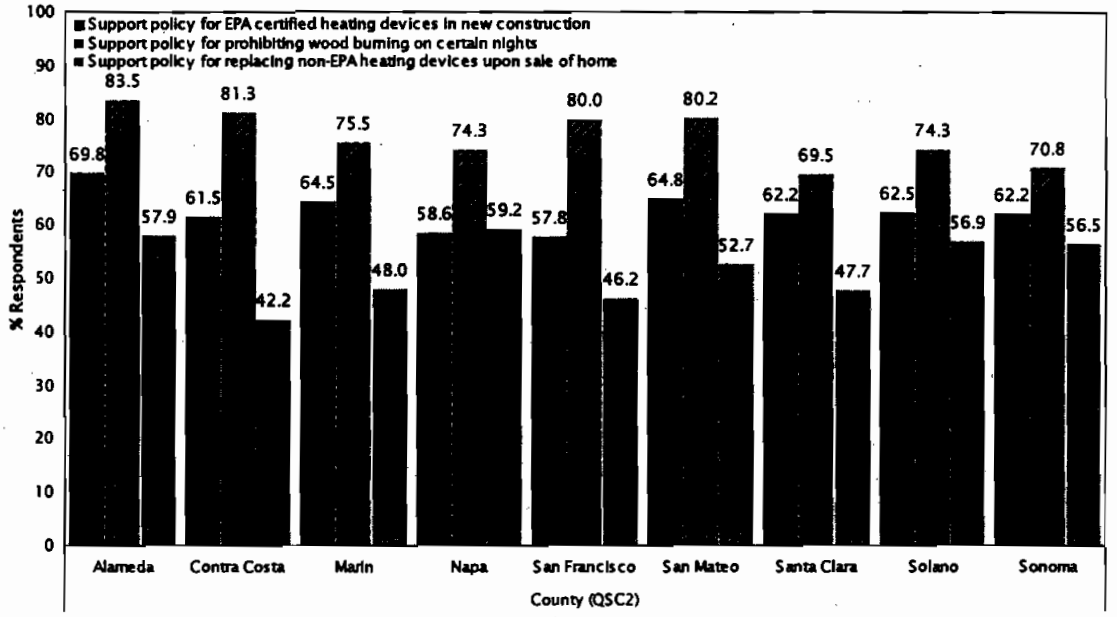


FIGURE 52 SUPPORT FOR PROPOSED POLICY CHANGES BY AGE (N = 988)

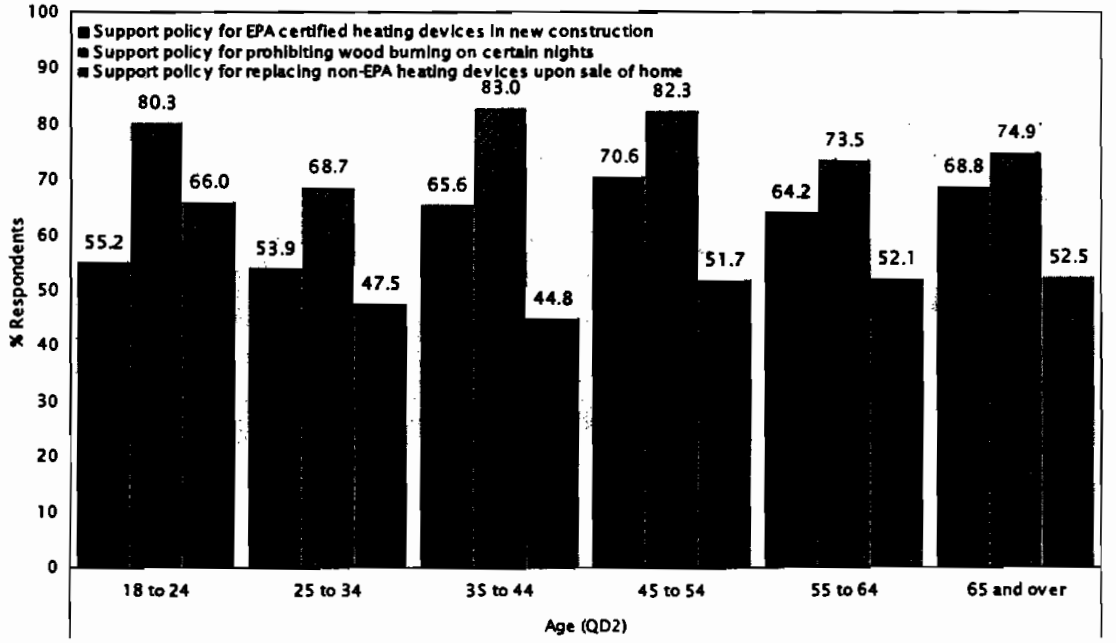
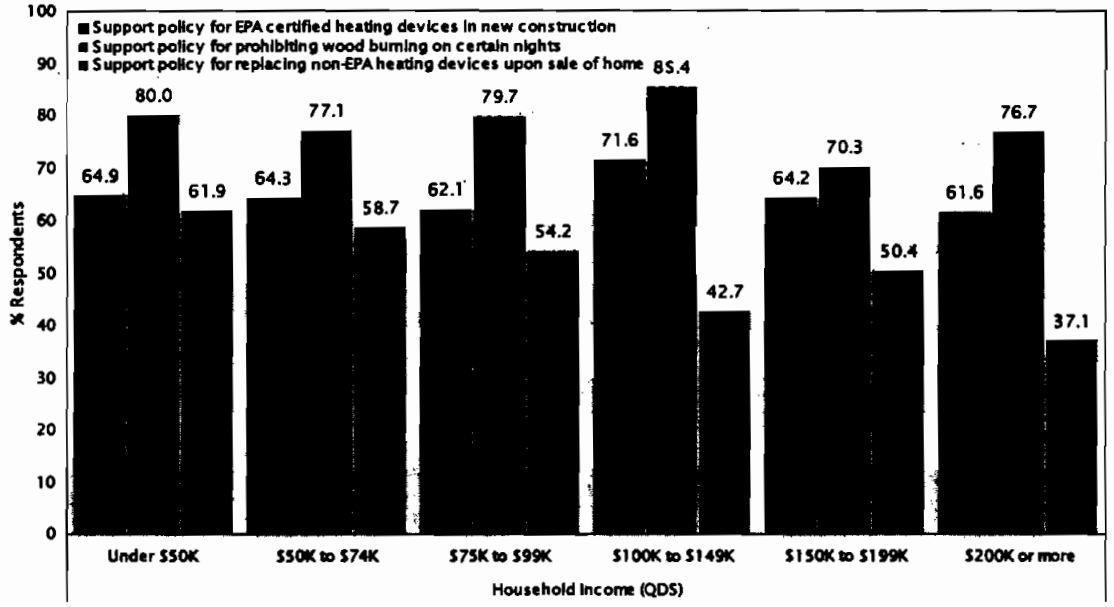


FIGURE 53 SUPPORT FOR PROPOSED POLICY CHANGES BY HOUSEHOLD INCOME (N = 988)



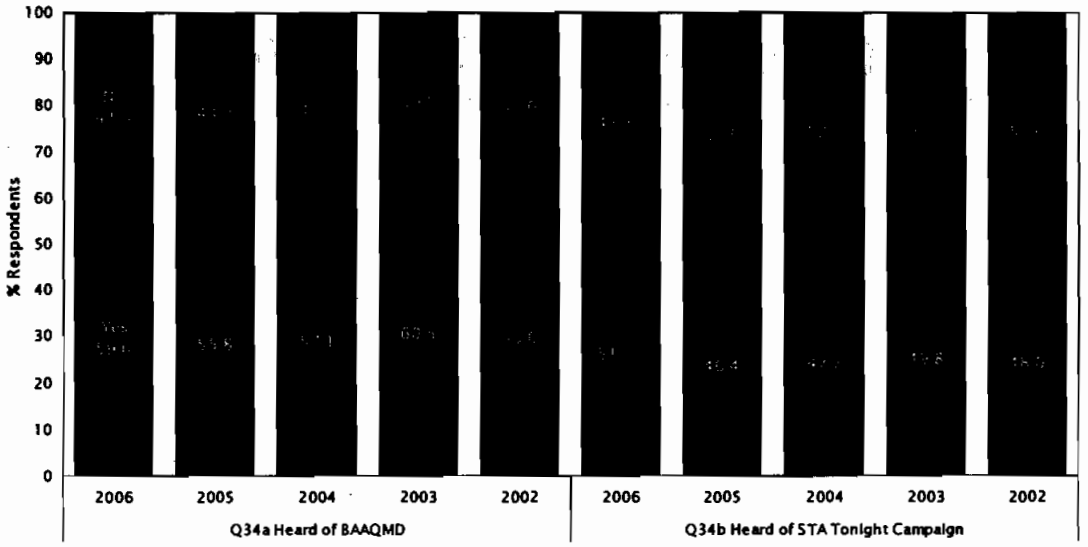
PERCEPTIONS OF ENTITIES

To identify and track perceptions of the BAAQMD and the Spare the Air Tonight Campaign, a series of three questions was presented to respondents to measure their awareness and opinions of the agency and the program, as well their recent exposure to information about each. Because these questions were asked in an identical manner in past winter surveys dating back to 2002, the results from these studies are also shown for comparison.

AWARENESS Figure 54 shows that awareness of the BAAQMD (59%) remained statistically similar to awareness of the agency in prior years, although awareness of the Spare the Air Tonight Campaign (52%) increased significantly in the past year.

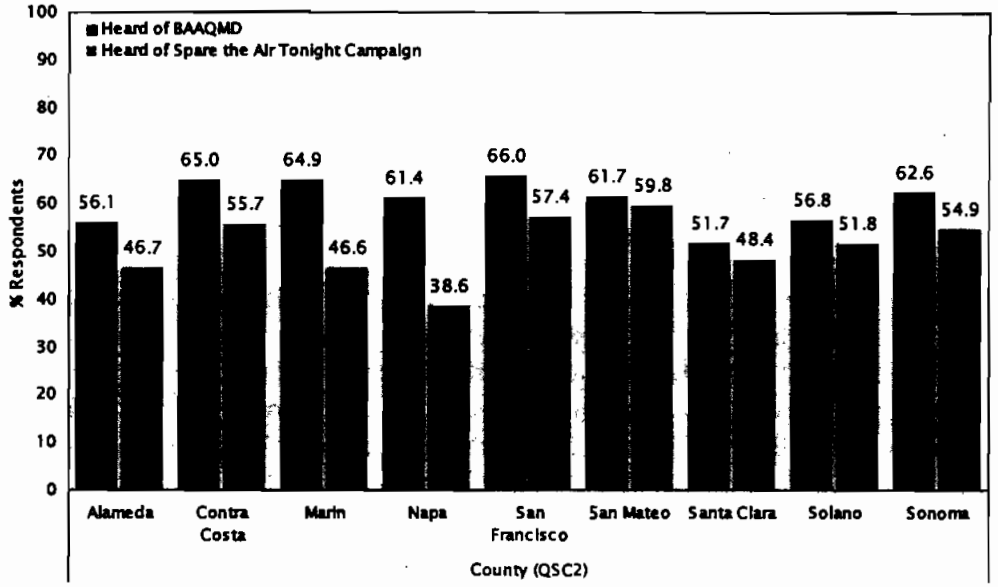
Question 34 *Let's change gears a bit. Have you ever heard of the _____?*

FIGURE 54 AWARENESS OF BAAQMD & SPARE THE AIR TONIGHT CAMPAIGN: 2002 ~ 2006 (N = 988)



Across the nine member counties, awareness of the BAAQMD was highest in San Francisco (66%), Marin (65%) and Contra Costa (65%) counties, and lowest in Santa Clara County (52%). Awareness of the Spare the Air Tonight Program, on the other hand, ranged from a high of 60% in San Mateo County to a low of 39% in Napa County (see Figure 55 on page 50).

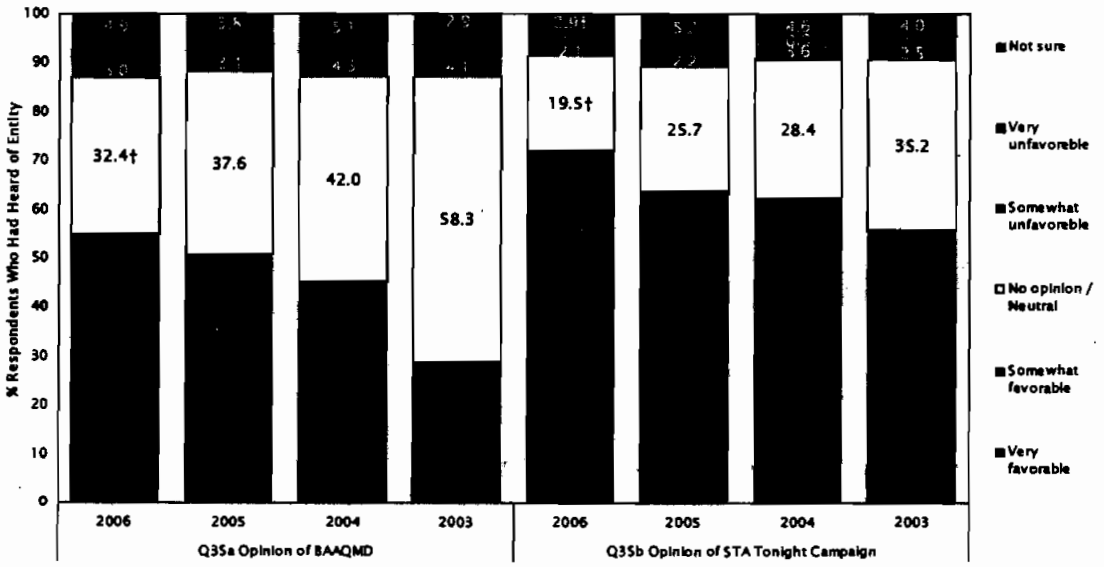
FIGURE 55 AWARENESS OF BAAQMD & SPARE THE AIR TONIGHT CAMPAIGN BY COUNTY (N = 988)



OPINIONS Respondents who had heard of an entity were next asked whether their opinion of the entity was favorable, unfavorable, or neutral. Figure 56 displays the findings of these questions in 2006, as well as the findings from the 2005, 2004 and 2003 studies.[12]

Question 35 *Generally speaking, would you say you have a favorable or unfavorable opinion of the _____, or do you have no opinion either way?*

FIGURE 56 OPINIONS OF BAAQMD & SPARE THE AIR TONIGHT CAMPAIGN: 2003 ~ 2006 (BAAQMD N = 582; STA TONIGHT CAMPAIGN N = 511)



12. The response options for these questions were more limited in the 2002 study, so comparisons are not provided in Figure 56.

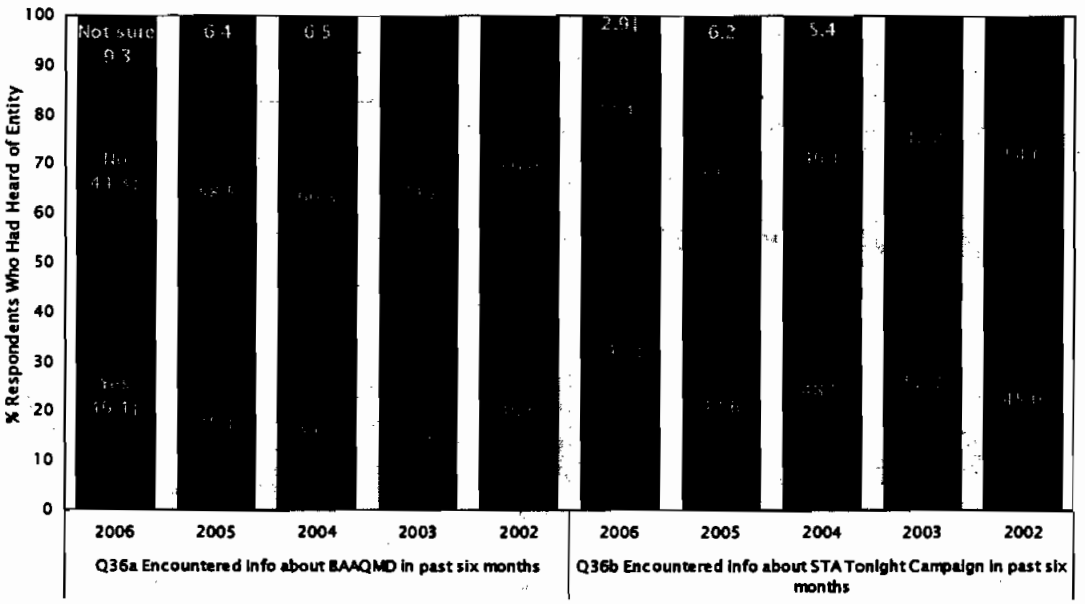
Of the individuals who received the question in 2006, more than half (55%) held a favorable opinion of the BAAQMD, whereas 32% held a neutral opinion and just 8% held an unfavorable opinion. When compared to the opinions recorded in the previous studies, opinions of the BAAQMD have become increasingly favorable—from 29% favorable in 2003 to 55% favorable in 2006.

The same is also true of public opinion regarding the Spare the Air Tonight Campaign, although the trend is less pronounced. Whereas 56% of respondents who had heard of the campaign held a favorable opinion of it in 2003, the corresponding percentage for 2006 was substantially higher at 72%.

EXPOSURE TO INFORMATION The last question in this series asked respondents whether they recalled hearing, reading or seeing any news stories, advertisements or public service announcements about the BAAQMD and/or the Spare the Air Tonight Program in the six months prior to the interview. As shown in Figure 57, the proportion of respondents who recalled being exposed to information about the BAAQMD during this period was 46%, up significantly from 35% in 2005. The proportion of respondents who recalled exposure to the Spare the Air Tonight Program was also substantially higher in 2006 (65%) when compared to 2005 (43%).

Question 36 *In the past six months, have you heard, read, or seen any news stories, advertisements, or public service announcements about the _____?*

FIGURE 57 ENCOUNTERED INFORMATION ABOUT BAAQMD & SPARE THE AIR TONIGHT CAMPAIGN IN PAST SIX MONTHS: 2002 ~ 2006 (BAAQMD N = 582; STA TONIGHT CAMPAIGN N = 511)



For the interested reader, Figures 58 and 59 display the percentage of *all* respondents who recalled hearing, reading or seeing information about the BAAQMD and the Spare the Air Tonight Program—not just among those who had heard of the agency or program as shown in Figure 57. Among all respondents, recalled exposure was greatest for the agency among Alameda County residents, those with wood-burning heating devices in the home, and respondents over the age

of 44. Recalled exposure to information about the Spare the Air Tonight program was highest among Contra Costa County residents, those with wood-burning heating devices in the home, and respondents over the age of 34.

FIGURE 58 ENCOUNTERED INFORMATION ABOUT BAAQMD & SPARE THE AIR TONIGHT CAMPAIGN IN PAST SIX MONTHS BY COUNTY (N = 988)

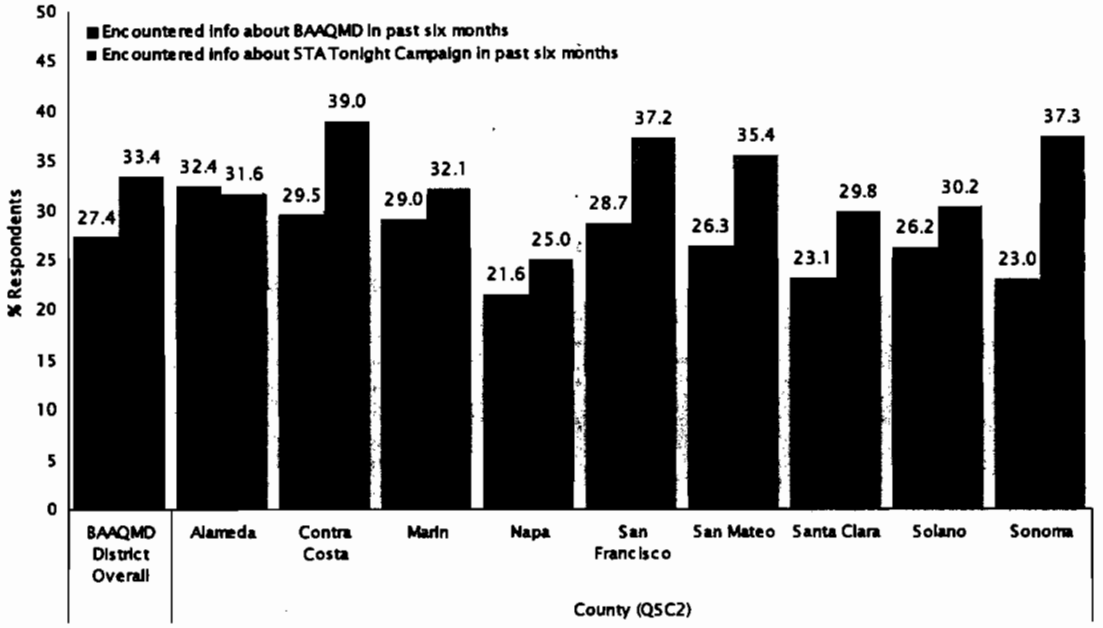
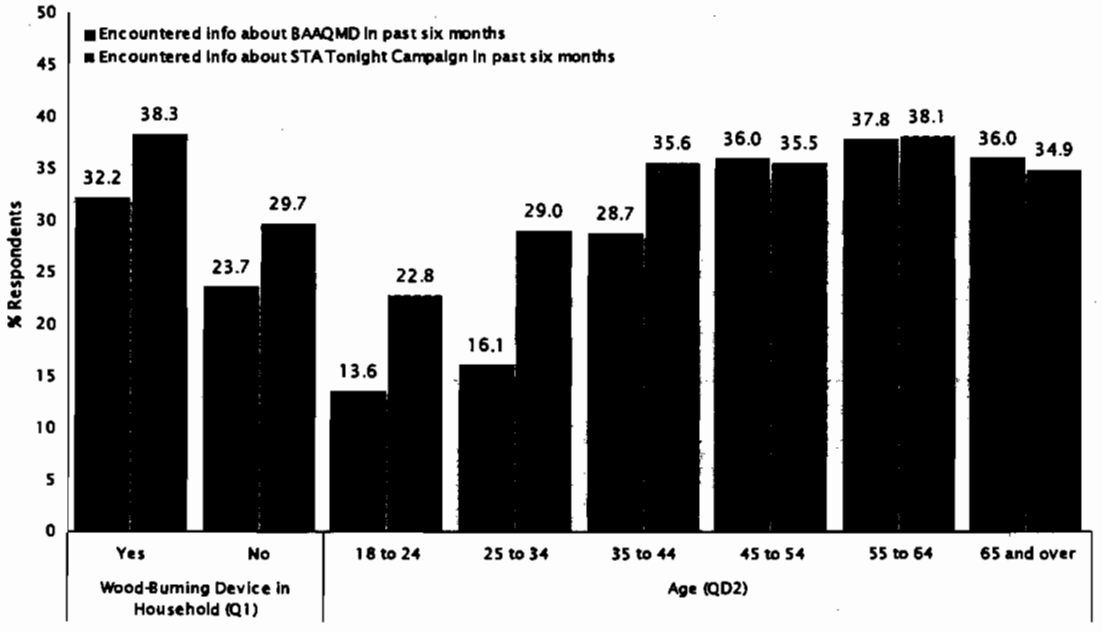


FIGURE 59 ENCOUNTERED INFORMATION ABOUT BAAQMD & SPARE THE AIR TONIGHT CAMPAIGN IN PAST SIX MONTHS BY WOOD-BURNING DEVICE IN HOUSEHOLD & AGE (N = 988)



BACKGROUND & DEMOGRAPHICS

TABLE 4 DEMOGRAPHICS OF SAMPLE

	Study Year				
	2006	2005	2004	2003	2002
Drivers in Household	%	%	%	%	%
Zero to one	27	27	27	31	32
Two to three	63	64	65	59	60
Four or more	8	7	7	10	8
Refused	2	2	2	1	1
Age					
18 to 29	19	20	11	16	15
30 to 39	25	22	19	19	18
40 to 49	18	20	23	21	18
50 to 64	21	19	18	25	27
65 and over	14	14	21	13	18
Refused	3	5	8	7	5
Home Type					
Apartment	20	21	20	21	16
Condo	5	6	4	5	2
Town home	7	8	8	5	4
Single-family detached	63	60	63	66	73
Mobile home	3	2	2	2	4
Refused	2	4	3	3	1
Age of Home					
0 to 10 years	12	11	10	14	20
11 to 20 years	10	14	10	9	18
21 to 30 years	12	13	12	14	20
31 to 40 years	15	13	13	15	10
41 to 50 years	13	10	11	14	8
Over 50 years	28	27	30	18	10
Not sure / Refused	11	13	14	16	15
Household Income					
Under $50,000	20	21	22	24	33
$50,000 to $74,999	16	16	18	17	20
$75,000 to $99,999	15	15	16	16	13
$100,000 to $149,999	16	17	14	15	9
$150,000 to $199,999	7	6	6	3	3
$200,000 or more	8	7	4	6	2
Not sure / Refused	18	18	19	20	21
Gender					
Male	52	48	43	45	44
Female	48	52	57	55	56
County					
Alameda	21	21	23	22	-
Contra Costa	13	14	15	14	-
Marin	4	4	4	4	-
Napa	2	2	2	2	-
San Francisco	13	13	14	14	-
San Mateo	11	11	10	11	-
Santa Clara	24	24	23	23	-
Solano	6	6	3	5	-
Sonoma	6	5	5	6	-

Table 4 displays the demographic and background information collected during the survey. The demographic and background information was used to monitor the sample during data collection, as well as provide insight into how the results of the substantive questions of the survey vary across important subgroups of adults.

METHODOLOGY

This section of the report outlines the methodology and protocols used when conducting this study, as well as the motivation for employing certain techniques.

QUESTIONNAIRE With the questionnaire used in 2005 as a starting point, Dr. McLarney of True North Research worked closely with the BAAQMD to develop and refine an improved survey instrument for the 2006 study. In the interest of improving the *validity* and *reliability* of select opinion and behavior measures, the 2006 study continued several questionnaire changes that were first implemented in the 2004 season. The most notable of these changes addressed how the questionnaire measured the impacts of the Spare the Air Tonight Program. The changes were made so that the impacts of the winter program on wood burning behavior would be measured using the same basic methodology employed by the BAAQMD—and recommended by CARB and EPA[13]—to measure the impacts of the summer Spare the Air Program on driving behavior.[14]

Based on the 2005 results, several additional refinements were made to the 2006 questionnaire with respect to measuring ownership of wood-burning heating devices (as opposed to those that use natural gas or propane) and the practice off-season burning. Because these improvements occasionally involved changing the wording, format and/or response options for a particular question, in some cases it is not possible to statistically compare the results of the 2006 survey with previous surveys for select measures.

CATI & PRE-TEST Before fielding the survey, the questionnaire was CATI (Computer Assisted Telephone Interviewing) programmed to assist the live interviewers when conducting the interviews. The CATI program automatically navigates the skip patterns, randomizes the appropriate question items, and alerts the interviewer to certain types of keypunching mistakes should they happen during the interview. The integrity of the questionnaire was pre-tested internally by True North and by dialing into random homes within the District prior to formally beginning the survey. Two training sessions were conducted to familiarize interviewers with the study and to answer questions and clarify details of the study.

SAMPLE & WEIGHTING Because the primary focus of the study was to gather information from adults who reside within the District, households were chosen for this study using a random digit dial (RDD) sampling method. An RDD sample is drawn by first selecting all of the active phone exchanges (first three digits in a seven digit phone number) and working blocks that service the area. After estimating the number of listed households within each phone exchange that are located within the area, a sample of randomly selected phone numbers is gen-

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13. The CARB/EPA Method is summarized in the Transportation Research Board's (TRB) journal—*Transportation Research Record*—for 2004 in an article entitled *Development of a Quantification Method for Measuring the Travel and Emissions Impacts of Episodic Ozone Alert Programs* (pages 153-159). It is described in detail in the following air resources guidance report: CARB, "Quantification Method Reference Manual: A Method to Measure Travel and Emissions Impacts of Ozone Action Public Education Programs," April 2003. In addition to Eric Schreffler, Dr. Timothy McLarney and Richard Sarles, the TRB paper and guidance report were co-authored by Joann Lu and Jeff Weir of CARB, as well as Thomas Higgins and Dr. Will Johnson of K.T. Analytics.

14. For a detailed description of the updated CARB/EPA Method and its application to the BAAQMD's summer Spare the Air Program, see the *Spare the Air Study: 2005 Summer Ozone Season* report prepared for the BAAQMD by True North & ESTC.

erated with the number of phone numbers per exchange being proportional to the estimated number of households within each exchange in the area. This method ensures that both listed and unlisted households are included in the sample. It also ensures that new residents and new developments have an opportunity to participate in the study, which is not true if the sample were based on a telephone directory.

Although the RDD method is widely used for local and regional surveys, the method also has several known limitations that must be adjusted for to ensure representative data. Research has shown, for example, that individuals with certain demographic profiles (e.g., older women) are more likely to be at home and are more likely to answer the phone even when other members of the household are available. If this tendency is not adjusted for, the RDD sampling method will produce a survey that is biased in favor of women—particularly older women. To adjust for this behavioral tendency, the survey included a screening question which initially asked to speak to the youngest male adult available in the home. If a male adult was not available, then the interviewer was instructed to speak to the youngest female adult currently available. This protocol was followed—to the extent needed—to ensure a representative sample of adults. In addition to following this protocol, the sample demographics were monitored as the interviewing proceeded to make sure they were within certain tolerances. Because the District is composed of seven complete counties and two partial counties, respondents were initially asked the ZIP code of their residence so that only those within the District's boundaries were included in the study.

The final raw data were weighted by age groups within each County to exactly match updated demographic projections for 2006 based on Census and California Department of Finance estimates. The results presented in this report are the weighted results, which are representative at the District-wide level, as well as within the nine member counties.

MARGIN OF ERROR By using an RDD probability-based sample and monitoring the sample characteristics as data collection proceeded, True North ensured that the sample was representative of adults and households in the District. The results of the sample can thus be used to estimate the opinions of *all* adults—and characteristics of *all* households—in the District. Because not every adult or household in the District participated, however, the results have what is known as a statistical margin of error due to sampling. For household characteristics, the margin of error refers to the difference between what was found in the survey of 988 households for a particular question and what would have been found if all of the estimated 2,432,147 households in the District had been interviewed.

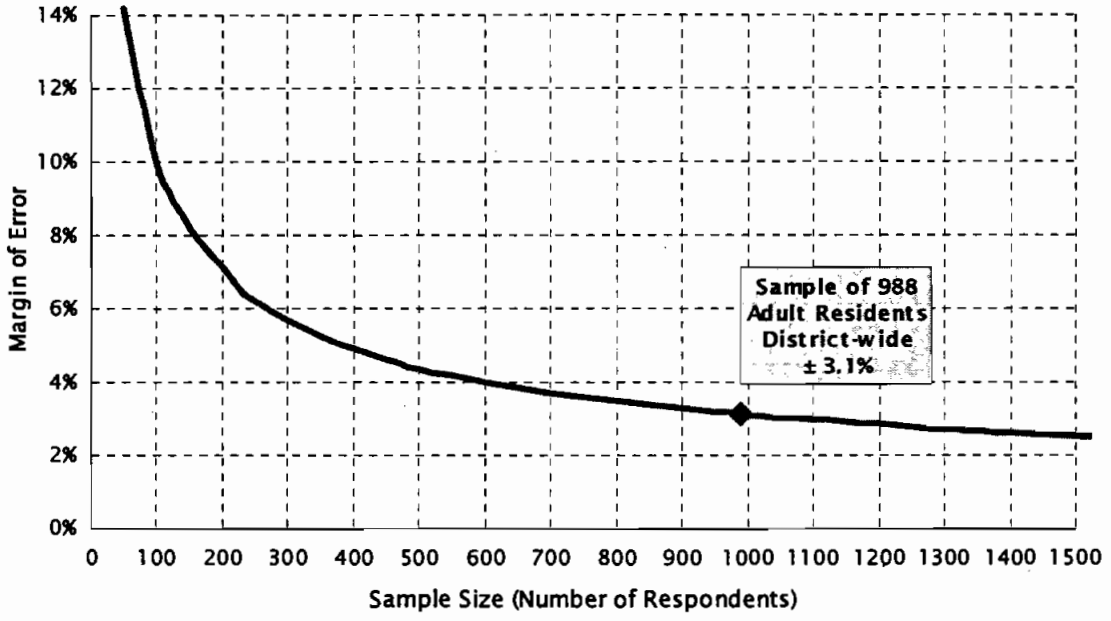
For example, in estimating the percentage of households who have an outdoor fireplace, firepit or chiminea that they have used in the past 12 months, the margin of error can be calculated if one knows the number of households in the District, the size of the sample, a chosen confidence level, and the distribution of responses to the question. The appropriate equation for estimating the margin of error, in this case, is shown below.

$$\hat{p} \pm t\sqrt{\left(\frac{N-n}{N}\right)\frac{\hat{p}(1-\hat{p})}{n-1}}$$

where $\hat{p}$ is the proportion of households that indicated that they possess and have used their outdoor fireplace, firepit or chiminea during this period (0.09 for 9%, for example), N is the total number of households in the District (2,432,147), n is the sample size that received the question (988), and t is the upper $\alpha/2$ point for the t-distribution with $n-1$ degrees of freedom (1.96 for a 95% confidence interval). Solving this equation using these values reveals a margin of error of +/- 1.79%. This means that, with 9% of sampled households indicating that they own and have used an outdoor fireplace, firepit or chiminea in the past 12 months, one can be 95 percent confident that the actual percentage is between 7% and 11%.

Figure 60 provides a graphic plot of the *maximum* margin of error in this study. The maximum margin of error for a dichotomous percentage result occurs when the answers are evenly split such that 50% provide one response and 50% provide the alternative response (i.e., $\hat{p}$=0.5). For this survey, the maximum margin of error is 3.1% for District-wide estimates.

FIGURE 60 MAXIMUM MARGIN OF ERROR PLOT



Within this report, figures and tables show how responses to certain questions varied by county, as well as by demographic characteristics such as presence of a heating device, respondent age, etc. Because the margin of error grows exponentially as the sample size decreases (see the left side of Figure 60), the reader should use caution when generalizing and interpreting the results of questions received by only a small percentage of the sample or when comparing results within subgroups of respondents.

DATA COLLECTION Interviews were conducted via telephone during weekday evenings (5:30PM to 9PM) and on weekends (10AM to 5PM) between December 2, 2006 and February 12, 2007. Interviews were conducted on randomly selected evenings (n=259), as well as targeted for

Spare the Air Tonight episodes throughout the season (n=729). It is standard practice not to call during the day on weekdays because most working adults are unavailable and thus calling during those hours would bias the sample.

DATA PROCESSING Data processing consisted of checking the data for errors or inconsistencies, coding and recoding responses, categorizing open-end responses, and preparing frequency analyses and crosstabulations. Because the research objectives involved comparing the 2006 results with those of prior studies, where appropriate, True North also accessed and processed data from the 2005, 2004, 2003 and 2002 winter season surveys to allow for meaningful comparisons.

STATISTICAL SIGNIFICANCE Many of the figures and tables in this report present the results of questions asked in 2006 alongside the results found in prior years for identical questions. In such cases, True North conducted the appropriate tests of statistical significance to identify changes that likely reflect actual changes in public opinion or behavior over time—as opposed to being due to chance associated with selecting two cross-sectional samples independently and at random. Differences between studies are identified as *statistically significant* if we can be 95% confident that the differences reflect an actual change in public opinion or behavior between the two studies. Statistically significant differences within response categories over time are denoted by the † symbol which appears in the figure next to the appropriate response value for 2006.

ROUNDING Numbers that end in 0.5 or higher are rounded up to the nearest whole number, whereas numbers that end in 0.4 or lower are rounded down to the nearest whole number. These same rounding rules are also applied, when needed, to arrive at numbers that include a decimal place in constructing figures and charts. Occasionally, these rounding rules lead to small discrepancies in the first decimal place when comparing tables and pie charts for a given question.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Winter 06-07 Spare the Air Survey
Designed by True North Research
Toplines
988 Respondents

Hi, my name is _____ and I'm calling on behalf of TNR, a public opinion research firm. We're conducting a survey concerning issues of importance to residents in the Bay Area region and we'd like to get your opinions.

If needed: This is only a survey about important issues in the Bay Area—I'm NOT trying to sell anything.
If needed: The survey should take no more than 15 minutes to complete.
If needed: If now is not a convenient time, can you let me know a better time so I can call back?

If the person says they are an elected official or is somehow associated with the survey, politely explain that this survey is designed to the measure the opinions of those not closely associated with the study, thank them for their time, and terminate the interview.

SC1	To begin, what is the ZIP code of your residence? *Read zip code back to respondent to confirm before submitting. Terminate those that fall outside District.*		
	Record 5-digit ZIP code		Data on file
SC2	County of Residence [988]		
	7	Alameda	21%
	9	Contra Costa	13%
	4	Marin	4%
	8	Napa	2%
	2	San Francisco	13%
	3	San Mateo	11%
	1	Santa Clara	24%
	6	Solano	6%
	5	Sonoma	6%

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Section 3: Heating Device Use

I'd like to begin by asking you a few questions about heating devices that you may have in your home.

Q1	Do you have a ____ in your home? *If yes, ask:* How many ____s do you have in your home?	
A	Wood-burning fireplace* [988]	
	None	59%
	One	35%
	Two	5%
	Three or more	1%
B	Natural gas or propane fireplace [988]	
	None	81%
	One	15%
	Two	3%
	Three or more	1%
C	Pellet stove* [988]	
	None	97%
	One	3%
	Two	0%
	Three or more	0%
D	Woodstove* [988]	
	None	96%
	One	4%
	Two	0%
	Three or more	0%
If Q1.1a, Q1.1b, Q1.1c AND Q1.1d = (2, 98), skip to Q20.		
Only ask Q2 if Q1.1a = 1 OR Q1.1d = 1, otherwise skip to Instruction preceding Q3.		

*45% of households reported at least one wood-burning device.

Q2	What type of wood do you primarily use in your wood-burning fireplace or woodstove: natural wood logs, manufactured logs such as Duraflame or Presto, scrap wood, pallets, or some other fuel? *If 'other', ask:* what type? [424]			
	1	Natural wood log	42%	*Ask Q3*
	2	Manufactured log/Duraflame/Presto	26%	*Skip to Q7*
	3	Scrap wood	1%	*Skip to Q7*
	4	Pallets (not pellets)	0%	*Skip to Q7*
	5	Never use fireplace	27%	*Skip to Q7*
	6	Other	1%	*Skip to Q7*
	98	Not sure	2%	*Skip to Q7*
	99	Refused	1%	*Skip to Q7*

Only ask Q3 if (Q1.1a = 1 and Q2 = 1) OR (Q1.1d = 1 and Q2 = 1), otherwise skip to Q7.

Q3	What type of natural wood do you typically burn? [178]		
	1	Ash	0%
	2	Eucalyptus	1%
	3	Oak	50%
	4	Pine (Cedar)	9%
	6	Almond	8%
	7	Fruitwood	4%
	5	Other	7%
	98	Not sure	20%
	99	Refused	0%
Q4	Do you typically purchase your wood from a wood supplier, the local store, or do you gather your own wood? [178]		
	1	Wood supplier	33%
	2	Local store	13%
	3	Gather own wood	44%
	4	Other	5%
	98	Not sure	4%
	99	Refused	0%
Q5	Do you tend to burn dry, seasoned wood or wood that is fresh-cut and somewhat moist? [178]		
	1	Dry, seasoned wood	92%
	2	Fresh-cut & moist	3%
	98	Not sure	5%
	99	Refused	0%

Q6	When you use your fireplace or woodstove, which of the following would you say is the primary reason you do so? For heating your home or for the ambiance of having a fire? [178]	
1	Heat	46%
2	Ambiance	50%
98	Not sure	4%
99	Refused	0%

For the next series of questions, when I refer to "winter" I mean the months of November through February.

Only ask Q7 for each appliance where Q1.1 = 1.

Q7 Will you use your _____ this winter?

Do Not Randomize		Yes	No	Not Sure	Refused
A	Wood-burning fireplace [407]	56%	43%	2%	0%
B	Natural gas or propane fireplace [187]	72%	27%	1%	0%
C	Pellet stove [32]	68%	32%	0%	0%
D	Woodstove [39]	81%	16%	3%	0%

Only ask Q8 for each appliance where Q7 = 2.

Q8 Why do you not expect to use your _____ this winter? *Do Not Read Responses. Multiple Responses OK.*

Do Not Randomize		Air Quality Reasons	Too Much Hassle	Heath Reasons	Other
A	Wood-burning fireplace [173]	17%	32%	8%	52%
B	Natural gas or propane fireplace [50]	0%	12%	10%	83%
C	Pellet stove [10]	0%	5%	0%	95%
D	Woodstove [6]	32%	48%	0%	23%

Read the following instruction if Q1.1c = 1.

For the remainder of this interview, when I refer to "burning wood" I mean burning any type of wood product, including wood pellets for a pellet stove.

Only ask Q9 if Q7a = 1, Q7c = 1 or Q7d = 1. Otherwise, skip to Q20.

Q9	How often do you expect to burn wood this winter? At least once per week or less often than that? *If unsure, ask them to estimate.* [252]		
1	At least once per week	53%	*Skip to Q11*
2	Less often than once per week	47%	*Ask Q10*
98	Not sure / Refused	0%	*Skip to Q12*

Q10	Would you say that you will burn wood about two to three times per month, once per month, or less often than once per month? *If unsure, ask them to estimate.* [119]			
	1	Two to three times per month	32%	*Skip to Q12*
	2	Once per month	32%	*Skip to Q12*
	3	Less often than once per month	35%	*Skip to Q12*
	98	Not sure	1%	*Skip to Q12*
	99	Refused	0%	*Skip to Q12*
Q11	In a typical winter week, how many days do you expect to burn wood? *If unsure, ask them to estimate.* [133]			
	1	One day	19%	
	2	Two days	32%	
	3	Three days	15%	
	4	Four days	7%	
	5	Five days	7%	
	6	Six days	4%	
	7	Seven days	14%	
	98	Not sure	1%	
	99	Refused	1%	
Q12	Did you burn wood in the past seven days? [252]			
	1	Yes	51%	*Ask Q13*
	2	No	49%	*Skip to Q14*
	98	Not sure	0%	*Skip to Q14*
	99	Refused	0%	*Skip to Q14*
Q13	Did you burn wood yesterday or last night? [129]			
	1	Yes	44%	
	2	No	56%	
	98	Not sure	0%	
	99	Refused	0%	
Q14	In a typical day that you burn wood, how many hours of the day do you have a fire burning? *If unsure, ask them to estimate.* [252]			
	One		5%	
	Two		23%	
	Three		33%	
	Four		21%	
	Five or more		17%	

Only ask Q15 if Q7a = 1 or Q7d = 1.

Q15	In a typical day that you burn wood, how many logs do you burn throughout the entire day? *If unsure, ask them to estimate.* [244]	
	One	23%
	Two	8%
	Three	10%
	Four	12%
	Five	15%
	Six	8%
	Seven or more	24%

Section 3 Changes in Wood Burning Behavior

Only ask Q16 if Q7a = 1, Q7c = 1 or Q7d = 1. Otherwise, skip to Q20.

Q16	This winter, do you expect that you will burn wood more often, less often, or about the same frequency as you did last winter? [252]			
	1	More often	15%	
	2	Less often	18%	
	3	About the same	65%	
	98	Not sure	3%	
	99	Refused	0%	
Q17	Were there occasions this winter when you normally would have burned wood, but decided not to? [252]			
	1	Yes	37%	*Ask Q18*
	2	No	59%	*Skip to Q20*
	98	Not sure	4%	*Skip to Q20*
	99	Refused	0%	*Skip to Q20*
Q18	Why did you decide not to burn wood on these occasions? *Do NOT Read Response Options. Multiple Responses OK.* [93]			
	1	Spare the Air Tonight campaign/ advertisements asking people not to burn wood/Don't Light the Night campaign	27%	*Ask Q19*
	2	Air quality reason/health reason	17%	*Ask Q19*
	3	Other	54%	*Skip to Q20*
	98	Not sure	3%	*Skip to Q20*
	99	Refused	0%	*Skip to Q20*

Q19	So far this winter, how many times did you choose not to burn wood because of air quality or health-related reasons? *If respondent is unsure, ask them to estimate.* [41]	
	Total number of times	161 (Average of 3.92 times)

17.6% of households with at least one wood-burning device reported not burning wood this winter (Q7) or a reduction in burning wood this winter (Q17) because of STA Campaign / Air quality info, or because of health concerns paired with encountering STA Campaign / Air quality info.

Q20	During this winter, have you heard, read, or seen any news stories, advertisements, or public service announcements about Spare the Air Tonight, poor air quality, or requests not to use your fireplace, pellet stove, or woodstove? [988]			
	1	Yes	56%	*Ask Q21*
	2	No	43%	*Skip to Q22*
	98	Not sure	1%	*Skip to Q22*
	99	Refused	0%	*Skip to Q22*
Q21	Where did you see or hear the news story, advertisement or public service announcement? *Don't read choices. Multiple responses OK.* [552]			
	1	Television	57%	
	2	Radio	40%	
	3	Newspaper	10%	
	4	Website	2%	
	5	Billboard	3%	
	6	E-mail/E-mail Air Alert	3%	
	7	Fax/Fax Alert	0%	
	8	Bus signs	1%	
	9	Other	5%	
	98	Not sure	4%	
	99	Refused	0%	
Only ask Q22 if interviewing the day after a Spare the Air event. Otherwise, skip to Q23.				
Q22	Prior to taking this survey, were you aware that there was a "Spare the Air Tonight" advisory yesterday? [762]			
	1	Yes	16%	
	2	No	83%	
	98	Not sure	1%	
	99	Refused	0%	

Q23	Do you think there are any negative health effects associated with breathing wood smoke? [988]			
	1	Yes	74%	*Ask Q24*
	2	No	16%	*Skip to Q25*
	98	Not sure	11%	*Skip to Q25*
	99	Refused	0%	*Skip to Q25*
Q24	What are the negative health effects associated with breathing wood smoke? *Don't read options. Multiple response OK.* [728]			
	1	Lung Disease (general reference)	32%	
	2	Asthma	28%	
	3	Allergies	6%	
	4	Bronchitis	3%	
	5	Cancer	14%	
	6	Emphysema	8%	
	7	Chemicals/Carcinogens/Toxins in wood	15%	
	8	Carbon monoxide	10%	
	9	Other health issue	22%	
	98	Not sure	15%	
	99	Refused	0%	
Q25	Different neighborhoods in the Bay Area experience different levels of air pollution from wood smoke. In your opinion, does your neighborhood periodically experience air pollution from wood smoke? [988]			
	1	Yes	24%	*Ask Q26*
	2	No	66%	*Skip to Q27*
	98	Not sure	10%	*Skip to Q27*
	99	Refused	0%	*Skip to Q27*
Q26	Would you say that periodic air pollution from wood smoke in your neighborhood is a big problem, medium problem, or a small problem? [234]			
	1	Big problem	12%	
	2	Medium problem	30%	
	3	Small problem	58%	
	98	Not sure	0%	
	99	Refused	0%	

If Q1.1a, Q1.1c AND Q1.1d = (2, 98), skip to Q31.

Only ask Q27 if Q1.1c = 1 or Q1.1d = 1. Otherwise, skip to instruction preceding Q28.

Q27	Is your woodstove or pellet stove EPA certified? *If not sure, clarify:* Most woodstoves and pellet stoves manufactured after 1992 are EPA certified, whereas older ones are not. [68]			
	1	Yes, EPA certified	54%	*Skip to Q31*
	2	No, not EPA certified	22%	*Go to Q28*
	98	Not sure	24%	*Go to Q28*
	99	Refused	0%	*Skip to Q31*

Only ask Q28 if Q1.1a = 1, (Q1.1c = 1 and Q27 = 2, 98), or (Q1.1d = 1 and Q27 = 2, 98). Otherwise, skip to Q31.

Q28	Gas fireplaces and EPA certified woodstoves, inserts or pellet stoves burn much cleaner and are less polluting than traditional fireplaces or old woodstoves. Would you be willing to replace your traditional fireplace, non-EPA certified woodstove or pellet stove with a gas fireplace? [405]		
	1	Yes	33%
	2	No	60%
	98	Not sure	7%
	99	Refused	0%
Q29	Would you be willing to replace your traditional fireplace, non-EPA certified woodstove or pellet stove with an EPA certified woodstove or pellet stove? [405]		
	1	Yes	38%
	2	No	53%
	98	Not sure	8%
	99	Refused	0%

If Q28 = 1 OR Q29 = 1, skip to Q31. Otherwise, ask Q30.

Q30 There is a government sponsored program that offers rebates to residents who replace their traditional fireplace or non-EPA certified woodstove or pellet stove with a gas fireplace or EPA certified woodstove or pellet stove. If you knew you could receive a rebate of $____, would you participate in this program?

If respondent says 'yes', record 'yes' for all higher dollar amounts and go to Q31.

Do Not Randomize		Yes	No	Not sure	Refused
A	200 [219]	7%	80%	12%	0%
B	300 [219]	11%	77%	12%	0%
C	400 [219]	17%	70%	11%	1%
D	500 [219]	22%	59%	17%	2%

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Section 8: Policy Attitudes			
Q31	Local governments throughout the Bay Area are considering a policy that would require all new housing construction to use only gas fireplaces or EPA certified fireplace inserts, woodstoves or pellet stoves. Would you support or oppose this policy? [988]		
	1	Support	63%
	2	Oppose	23%
	98	Not sure	13%
	99	Refused	0%
Q32	In some areas, local governments have a policy that prohibits wood burning on nights when air pollution is expected to reach unhealthy levels. Would you support or oppose a policy like this in your area? [988]		
	1	Support	77%
	2	Oppose	18%
	98	Not sure	5%
	99	Refused	0%
Q33	In some areas, local governments require that when a home that contains an older woodstove is sold to a new owner, the stove must be removed—or replaced with a new stove or fireplace that causes less pollution. Would you support or oppose a policy like this in your area? [988]		
	1	Support	51%
	2	Oppose	40%
	98	Not sure	9%
	99	Refused	0%

Section 9: BAAQMD and Spare the Air Tonight Name Recognition				
Q34	Let's change gears a bit. Have you ever heard of the ____? *Code 'Not sure' as 'No'.*			
Randomize			Yes	No
A	Bay Area Air Quality Management District [988]		59%	41%
B	Spare the Air Tonight Campaign [988]		52%	48%

Only ask Q35 and Q36 for each item in Q34 that respondent had heard of (ask if Q34 = 1).

Q35 Generally speaking, would you say you have a favorable or unfavorable opinion of the _____, or do you have no opinion either way? *Get answer and ask:* Would that be very or somewhat favorable / unfavorable?

		Very Favorable	Somewhat Favorable	Neutral/ No Opinion Either Way	Somewhat Unfavorable	Very Unfavorable	Not sure
A	Bay Area Air Quality Management District [582]	21%	34%	32%	3%	5%	5%
B	Spare the Air Tonight Campaign [511]	38%	34%	20%	2%	3%	3%

Q36 In the past six months, have you heard, read, or seen any news stories, advertisements, or public service announcements about the _____?

		Yes	No	Not sure
A	Bay Area Air Quality Management District [582]	46%	44%	9%
B	Spare the Air Tonight Campaign [511]	65%	32%	3%

Q37 Do you have an outdoor fireplace, firepit or chiminea (chim-uh-nay-uh) that you've used to burn wood in the past 12 months? [988]

	1	Yes	9%
	2	No	91%
	99	Refused	0%

Q38 Do you ever burn wood indoors or outdoors in non-winter months, between March and October? *If no, record. If yes, ask:* Which months during this period to you tend to burn wood? *Check all months that apply.* [988]

	1	March	3%	*Ask Q39*
	2	April	3%	*Ask Q39*
	3	May	3%	*Ask Q39*
	4	June	6%	*Ask Q39*
	5	July	7%	*Ask Q39*
	6	August	7%	*Ask Q39*
	7	September	4%	*Ask Q39*
	8	October	3%	*Ask Q39*
	9	No non-winter burning	85%	*Skip to D1*
	98	Not sure	1%	*Skip to D1*
	99	Refused	0%	*Skip to D1*

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Q39	How often do you burn wood in non-winter months? At least once per week or less often than that? *If unsure, ask them to estimate.* [130]			
	1	At least once per week	18%	*Skip to Q41*
	2	Less often than once per week	80%	*Ask Q40*
	98	Not sure	2%	*Skip to D1*
	99	Refused	0%	*Skip to D1*
Q40	In non-winter months, would you say that you burn wood about two to three times per month, once per month, or less often than once per month? *If unsure, ask them to estimate.* [104]			
	1	Two to three times per month	15%	*Skip to D1*
	2	Once per month	25%	*Skip to D1*
	3	Less often than once per month	59%	*Skip to D1*
	98	Not sure	0%	*Skip to D1*
	99	Refused	1%	*Skip to D1*
Q41	In a typical week during non-winter months, how many days do you expect to burn wood? *If unsure, ask them to estimate.* [23]			
	1	One day	10%	
	2	Two days	42%	
	3	Three days	4%	
	4	Four days	0%	
	5	Five days	5%	
	6	Six days	0%	
	7	Seven days	2%	
	98	Not sure	28%	
	99	Refused	9%	

Section 11: Background / Demographics		
Thank you so much for your participation. I have just a few background questions for statistical purposes.		
D1	Including yourself, how many licensed drivers live in your household? [988]	
	None	3%
	One	24%
	Two	51%
	Three or more	20%
	Refused	2%

D2	In what year where you born? Recoded into age below. [988]		
	18 to 24		11%
	25 to 34		21%
	35 to 44		22%
	45 to 54		18%
	55 to 64		11%
	65 and over		14%
	Refused		3%
D3	Do you live in an apartment, condo, townhome, single-family detached home, or mobile home? [988]		
	1	Apartment	20%
	2	Condo	5%
	3	Townhome	7%
	4	Single-family detached home	63%
	5	Mobile home	3%
	99	Refused	2%
D4	Approximately how many years ago was your home built? [988]		
	1	0 to 10 years	12%
	2	11 to 20 years	10%
	3	21 to 30 years	12%
	4	31 to 40 years	15%
	5	41 to 50 years	13%
	6	Over 50 years	28%
	98	Not sure	10%
	99	Refused	1%
D5	This last question is for statistical purposes only. As I read the following income categories, please stop me when I reach the category that best represents your household's total annual income before taxes. [988]		
	1	Under $50,000	20%
	2	$50,000 to $74,999	16%
	3	$75,000 to $99,999	15%
	4	$100,000 to $149,999	16%
	5	$150,000 to $199,999	7%
	6	$200,000 or more	8%
	7	Not sure / Refused	18%

Those are all of the questions that I have for you! Thanks very much for participating. This survey is sponsored by the Bay Area Air Quality Management District.			
Post Interview Items			
D6	Gender (988)		
	1	Male	52%
	2	Female	48%
D7	Month of Interview		
	12	December	39%
	1	January	44%
	2	February	17%

3/05 www.state.nj.us/dep/airworkgroups/docs/tleerborrman_bayca.pdf

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Bay Area Woodstove Changeout Program

Teresa Lee- Director, Public Information & Outreach Office
Ralph Borrmann- Public Information Officer

Local Authority

- [illegible]
- [illegible] miles
- Seven million people

Wintertime Particulate Strategy

- Health effects of wood smoke
- Particulate strategy
  - "Spare the Air Tonight"
  - Model Ordinance
  - Woodsmoke Rebate Program

Health Effects of Wood Smoke

- Smoke Contains Toxic Pollutants:
  - Carbon Monoxide
  - NO2 - nitrogen dioxide
  - VOCs - volatile organic compounds
  - PM - particulate matter
  - Toxins – dioxin
- Air Pollution Increases with Population

Particulate Strategy
1. Spare the Air Tonight!

- Issued when PM2.5 readings are expected to exceed 150 AQI
- Ask residents to drive less and not to burn
- Wood burning produces about 30% of the particulate pollution on a typical winter night

Particulate Strategy
2. Model Woodstove Ordinance

- A guidance document for cities and counties
- Does not ban wood burning in fireplaces
- **Air Quality Benefits of the Model Ordinance**
  - Attaining and maintaining federal and state PM standards in a reasonable, cost-effective manner
  - Per 1,000 new homes, three tons of PM10 are avoided each winter
  - Estimated 1.7 million fireplaces and woodstoves in the Bay Area
  - Allows for local government control over quality of life
  - As of December 2001, 12 cities and 2 counties have adopted model ordinance

Particulate Strategy
3. Woodsmoke Rebate Program

- Modeled on the Great Stove Changeout and Three Mountain Power Project in Burney, CA.
- California Energy Commission directed PM-10 emission mitigation for power plant projects
- First large urban rebate program
- 100% voluntary. Cash Incentive
- Power Plant sponsors, Air District administers.
- Real emission reduction targets

Ways to Organize

- Retail incentive- (Great Stove Changeout)
  - Rebate given by retailer off purchase price
  - Retailer is the main point of information
  - Advertising through utility bill inserts or retailer
- Direct rebate- (Energy efficiency programs)
  - Rebate sent direct to consumer
  - Air District is the main contact for information
  - Advertising through paid marketing campaign
  - Air District handles all administration

Calpine Program Coordination
First Program

- CEC mandates
- 2002 registered retailer agreements
- Limited geographical area
- Rebate amounts & eligibility requirements
  - Invoice & proof of payment for appliance and plumbing
- Numbered voucher
- PR and advertising
  - Radio, print, bill inserts, tabling, direct mail, press release, TV, counter ad, brochure, web, media stories

Mitigation Calculations

[illegible]

[illegible]

Projected Activity to achieve goal	% of Emission Reductions	Lbs/year of PM10 to be reduced	12003.2 Emission Reductions per unit	# of Units	Incentive per unit	Cost
		21,297				

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

SANTA CLARA COUNTY WOODSMOKE REBATE PROGRAM APPLICATION

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Mail to: BAAQMD Woodsmoke Rebate • 939 Ellis Street • San Francisco, CA 94109 • Tele. (1-800) HELP-AIR

Applications are processed in the order received. Rebates will be distributed on a first come – first served basis. Funding is limited, therefore rebates are not guaranteed. To check availability call (1-800 HELP-AIR).

Santa Clara County residents can make a clean air choice and save money too! The Bay Area Air Quality Management District is offering rebates when you replace your woodburning appliance with one that uses natural gas instead. Switching from burning wood to using gas will reduce air pollution and improve air quality in your neighborhood. Available rebates are:

- **$100** to retrofit an existing fireplace by installing a new gas log set or a new insert.

- **$300** to replace an existing woodburning stove or fireplace insert (must be 1990 or older) with a new gas appliance. Your old woodstove must be scrapped at Pick Your Part yard in Milpitas.

The Santa Clara Woodstove Rebate Program is co-sponsored by Silicon Valley Power as part of an air quality mitigation program required by the California Energy Commission for the new Donald Von Raesfeld Power Plant in Santa Clara. The Bay Area Air Quality Management District manages the program locally. For more information call (1-800) HELP-AIR or go online to www.sparethair.org

Which rebate are you applying for?

☐ $100 to purchase and install gas logs or an insert.

☐ $300 to purchase and install gas logs or an insert. You must also recycle your old pre-1990 woodstove at Pick Your Part yard in Milpitas.

Name_____

Address_____

City_____ Zip_____

Phone_____

Manufacturer_____ Model #_____

Retailer (where Purchased)_____ City_____

How did you hear about the program? ☐ Newspaper ☐ Utility bill inserts ☐ Retailer ☐ Website ☐ Other

What was your reason for this purchase? ☐ Convenience ☐ Remodel ☐ Reduce pollution ☐ Rebate dollars

Was the rebate a significant factor in switching to natural gas? ☐ Yes ☐ No ☐ Somewhat

How often did you burn wood last season? ☐ 1 – 7 days ☐ 7-14 days ☐ 14- 21 days ☐ Over 21 days

I certify that the information on this application is true and correct.
I have read, understand, and agree to the terms of the REBATE PROGRAM on the reverse side.

Customer Signature_____

Print Name_____ Date_____

Recycling Receipt

RODEO WOODSMOKE REBATE RECYCLING RECEIPT

Please include this original stamped receipt with the competed application when applying for the $300 rebate. Keep a copy for your records. Make sure it is completely filled out by Pick-n-Pull. Mail completed package to: BAAQMD, Rodeo Woodsmoke Rebate, 939 Ellis Street, San Francisco, CA 94109.

1 Applicant

Name_____

Address_____

City_____ Zip_____

Phone_____

Pick-n-Pull Stamp

2 Pick-n-Pull

Acknowledge Receipt of Woodstove (staff signature)_____

Date_____

Number

SoCalGas Utility Rebate Program
An Alternative Approach

- Hands off approach
- Sold from an energy efficiency perspective
- Utilities have declining use per meter, losing market share
- Leveraged by uniting manufacturers, retailers, and the utility
- Win win. Everyone gets something out of the process
- Gov's office and NRDC stress reducing energy use. Program discontinued
- Future implementation based on teaming up with local air quality agency

SoCalGas Rebate Program
1. "Fireside Living" Gas Logs

- Winter program started [illegible]
- Promotes decorative gas logs as [illegible] alternative to wood burning
- Participants
  - 159 specialty dealers
  - 7 manufacturers / distributors
- Key Elements
  - Bill insert to single family homes
  - $25 coupons, sponsored by manufacturers / dealers
  - $5 processing fee paid by SCG
  - Dealer co-op ads (50%, $2000 max per dealer)
  - Direct Mail to select homes with gas stubs
  - Dealer locator support through IVR and web site

SoCalGas Rebate Program
2. "Fireside Living" Stoves

- Started in 1998, a fall program
- Promotes awareness of natural gas fireplaces and freestanding stoves, and their efficiency and zone heating benefits
- Participants
  - 65 specialty dealers
  - 4 manufacturers / distributors
- Key Elements
  - Bill insert to above average gas use homes
  - $125 coupons from manufacturers / dealers
  - $25 processing fee to manufacturers, paid by SCG
  - Dealer co-op ads (50%, $2000 max per dealer)
  - Direct Mail to select homes with gas stubs
  - Dealer location support through IVR, Web site

Future Modifications ?

- Make the program more widely available
- Air District concentrates on messaging
- Manufacturers & retailers provide the rebate dollars
- Retailers provide customer contact and support
- Provide extra incentive
  for woodstove recycling
- Team with PG&E

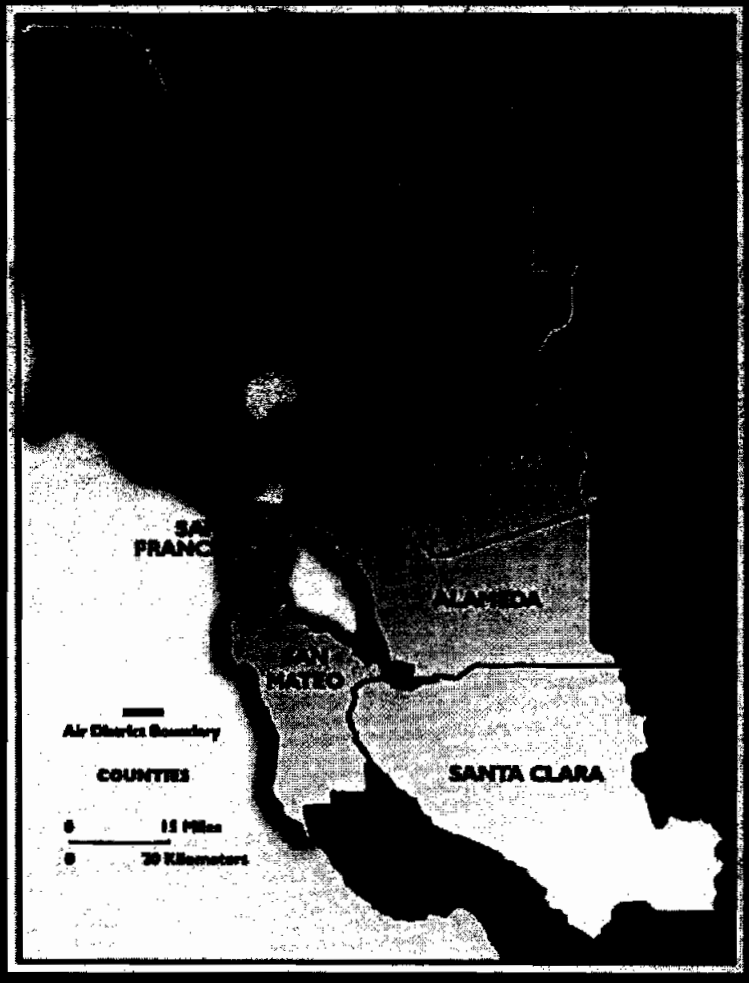
3/07 www.epa.gov/woodstoves/workshop2007/BAAQMD_reno.pdf

Bay Area Woodstove Changeout Program

Jack M. Colbourn- Director, Outreach & Incentives Division
Ralph Borrmann- Public Information Officer

Local Authority

- 1955 - 2007
- 9 counties, 6000 sq. miles
- Seven million people
- 1 million fireplaces



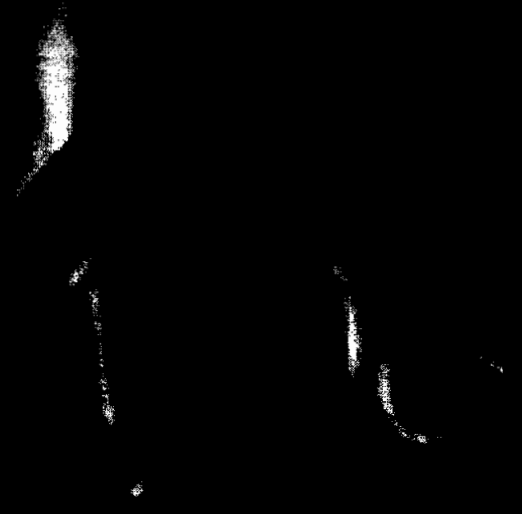
Wintertime Particulate Strategy

- Health effects of woodsmoke
- Particulate strategy
  - "Spare the Air Tonight"
  - Model Ordinance
  - Woodsmoke Rebate Program

Health Effects of Wood Smoke

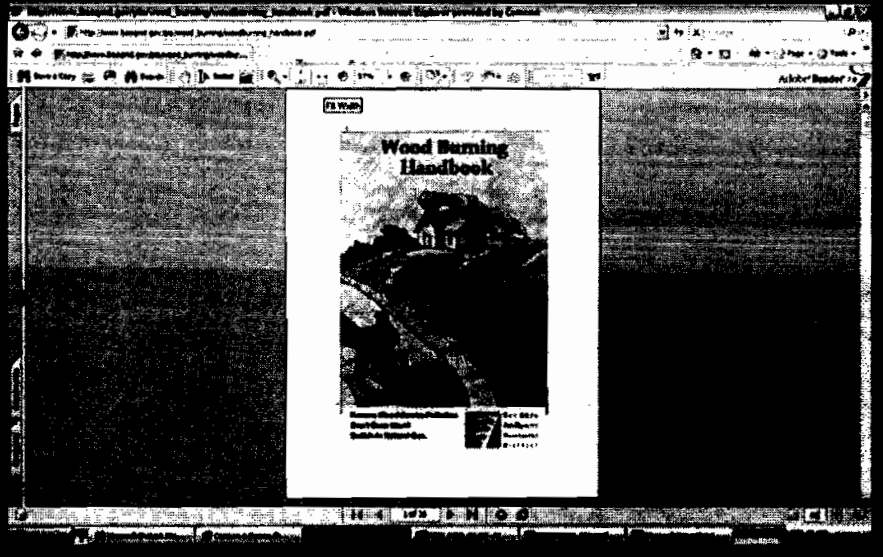
- Smoke Contains Toxic Pollutants
  - CO - carbon monoxide
  - NO2 - nitrogen dioxide
  - VOCs - volatile organic compounds
  - PM - particulate matter
  - Toxins – dioxin

- Air Pollution Increases with Population



Particulate Strategy
1. Spare the Air Tonight!

- Issued when $PM_{2.5}$ readings are expected to exceed 101 AQI
- Ask residents to drive less and not to burn
- Wood burning produces abour 30% of the particulate pollution

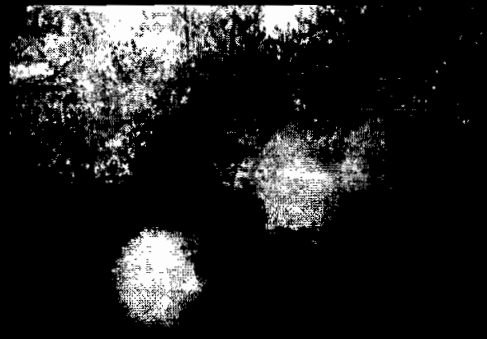


Particulate Strategy
2. Model Woodstove Ordinance

- A guidance document for cities and counties
- Does not ban wood burning in fireplaces
- Air Quality Benefits of the Model Ordinance
  - Attaining and maintaining federal and state PM standards in a reasonable, cost-effective manner
  - 41 cities and 8 counties have adopted the model ordinance

Particulate Strategy
3. Woodsmoke Rebate Program

- Modeled on the Great Stove Changeout and Three Mountain Power Project in Burney, CA
- California Energy Commission directed PM 10 emission mitigation for power plant projects
- Urban area rebate program
- 100% voluntary. Cash Incentive
- Power Plant sponsors, Air District administers.
- Real emission reduction targets



Ways to Organize

- Retail incentive- (Great Stove Changeout)
  - Rebate given by retailer off purchase price
  - Retailer is the main point of information
  - Advertising through utility bill inserts or retailer
- Direct rebate- (Energy efficiency programs)
  - Rebate sent direct to consumer
  - Air District is the main contact for information
  - Advertising through paid marketing campaign
  - Air District handles all administration

Calpine Sponsored Program

- California Energy Commission mandate
- Registered retailer agreements
- Limited geographical area
- Rebate amounts & eligibility requirements
  - Invoice & proof of payment for appliance and plumbing
- Numbered voucher
- PR and advertising
  - Radio, print, bill inserts, tabling, direct mail, press release, TV, counter ad, brochure, web, media stories

Mitigation Calculations

12,003

21,297

12003.2

21,297

Challenges to Success

- The number of stoves vs. fireplaces
- Limited geographic [illegible]
- Local network vs. traditional marketing
- Dealer network
- High rebate amounts
- High Administrative costs

SANTA CLARA COUNTY WOODSMOKE REBATE PROGRAM APPLICATION

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Mail to: BAAQMD Woodsmoke Rebate • 939 Ellis Street • San Francisco, CA 94109 • Tele. (1-800) HELP-AIR

[redacted]

- Complete all sections of the application on the reverse side.
- Retain a copy of this application and the receipt for your records. The Rebate Program is not responsible for materials lost by mail.
- (1) Attach both the **original payment receipt** and the **original retail invoice** to this application. Copies will not be accepted.
- (2) Attach the **original** UPC code from the box, or the make and model description from the box.

UPC

- In order to receive the $300 rebate you must also recycle your pre-1990 woodstove. Please include the original proof of recycling receipt that will be given to you at Pick Your Part yard in Milpitas.
- Agree to the terms of the Rebate Program listed below and sign the application.

7. Rebate Program Terms

Important! Please Read Carefully! In signing you are agreeing to the following provisions.

- This rebate offer is only available for homes in Santa Clara County.
- To receive the $300 rebate amount, your pre-1990 woodstove must be scrapped at Pick Your Part – Milpitas. Please remove the stove doors separately or make the stove un-viable in some way before delivery to Pick Your Part. They are located at 595 Trade Zone Blvd. in Milpitas. Tele. (408) 262-4500.
- I understand that I must complete the installation of the new gas appliance before sending in this application for processing. The rebate is not available to replace existing gas appliances.
- I understand that participants are limited to receiving one rebate per household.
- I understand that rebates are processed in the order received. Rebates will be distributed on a first come – first served basis. Funding is limited, therefore rebates are not guaranteed. To check availability call (1-800 HELP-AIR).
- I understand that the new gas appliance must be purchased and installed at the address listed on the reverse side beginning August 26, 2004 and extending through November 30, 2006. These dates may end earlier if allocated funds are depleted.
- I understand that the new gas appliance, for which a rebate is issued, may be subject to on-site installation verification. If the new gas appliance cannot be verified, the customer will reimburse the Rebate Program for funds issued and other costs associated with processing the rebate.
- As of August 26, 2004 you will no longer be required to install a new gas line in order to apply for a rebate or to purchase the appliance from an authorized retailer. This rebate does apply to pre-plumbed fireplaces, and you may purchase the appliance where you wish. Requirements of the previous program are no longer applicable.
- No retroactive rebates available.
- Please allow 6 – 8 weeks for processing.

SANTA CLARA COUNTY WOODSMOKE REBATE PROGRAM APPLICATION

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Mail to: BAAQMD Woodsmoke Rebate • 939 Ellis Street • San Francisco, CA 94109 • Tele. (1-800) HELP-AIR

[redacted]

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[redacted]

Name_____

Address_____

City_____ Zip_____

Phone_____

Which rebate are you applying for?

☐ $100 to purchase and install gas logs or an insert.

☐ $300 to purchase and install gas logs or an insert. You must also recycle your old pre-1990 woodstove at Pick Your Part yard in Milpitas.

[redacted]

Manufacturer_____ Model #_____

Retailer (where Purchased)_____ City_____

[redacted]

How did you hear about the program? ☐ Newspaper ☐ Utility bill inserts ☐ Retailer ☐ Website ☐ Other

What was your reason for this purchase? ☐ Convenience ☐ Remodel ☐ Reduce pollution ☐ Rebate dollars

Was the rebate a significant factor in switching to natural gas? ☐ Yes ☐ No ☐ Somewhat

How often did you burn wood last season? ☐ 1 – 7 days ☐ 7-14 days ☐ 14- 21 days ☐ Over 21 days

[redacted]

I certify that the information on this application is true and correct.
I have read, understand, and agree to the terms of the REBATE PROGRAM on the reverse side.

Customer Signature_____

Print Name_____ Date_____

Utility Rebate Approach

- Hands off method. Very low processing cost.
- Sold from an energy efficiency perspective
- Leveraged by uniting manufacturers, retailers, and the utility
- Gov's office and NRDC stress reducing energy use. Program discontinued

SoCalGas Rebate Program
Gas Logs

- Promotes decorative gas logs as a clean convenient alternative to wood burning
- Participants
  - 159 specialty dealers
  - 7 manufacturers / distributors
- Key Elements
  - Bill insert to single family homes
  - $25 from manufacturers / dealers
  - $5 processing fee paid by SCG
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  - Direct Mail to select homes with gas stubs
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SoCalGas Rebate Program Stoves

- Promotes natural gas fireplaces and freestanding stoves, efficiency and zone heating benefits
- Participants
  - 65 specialty dealers
  - 4 manufacturers / distributors
- Key Elements
  - Bill insert to above average gas use homes
  - $125 coupons from manufacturers / dealers
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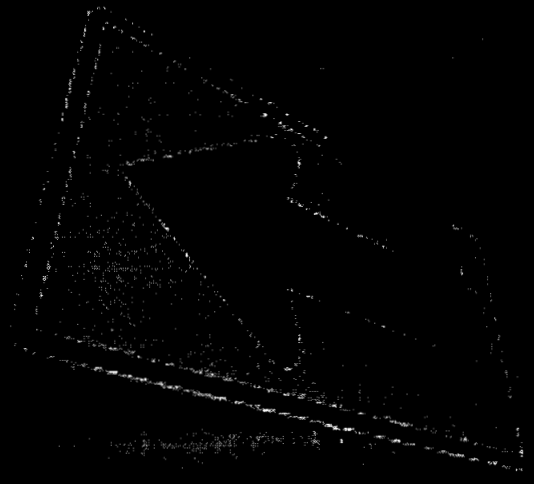
  - Dealer co-op ads (50%, $2000 max)
  - Direct Mail to select homes with gas stubs
  - Dealer location support through IVR, Web

Future Modifications ?

- Make the program more widely available
- Concentrate on messaging
- Manufacturers & retailers provide additional rebate dollars
- Retailers provide customer contact and support
- Provide extra incentive for woodstove recycling

Which way do we go?



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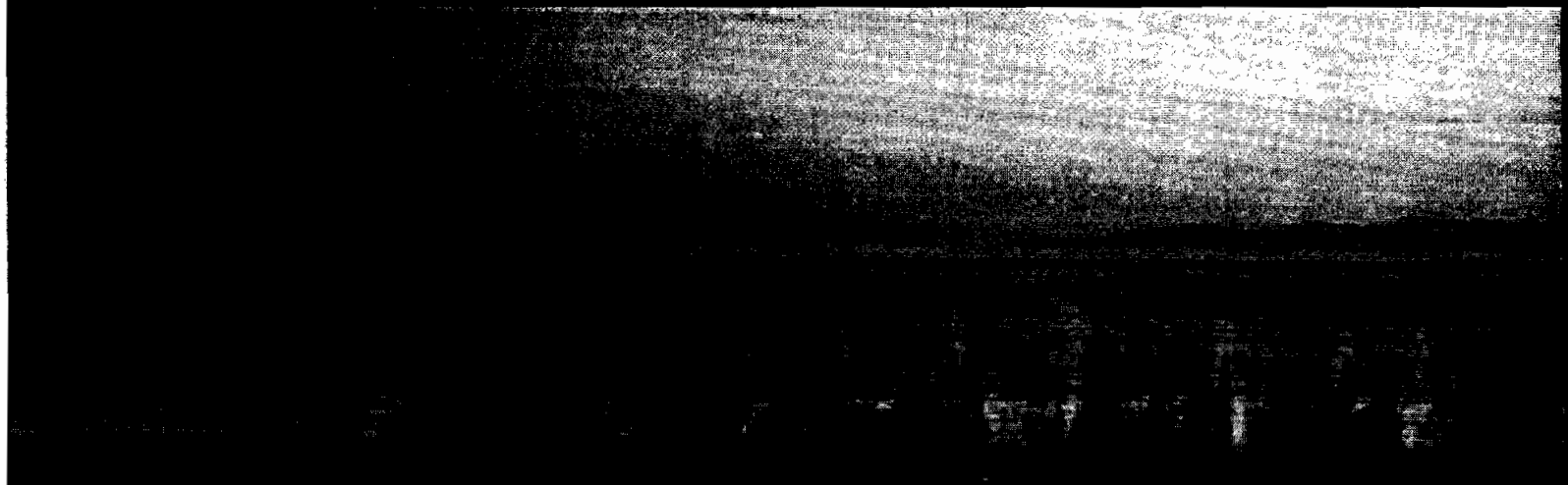


Or this

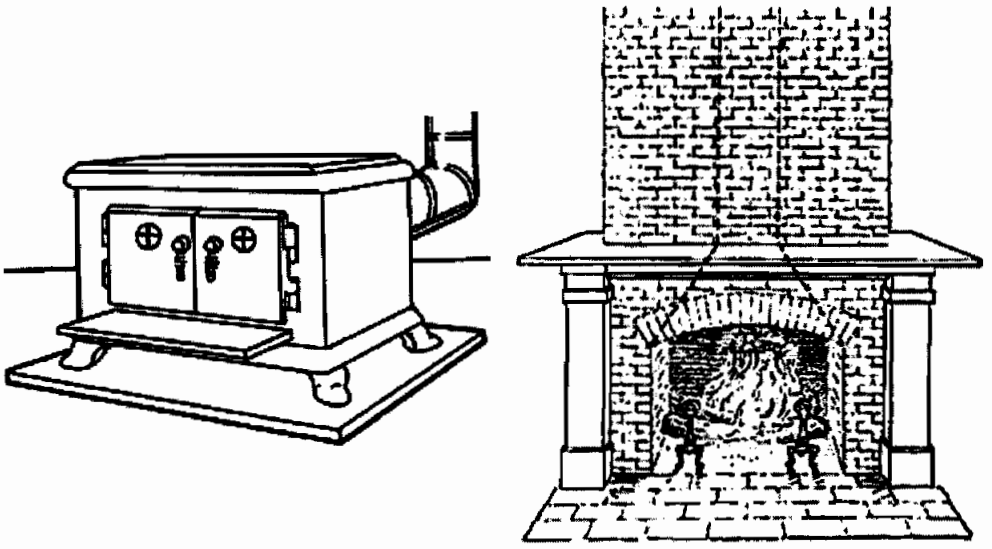
www.baaqmd.gov/pln/ruledev/workshops.htm

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Workshop Report

Wood Smoke Reduction Program

Proposed Regulation 6, Rule 3 to Control Particulate Matter and Visible Emissions from Wood-burning Devices



November 2007

Prepared by:

Eric Pop
Air Quality Specialist
Compliance and Enforcement Division

WORKSHOP REPORT
Regulation 6, Rule 3, Wood-burning Devices

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I. INTRODUCTION

This Workshop Report introduces proposed Bay Area Air Quality Management District (Air District) Regulation 6, Rule 3: Wood-burning Devices. The purpose of the rule is to limit emissions of particulate matter (PM) and visible emissions (VE) from wood-burning devices as part of an overall wood smoke reduction program within the jurisdiction of the Air District. Minor changes in current Regulation 1 and Regulation 5 are also discussed as they are necessary to accomplish associated reductions.

PM consists of very small liquid and solid particles suspended in the air, and includes particles smaller than 10 microns in size (PM_{10}) as well as finer particles smaller than 2.5 microns in size ($PM_{2.5}$). PM is of concern because it can enter nasal passages and the lungs and cause serious health effects such as aggravated asthma, nose and throat irritation, bronchitis, lung damage, and premature death. People with respiratory illnesses, children and the elderly are more sensitive to the effects of PM, but it can affect everyone.

The Bay Area experiences its highest PM concentrations in the winter, especially during the evening and night time hours. Wood-burning is the single greatest source contributing to the PM concentrations, based on chemical composition analysis of deposited airborne PM. Emissions calculations indicate wood smoke contributes only about 10 percent of total PM emissions on an annual basis, but approximately 30 percent of total wintertime $PM_{2.5}$.

During recent winters, the Bay Area Air Basin exceeded the 24-hour $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) 20 to 30 days. Air District staff anticipates a non-attainment designation for this new standard. The emission limitations in this proposed rule are intended to address this expected non-attainment status and reduce the health impacts of PM in the Bay Area. Reductions in wood smoke emissions will be necessary to achieve clean air on a district-wide basis. The Air District's jurisdiction is the San Francisco Bay Area Air Basin which comprises all or part of nine counties: Alameda, Contra Costa, Marin, Napa, San Francisco, Santa Clara, San Mateo, southern Sonoma and the southeastern portion of Solano County.

The proposed rule would reduce wintertime $PM_{2.5}$ levels by curtailing wintertime wood-burning emissions from wood-burning devices, which includes fireplaces, and achieve additional reductions by requiring cleaner burning technologies in new construction. In addition, non-wintertime burning will be improved by requiring appropriate fuel with low-moisture content be used throughout the year in wood-burning devices. Currently, there is no Air District rule which directly limits emissions from wood-burning devices. Air District Regulation 1 has historically excluded regulation of any fires associated with residential heating and will be amended to remove this exclusion. An amendment to existing Regulation 5, Open Burning, will remove an exemption for outdoor wood fires set for recreational

purposes and create a similar requirement to curtail wintertime burning outdoor as well as indoor.

A wood-burning device is any indoor wood-burning stove or insert, pellet-fueled device, conventional fireplace and/or any indoor permanently-installed device burning solid-fuel for aesthetic or space-heating purposes in structures for residential or commercial use. The proposal for wood-burning devices would:

1. Curtail operation of any wood-burning device during periods forecast to negatively impact public heath due to $PM_{2.5}$ levels;
2. Establish limitations on visible emissions from wood burning;
3. Establish criteria for the sale, transfer or installation of wood-burning devices;
4. Establish criteria for the installation of wood-burning devices in new building construction;
5. Prohibit the burning of garbage and certain types of materials;
6. Establish requirements for the sale of wood products for use in wood burning devices.

The proposal to amend Regulation 5, Open Burning, would:

1. Create only a limited exemption for outdoor fires set for recreational purposes which would require curtailment during periods forecast to negatively impact public heath due to $PM_{2.5}$ levels.

The proposal to amend Regulation 1, General Provisions and Definitions, would:

1. Remove the language "residential heating" to allow for the regulation of indoor wood-burning devices.

II. BACKGROUND

A. Wood-burning Devices

Wood-burning devices are defined as any wood-burning stove or heater, pellet-fueled device, fireplace, or any indoor permanently installed device burning any solid fuel for space-heating or aesthetic purposes. In the process of burning wood or a solid-fuel product these devices must vent gases and combustion by-products through a flue or chimney. For the purposes of Regulation 6, Rule 3, only use of indoor devices will be considered for regulation. Amendments to Regulation 5 will be addressed later in this report to cover regulation of outdoor recreational fires.

Wood-burning devices can be considered low emitters of PM or high emitters of PM. Low emitting devices produce fewer emissions and are identified as being certified[1] by the U.S. Environmental Protection Agency (EPA), or are exempt from certification such as a pellet stove, pellet insert or a masonry heater. Devices, regardless of level of emissions, are exempt from EPA certification if the certification test methods are not appropriate for that device. Conventional fireplaces do not qualify for EPA certification due to the high air-to-fuel ratio of these devices.

High emitting devices are non-EPA-certified stoves or inserts as well as conventional fireplaces. Older, uncertified wood stoves and fireplaces release more than twenty times the amount of $PM_{2.5}$ as compared to new EPA-certified wood-burning devices. See Figure 1, "Relative Emissions of Fine Particles" for a comparison of the average emissions in pounds per million Btu (British Thermal Unit, a heat value unit) for each type of device. The figure also compares wood-burning devices to oil and gas-fueled furnaces.

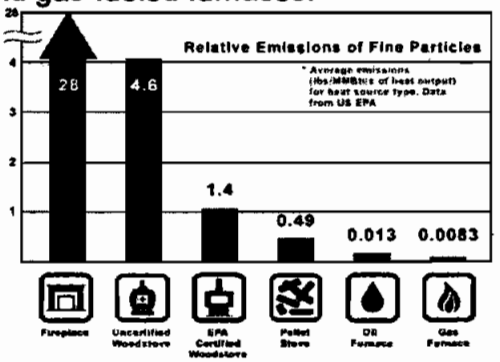

Figure 1. Relative Emissions of Fine Particles, by fuel burning device.

[1] Wood-burning stoves to be sold in the United States (U.S.) must be certified by the U.S. Environmental Protection Agency (EPA) in accordance with Title 40 of the Code of Federal Regulations (CFR), Part 60, Subpart AAA – Standards of Performance for New Residential Wood Heaters (i.e., the EPA emissions standard).

B. Regulatory Background

Wood smoke has been a concern for the Air District as scientific research began establishing a stronger link between emissions from wood combustion and public health. Since 1991, the Air District has promoted various voluntary programs to reduce wood smoke emissions. These programs include a voluntary curtailment program, an annual random public survey to better understand wood-burning in the Bay Area and a model ordinance for local governments to adopt to reduce PM from wood smoke. The Air District has also directed a financial incentives program on a limited basis promoting cleaner burning technologies, such as natural gas fueled devices, in Santa Clara County.

The voluntary curtailment program is called Spare the Air Tonight (STAT). The program advises Bay Area residents to not burn wood on evenings with meteorological conditions leading to increased PM levels that impact public health. The Air District has also conducted an annual wintertime survey following STAT advisories in order to ascertain and document the public's attitudes and behavior with respect to burning wood.

The Air District developed and promoted a model ordinance that cities and counties may adopt to further reduce wood smoke impacts in their community. The model ordinance developed by the Air District includes the following suggested elements:

- curtails burning during STAT advisories;
- specifies criteria for cleaner wood-burning devices; and
- limits fuel type to materials appropriate for wood-burning devices (no garbage, etc).

The model ordinance has been adopted by city and county governments within the Air District, with different mixes of suggested elements.

In addition, the Air District co-sponsored and managed a financial incentive, or "wood stove change-out", program in Santa Clara County as part of an air quality mitigation program required by the California Energy Commission. Rebates were offered to residents to remove non-EPA-certified wood-burning devices, install only EPA-certified devices, or to retrofit wood-burning fireplaces with natural gas fireplaces. The District's new Cleaner Burning Technology Incentives Program will provide similar incentives in the future.

In 2005 the Air District published the "Particulate Matter Implementation Schedule", pursuant to SB 656, and wood smoke reduction was identified in that Schedule as a priority. Subsequently, the Air District Advisory Council examined wood smoke impacts on $PM_{2.5}$ levels and issued recommendations to the Air District Board of Directors.

The recommendations were accepted by the Air District Board of Directors and staff began work on a wood smoke reduction strategy. Through the rule development process, staff has continued to review wood smoke regulations and programs at other air districts; some are identified in Table 1.

Air District	Rule	Mandatory Solid Fuel Burning Curtailment	Prohibition of Exceeding Visible Emission Limit	Sale, Transfer or Installation Criteria for Devices	Criteria for Devices in New Building Construction	Prohibition Against Burning Garbage or Certain Fuel	Requirements for Sale of Seasoned Wood
Puget Sound (WA)	Chap 173-433	✓	✓	✓	✓	✓	✓
San Joaquin Valey	4901	✓	✓	✓	✓	✓	✓
Great Basin	431	✓	✓	✓	✓	✓	
Sacramento	417[2]	✓		✓		✓	✓
	421[3]	✓	N/A	N/A	N/A	N/A	N/A
Yolo-Solano	2.40			✓		✓	✓
Northern Sonoma	R4-1			✓		✓	✓
Monterey Bay	400					✓	
Shasta	3.23			✓	✓	✓	
Butte	207			✓	✓	✓	
Feather River	3.17			✓	✓		
South Coast	445			✓	✓	✓	

Table 1. Other air districts' wood smoke reduction programs.

The standards shown in the column headings of Table 1 reflect the breadth of current rules regulating wood smoke. The proposed Regulation 6, Rule 3 draws from those standards and methods which have proven effective in maximizing the reduction of PM from wood smoke and at the same time minimizing economic or lifestyle adjustments required of impacted stakeholders such the hearth-related industries and health-related organizations.

[2] Rule 417 is an existing rule governing wood-burning criteria other than no-burn restrictions.

[3] Rule 421 is a proposed rule solely affecting mandatory no-burn restrictions.

Local ordinances, based on the Air District's model ordinance to reduce PM from wood smoke, have been adopted by 41 cities and eight counties in the Bay Area. The local ordinances that have been adopted vary in the degree to which they incorporate elements of the model ordinance. Those jurisdictions that have adopted an ordinance with a mandatory, as opposed to voluntary, curtailment provision are shown in Table 2, along with other provisions of their ordinances.

CITY	Adopted	Curtailment Action upon STAT Advisory	Certified Device in New Construction	Certified Device in Remodels	Prohibition on Conversion from Gas to Wood
Fremont	Jul 02	Mandatory	✓	✓	✓
Gilroy	Mar 05	Mandatory	✓	✓	
Los Gatos	Dec-92	Mandatory	✓	✓	
Martinez	Sep 05	Mandatory	✓	✓	✓
Mill Valley	Sep 05	Mandatory	✓	✓	✓
Oakland	May 05	Mandatory	✓		✓
Rohnert Park	Sep 04	Mandatory	✓	✓	✓
San Pablo	Dec 01	Mandatory	✓	✓	✓
Union City	Apr-99	Mandatory	✓	✓	✓

Table 2. Cities that have adopted a mandatory curtailment standard.

In order to further reduce wintertime PM levels to improve public health, a district-wide policy is necessary. The proposed Regulation 6, Rule 3, is designed to best address PM from wood smoke throughout the Bay Area. Any local ordinance that is more stringent than the provisions of proposed Regulation 6, Rule 3, may be appropriate for that area and would not be superseded by adoption of an Air District rule. The Air District will continue to support the adoption process of ordinances in individual jurisdictions, even though the new minimum requirements within the Air District would be the provisions of Regulation 6, Rule 3, if adopted.

Regulation 1, General Requirements and Definitions, has historically excluded fires from residential heating, as well as cooking, from any Air District regulation.

Regulation 5, Open Burning, has historically exempted outdoor recreational fires from any Air District regulation other than to require they be composed only of clean dry wood or charcoal and a small amount of fire starter.

III. TECHNICAL REVIEW

A. Emission Inventory

Burning wood dates back to early human history and, since it is a natural process, is sometimes thought to have a benign impact upon human health (Naeher, et al 2007). However, combustion processes, including the combustion of wood in wood-burning devices, are a major source of anthropogenic air pollution, including hydrocarbons and PM. Carbon monoxide, nitrogen oxides and sulfur dioxides are other dangerous by-products from the combustion of wood (Boman, et. al 2003).

PM is a mixture of very small liquid droplets and solid particles suspended in the air. Negative health effects are linked to both droplets and particles. Numerous studies have shown that mortality and hospital admission are related to pulmonary and cardiovascular disease increase on days with high particulate air pollution levels (Dominici et. al, 2006; Sällsten et. al, 2006). In addition to premature death in people with heart or lung disease, the EPA indicates that health studies have linked exposure to PM, especially fine particles, to several other 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.

Residential wood combustion is an important contributor to ambient fine particle levels in the United States (Fine 2004). Air District staff has identified wood smoke as the single greatest contributor on peak days (33%) to $PM_{2.5}$ in the Bay Area, as shown in Figure 2 (Fairly 2007).

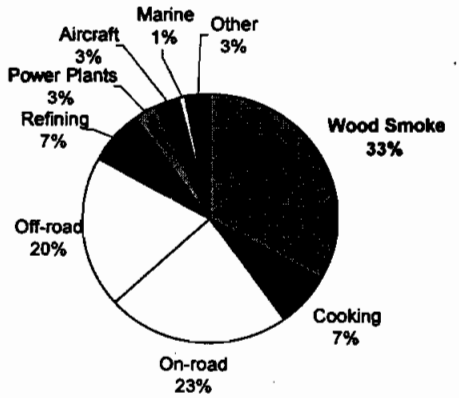

Figure 2. $PM_{2.5}$ Concentration on Peak Days by Constituent in the Bay Area.

Other studies find results and trends that support emission inventory estimates derived from the Air District data. The California Air Resources Board finds residential wood combustion makes up 20 percent to 35 percent of PM (Magliano, 1999).

To estimate the amount of PM coming from wood-burning devices, including fireplaces, Air District staff used data from survey sample results from Bay Area residents. These results were then correlated with projected demographic trends from the Association of Bay Area Governments (ABAG), which were based on U.S. Census data, and used to arrive at the estimated number of devices. These data, along with an annual through-put (fuel load), also derived from survey results, and an emission factor were then used to generate a PM_{10} estimate for each county in the Bay Area. These data are summarized in Table 3 in tons per day (tpd) and tons per year (tpy), for both PM_{10} and $PM_{2.5}$.

County	Wood Stove PM_{10} (tpd)	Fireplace PM_{10} (tpd)	Wood Stove $PM_{2.5}$ (tpd)	Fireplace $PM_{2.5}$ (tpd)
Alameda	0.03	2.28	0.03	2.19
Contra Costa	0.76	4.32	0.73	4.15
Marin	1.03	0.37	0.99	0.36
Napa	0.33	0.41	0.32	0.39
San Francisco	0.03	0.28	0.03	0.27
San Mateo	0.38	0.70	0.36	0.67
Santa Clara	0.65	3.11	0.62	2.99
Solano	0.05	0.89	0.05	0.85
Sonoma	1.27	1.43	1.22	1.37
Total Emissions Bay Area (tpd)	4.54	13.80	4.36	13.25
Total Emissions Bay Area (tpy)	1657	5037	1591	4836

Table 3. Summary of PM emissions from wood-burning devices by county.

Because the category of PM_{10} also includes $PM_{2.5}$, a large portion of PM_{10} particles are also $PM_{2.5}$ particles (Houck 1998). Therefore, the majority of PM from wood smoke are fine particles. It is these fine particles that are of greatest concern to public health according to recent studies (Woodruff 2006).

B. Evaluation of Controls for Wood-Burning Devices

PM emissions from wood-burning result from inefficient combustion of the wood. Increasing combustion efficiency reduces emissions and can be achieved through use of EPA-certified wood stoves (See certification example at Figure 3) and proper burning techniques.

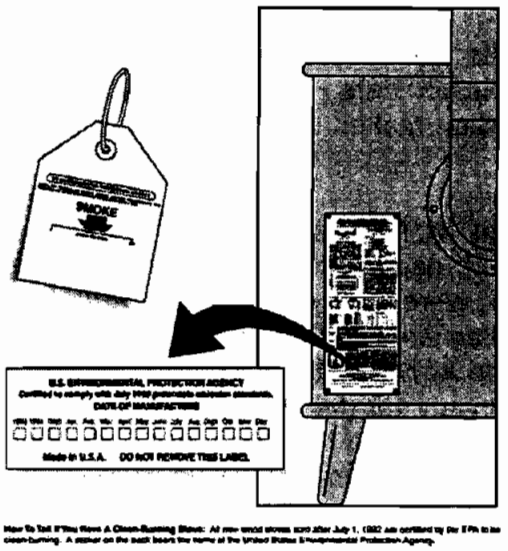

Figure 3. Example of an EPA certification on a wood burning stove.

Another alternative in reducing PM emissions from wood-burning combustion is to replace solid fuel combustion (wood as a fuel source) with natural gas or propane, which essentially eliminates PM.

Wood stoves are wood-burning devices that are enclosed to control combustion. EPA-certified stoves employ either a catalytic or non-catalytic system to increase combustion of the exhaust stream. These units are either stand alone or installed into a building's walls. A wood-burning insert can be placed in either a new or an existing fireplace.

Some EPA-certified stoves utilize a catalyst to reduce the ignition temperature of volatile gases resulting from wood combustion. A catalyst in a stove is a ceramic honey-combed combustor that is coated with a noble metal, such as platinum or palladium. These types of stoves require maintenance and eventually catalyst replacement during the lifetime of the stove in order to operate properly. The EPA certification emission limit for catalytic stoves is 4.1 grams per hour (g/hr).

Non-Catalytic stoves, on the other hand, achieve low-emission, cleaner burning by decreasing the firebox size, increasing turbulence (mixing) within the firebox, and adding baffles as well as secondary burn tubes to combust emission gases. These stoves still require maintenance to operate effectively, but do not have a catalyst to replace. The EPA certification emission limit for non-catalytic stoves is 7.5 g/hr.

Pellet stoves were developed during the 1970's to develop alternatives to fossil fuel. These devices burn pellets very cleanly and do not require EPA certification, although many manufacturers have the devices certified by the EPA. Pellet stoves burn wood that has been compressed into pellet form for combustion and easy storage. Some pellet stoves burn products other than wood, such as wheat or

corn. In addition to the need to be vented to the outside of the structure, pellet stoves require electricity to operate in order to utilize active air and fuel management systems to control combustion efficiency. Some pellet stoves cannot meet the EPA certification requirements due to excessive air-to-fuel ratios. These stoves, however, are efficient and clean burning.

A masonry heater is a site-built, or site-assembled, solid-fueled heating device consisting of a firebox, a large masonry mass, and a maze of heat exchange channels. While a masonry heater may look like a fireplace, it operates differently. It stores heat from a rapidly burning fire within its masonry structure, and slowly releases the heat over time. These devices currently do not require EPA-certification.

Proper burning techniques focus on proper fuel selection and fire-building. Dry or "seasoned" wood has a moisture content of 20 percent or less. This wood burns more efficiently since less heat is required to vaporize water in the wood. Proper wood placement for a fire also improves the combustion efficiency. Requiring proper labeling of seasoned wood for sale will provide the consumer with the necessary information on how to comply with mandatory wood-burning curtailment. Overall, an efficient fire leads to more complete combustion, lower emissions and lower fuel costs.

C. Evaluation of Potential Reductions

Emission reductions are calculated using the best available data and methodology. Reduction calculations for the proposed regulation are based upon baseline emission inventory data for wood-burning devices in the Bay Area, utilizing survey data and household population estimates from the ABAG.[3]

1. Mandatory Solid Fuel Burning Curtailment: Reductions from this standard were calculated using a total annual emission (see Table 3) from both wood stoves (1591 tpy) and fireplaces (4836) which totals 6427 tpy of $PM_{2.5}$.[4] The daily amount of emissions can be estimated to be:

> 6427 tpy (total annual emissions) divided by
> 120 days (number of days in the winter burning season) =
> 53 tpd (tons per day during winter season).

Air District staff estimates an average of 20 days per year of mandatory curtailment on wood burning. Therefore, the Air District anticipates a reduction based on:

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[3] Please note that values were rounded following the reductions calculations and therefore totals may not appear to be cumulative. For example, conversions from "tons/day" to "tons/year" were calculated before rounding the resulting values.

[4] For the purposes of this calculation, staff allocated annual emissions to the wintertime period (Sacramento, 2007).

20 days (number of estimated curtailment periods) times
53 tpd (tons per day during winter season) =
1071 tpy of $PM_{2.5}$.

According to Air District survey results, 77 percent of all Bay Area residents support mandatory curtailment. However, only 18 percent of households with a wood burning device did not burn at all during the season or refrained from burning due to the STAT campaign. Air District staff is, therefore, assuming a conservative 18 percent compliance rate, which reduces emissions of $PM_{2.5}$ to a total reduction of 192 tpy for the lower range of reductions. Staff anticipates that increased outreach and the transition from voluntary to mandatory curtailment will increase compliance rates and emission reductions over time to 77 percent, or a higher range of 825 tpy of $PM_{2.5}$.

2. Prohibition of Exceeding Ringelmann No. 1 (20 percent opacity): Air District staff has not calculated an emission reduction value for this standard due to the lack of sufficient data. A Ringelmann No. 1 standard, however, is consistent with visible emission standards applied to industrial sources and indicates efficient combustion. Staff anticipates the cumulative effect of this standard will contribute to lower local and overall PM concentrations.

3. Criteria for Sale, Transfer or Installation of Wood-burning Devices:
To calculate the emission reduction on a per unit basis, data calculations were based on assumptions of 50 g/hr of $PM_{2.5}$ for high-emitting or non-certified devices and 5 g/hr of $PM_{2.5}$ for low-emitting or certified devices were used. Therefore, the reduction is calculated as the difference between the two rates, or 45 g/hr.

According to Air District survey results, data indicates likely annual burn times in residences range from 30 to 150 hours per year. Therefore, in pounds per year based on a per unit basis for upgraded units, estimated reductions will be 3 to 15 pounds per year of $PM_{2.5}$.

It is anticipated that upgrades to cleaner burning technology will result in additional reductions. However, at this point in time it is not possible to determine where device upgrades will occur and to what extent Bay Area residents will upgrade.

4. Criteria of Wood-burning Devices in New Building Construction: Air District staff anticipates that requiring installation of wood-burning devices which are EPA certified or designated low emitting into any new housing construction will reduce annual $PM_{2.5}$ by 58 tpy. This value is based on survey results indicating the type of fuel Bay Area households are burning and the frequency at which the households are burning. These trends were applied to ABAG household projections forward looking to 2015 from 2005.[5]

[5] The Bay Area Air Quality Management District is comprised of the nine counties of the San Francisco Bay Area: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa

To calculate a reduction achieved for emissions from installed wood burning devices in new construction, staff started with two assumptions:

(1) Current emission levels carried forward to 2015 without New Construction Standard will increase by 2.8 tpd of $PM_{2.5}$ over ten years,

And,

(2) Lower emission levels projected forward to 2015 with New Construction Standard will increase by 1.2 tpd of $PM_{2.5}$ over ten years.

The difference between (1) and (2) is 1.6 tpd of $PM_{2.5}$. The annual results are achieved by multiplying 1.6 by 365, and then dividing by 10 to achieve per year averages which are summarized in Table 4.

Process description	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
(1) Projected emissions WITHOUT new construction requirement	105	102
(2) Projected emissions WITH new construction requirement	45	44
Bay Area Reduction [Difference between (1) and (2)]	**60**	**58**

Table 4. PM reduction annualized amounts based upon new household population growth.

According to Air District survey results, 64 percent of all Bay Area residents support a policy that all new construction use only gas fireplaces or EPA certified fireplace inserts, woodstoves or pellet stoves.

5. Prohibition Against Burning Garbage or Certain Materials: The prohibition against burning garbage or other materials not intended for wood-burning device use has no emission reduction calculated. This standard, however, is anticipated to reduce toxic air contaminants from residential burning.

6. Requirements for Seasoned Wood: Air District staff anticipates that burning seasoned wood increases combustion efficiency and decreases emissions.

According to Air District survey results, 4% of all Bay Area residents burned fresh cut wood and 5% were unsure of their firewood source. Air District staff approximated that 50% of those unsure of their fuel source burned non-seasoned wood for a total of 6.5% of all residents that burned non-seasoned wood. A total of annual emission (see Table 3) from both wood stoves (1591 tpy) and fireplaces (4836) is 6427 tpy of $PM_{2.5}$. Therefore,

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Clara, Solano, Sonoma. Solano and Sonoma county populations are 75 percent and 87 percent within the Air District jurisdiction, respectively.

6.5% of 6427 tpy of $PM_{2.5}$ = 417 tpy of $PM_{2.5}$ and

assuming seasoned wood emits 1 percent less of $PM_{2.5}$ than non-seasoned wood,

1% of 417 tpy of $PM_{2.5}$ = 4 tpy of $PM_{2.5}$.

IV. PROPOSED RULE AND AMENDMENTS BEING CONSIDERED

Proposed Regulation 6, Rule 3, consists of six standards to reduce PM from wood smoke as well as amendments to existing regulations:

1. Mandatory Solid Fuel Burning Curtailment: This standard would prohibit the operation of a wood-burning device whenever the Air District anticipates a negative impact upon public heath as a result of $PM_{2.5}$ levels. Mandatory curtailments will be forecast and the public will be notified via the Air District's website, news release, phone-line or email list-serve as well as other mass media and means deemed appropriate by the Air District.

The proposed rule has a limited exemption for this standard only for a person:

- whose wood burning device is the sole source of heat; or
- who is located where natural gas is unavailable.

2. Prohibition of Exceeding Ringelmann No. 1: The Ringelmann No. 1 is a visible emission standard equivalent to 20% opacity and will limit visible emissions from chimneys or flues based on visual observation.

The proposed rule has a limited exemption for emissions from the startup of a new fire for a period that is not to exceed twenty minutes in any four-hour period.

3. Criteria for Sale, Transfer or Installation of Wood-burning Devices: This standard applies to both used and new devices. A wood-burning device shall not be sold, transferred or installed within the Bay Area unless it is one of the following:

- A U.S. EPA Phase II certified wood-burning device;
- A pellet-fueled device;
- A masonry heater;
- A device approved in writing by the APCO that meets low mass fireplace emission targets.

Retailers and manufactures will be required to provide public awareness information (to include: the proper sizing, installation, operation and maintenance of the wood-burning device as well as the health effects of wood smoke) with the sale of each new wood-burning device. This information will be made available in print or electronic format, including email distribution, to the purchaser(s) of the device.

4. Criteria of Wood-burning Devices in New Building Construction: This proposed standard specifies that a wood-burning device installed in new construction must be one of the following:

- A U.S. EPA Phase II certified wood-burning device;
- A pellet-fueled device;

- A masonry heater;
- A device approved in writing by the APCO that meets EPA low mass fireplace emission targets.

Builders will provide public awareness information (to include: the proper sizing, installation, operation and maintenance of the wood-burning device, as well as the health effects of wood smoke) with any new construction which contains a builder-installed wood-burning device.

5. Prohibition Against Burning Garbage or Certain Materials: This standard requires that the following materials cannot be burned under any circumstance: garbage, chemically treated wood, non-seasoned wood, used or contaminated wood pallets, plastic products, rubber products, waste petroleum products, paints and paint solvents, coal, animal carcasses, glossy and/or colored paper, salt water driftwood, particle board, and any material not intended by a manufacturer for use as a fuel in a wood-burning device.

6. Requirements for Seasoned Wood: This standard requires that seasoned wood supplied or offered for sale must contain a moisture content of 20 percent or less by weight for cleaner burning.

A related administrative requirement requires that any seasoned wood packaged for sale include a package label identifying the wood as having a moisture content of 20 percent or less by weight. Seasoned wood and other solid fuels, with the exception of those intended for cooking, such as charcoal, also require additional labeling explaining the solid-fuel burning mandatory curtailment notification process and the health effects of solid fuel combustion.

7. Amendments: Regulation 1 establishes general provisions and definitions which apply to all other Air District rules and regulations. Regulation 1 currently excludes from any Air District regulation any fire for residential heating. An amendment is being proposed to eliminate this exclusion in order for Regulation 6, Rule 3, to regulate residential fires. Fires used indoor for residential cooking will not be affected.

Currently, Regulation 5 regulates open burning, or fires conducted outside of buildings. However, recreational fires are exempt if using only clean and dry wood. In order for a mandatory curtailment to be effective in reducing PM, the curtailment must be applicable also to outdoor recreational fires. Therefore, an amendment to Regulation 5 is being proposed to remove the exemption for recreational fires. Fires used outdoor for residential cooking will not be affected.

V. RULE DEVELOPMENT/PUBLIC CONSULTATION PROCESS

This Report and the associated Public Workshops are the most recent steps in the Air District's consultation process with industry, health organizations, and the public regarding Regulation 6, Rule 3: Wood-burning Devices. Following public workshops, Air District staff will evaluate comments before presenting a final draft for a public hearing by the Air District's Board of Directors.

Air District staff has met with concerned and interested stakeholders including: the American Lung Association and members of the Hearth, Patio & Barbecue Association. Air District staff has also spoken with the Home Builders Association of Northern California and the Marin County Community Development Sustainability Team.

The purpose of the Public Workshops is to solicit comments from the public on the proposed new Regulation 6, Rule 3. At the workshops, the staff will also respond to questions about information presented in this Workshop Report. Based on the input staff receives prior to and at the workshop, staff will decide whether changes to the proposal are necessary prior to a public hearing before the Air District's Board of Directors.

VI. REFERENCES

Association of the Bay Area Governments, Projections 2007

Boman, B Christoffer, A Forsberg, and Bengt Jarvholm. "Adverse Health Effects from Ambient Air Pollution in Relation to Residential Wood Combustion in Modern Society." Scan J Work Environ Health 29(2003): 251-260.

Dominici, Francesca; Roger Peng, Michelle Bell, Luu Pham, Aidan McDermott, Scott, Zeger, and Jonathan Samet.. "Fine Particulate Air Pollution and Hospital Admission for Cardiovascular and Respiratory Diseases." The Journal of the American Medical Association. 295(2006): 1127-1134.

Fairley, David. "Sources of Bay Area Fine Particles." Bay Area Air Quality Management District. *Draft.* Dated July 2007.

Houch, James, Paul Tiegs, Robert McCrillis, Carter Keithley, and John Crouch. "Air Emissions from Residential Heating: The Wood Heating Option Put into Environmental Perspective" U.S. EPA and Air Waster Management Association Conference: Emission Inventory: living in a Global Environment. 1(1998): 373-384.

Magliano, Karen, Philip Roth, Charles Blanchard, Steven Reynolds, Steve Ziman, and Rob DeMandel. "California Regional PM10/PM2.5 Air Quality Study Objectives and Associated Data Analysis and Modeling Approaches." *Draft.* Dated February 5, 1999.

Naeher, Luke, Michael Brauer, Michael Lipsett, Judith Zelikoff, Christopher Simpson, Jane Koenig and Kirk Smith. "Woodsmoke Health Effects: A Review." Inhalation Toxicology. 19(2007): 67-106.

Sacramento Metropolitan Air Quality Management District, 2007. Staff Report for Proposed Rule 417 – Wood Burning Appliances. Dated June 7, 2007.

Sällsten, Gerd, Pernilla Gustafson, Linda Johansson, Sandra Johannesson, Peter Molnar, Bo Strandberg, Claes Tullin and Lars Barregard. "Experimental Wood Smoke Exposure in Humans." Inhalation Toxicology. 18(2006): 855-864.

San Joaquin Valley Air Pollution Control District Rule 4901, "Wood Burning Fireplaces and Wood Burning Heaters." Adopted July 15, 1993.

South Coast Air Pollution Control District Proposed Rule 445, "Wood Burning Appliances." Dated March 13, 2007.

Washington State Department of Ecology, Chapter 173 – 433 WAC. "Solid Fuel Burning Devices." Adopted February 3, 1993.

Woodruff, Tracey, Jennifer D. Parker, Kenneth Schoendorf. "Fine Particulate Matter (PM2.5) Air Pollution and Selected Causes of Postneonatal Infant Mortality in California." Environment Health Perspectives. 114(2006): 786-790.

REGULATION 1
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REGULATION 1
GENERAL PROVISIONS AND DEFINITIONS

(Adopted September 5, 1979)

1-100 GENERAL

1-101 **Description:** The general provisions and definitions included in Regulation 1 shall apply to all other District Rules and Regulations. Definitions which are included in any other District Rule or Regulation are specific to that Rule or Regulation and shall not apply to any other Rule or Regulation.

1-102 **More than One Emission Standard**: Where a person is subject to more than one emission standard for the same air contaminant, the more stringent shall apply.

1-103 **Violations Not Authorized:** Nothing in District Rules or Regulations is intended to permit any practice in violation of any statute, ordinance, Rule or Regulation.

1-104 **Circumvention Not Permitted:** A person shall not undertake or authorize any practice intended or designed to evade or circumvent District Rules or Regulations.

1-105 **Regulations Not Intended to Apply to Workroom Atmosphere:** District Regulations are not intended to apply to the air quality requirements for the workroom atmosphere necessary to protect an employee's health from contaminants emitted by the source; nor are they concerned with the occupational health factors in an employer-employee relationship.

1-106 **Separation of Emissions:** Where air contaminants from a single source are emitted through two or more emission points, the total quantity of air contaminants thus emitted shall not exceed the quantity allowable through a single emission point.

1-107 **Combination of Emissions:** Where air contaminants from two or more sources are combined prior to emission and there are no adequate and reliable means to establish the nature, extent and quantity of emission from each source, District Regulations shall be applied to the combined emission as if it originated in a single source. Such emissions shall be subject to the most stringent limitations and requirements of District Regulations applicable to any of the sources whose air contaminants are so combined.

1-108 **Metric Governs:** When units of weight or measure are expressed in both the international system (SI) of metric units and English units, the metric units are the standard and the English units are approximations to be used for guidance only.

(Amended May 17, 2000)

1-109 **Severability:** If any District Rule or Regulation, or portion thereof, is adjudged by a court of competent jurisdiction to be unconstitutional or otherwise invalid, such judgment shall be limited to that Rule, Regulation or portion thereof, and not otherwise affect or invalidate the remainder of District Rules and Regulations.

1-110 **Exclusions:** District Regulations shall not apply to the following:

110.1 Engines used to propel motor vehicles, and defined by the Vehicle Code of the State of California.

110.2 Deleted May 17, 2000.

110.3 Aircraft.

110.4 Fires from ~~residential heating and~~ residential cooking.

110.5 Open outdoor fires, other than for the disposal of waste propellants, explosives or pyrotechnics by manufacturing facilities; recreational fires and outdoor cooking fires, except as limited by Regulation 5.

110.6 Any emission point which is not an intended opening and from which no significant quantities of air contaminants are emitted.

110.7 Smoke generators intentionally operated to train observers in appraising the shade of emissions.

110.8 Air contaminants, where purposely emitted for the sole purpose of a specific beneficial use, and where essentially all of the air contaminants are confined to the area in which such beneficial use is obtained. The quantity and nature of the air contaminants, and the proportion of air contaminants used in

relation to amounts of other materials involved in the beneficial use of air contaminants, shall conform to accepted practice in type of use employed.

110.9 Agricultural sources except as provided in:

9.1 Regulation 5: Open Burning; and

9.2 Regulation 2: Permits.

(Renumbered 3/17/82; Amended 12/19/90; 11/3/93; 5/17/00; 5/2/01; 7/19/06)

1-111 Deleted, October 7, 1998

1-112 Breakdown: The APCO may refrain from enforcing the provisions of District regulations for excesses of emissions resulting from the breakdown of air pollution abatement equipment or operating equipment provided such emissions do not interfere with the attainment or maintenance of any national or California ambient air quality standard and further provided that the persons responsible for such emissions comply with the administrative requirements of Section 1-431 and 432.

(Amended March 17, 1982)

1-113 Discretionary Enforcement, Breakdown: If excessive emissions resulting from the breakdown of air pollution abatement equipment or operating equipment persist until the end of a production run or up to 24 hours, whichever is sooner, a violation of District regulations shall be deemed to have occurred. However, the APCO may elect to take no enforcement action if the person responsible for the emissions shows that appropriate corrective measures have been taken and that emissions are either in compliance or that the equipment has been shut down either before the next production run or within 24 hours, whichever is sooner.

1-114 Exemption, Uncombined Water: Where the presence of uncombined water is the only reason for the failure of a visible emission to meet District limitations, those limitations shall not apply. The burden of proof to establish the application of this section shall be upon the person seeking to come within its provisions.

1-115 Exemption, Modification to Meet Emission Standards: When permits are necessary for modifying an existing source in order to comply with emission regulations such modifications shall not subject the existing source to emission standards for new or modified plants as set forth in Section 2-2-301 or 2-2-302 or 2-2-303 of Regulation 2, Permits.

(Amended December 17, 1980)

1-116 Definitions: Definitions that are specific to a Rule or Regulation shall take precedence over more general definitions.

116.1 A definition contained in a Rule shall apply to that Rule. Lacking such a definition,

116.2 A definition contained in Rule 1 of a regulation shall apply to all Rules of the Regulation. Lacking such a definition,

116.3 A definition contained in Regulation 1 shall apply to all District Regulations.

(Adopted May 17, 2000)

1-200 DEFINITIONS

1-201 Air Contaminant or Air Pollutant: Any material which, when emitted, causes or tends to cause the degradation of air quality. Such material includes, but is not limited to, smoke, charred paper, dust, soot, grime, carbon, fumes, gases, odors, particulate matter, acids or any combination thereof.

1-202 Air Pollution Control Equipment: Any equipment, the operation of which has as its primary purpose a significant reduction in either the emission of air contaminants or the effects of such emissions.

1-203 APCO: The Air Pollution Control Officer of the Bay Area Air Quality Management District or the designee thereof.

1-204 ARB: The Air Resources Board of the State of California.

1-205 Atmosphere: The air that surrounds the earth, excluding the general volume of gases contained within any building or structure if the APCO determines that emissions within such building or structure do not escape to the outside air.

(Amended March 17, 1982)

1-206 BAR: 100,000 pascals (100,000 N/m^2).

1-207 **Best Modern Practices:** The minimization of emissions from equipment and operations by the employment of modern maintenance and operating practices used by superior operators of like equipment and which may be reasonably applied under the circumstances.

1-208 **Breakdown (malfunction):** Any unforeseeable failure or malfunction of any air pollution control equipment or operating equipment which causes a violation of any emission standard or limitation prescribed by District, California or federal rules, regulations or laws, where such failure or malfunction:

208.1 Is not the result of intent, neglect, or disregard of any air pollution control law, rule or regulation;

208.2 Is not the result of improper maintenance;

208.3 Does not constitute a nuisance;

208.4 Is not an excessively recurrent breakdown of the same equipment.

1-209 **Commenced:** Where a person has undertaken a continuous program of construction, reconstruction or modification, or a person has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction, reconstruction or modification.

1-210 **Construction:** Fabrication, erection or installation of a plant.

1-211 **Discharge:** To permit, let, suffer or allow an emission.

1-212 **District:** The Bay Area Air Quality Management District.

1-213 **Emission or Emissions:** A gas or liquid stream containing one or more air contaminants. The verb form, emit, means the act of discharging an emission into the atmosphere.

1-214 **Emission Point:** The location (place in horizontal plane and vertical elevation) at which an emission enters the atmosphere.

1-215 **Facility:** Any property, real or personal, which may incorporate one or more plants all being operated or maintained by a person as part of an identifiable business on contiguous or adjacent property, and shall include, but not be limited to manufacturing plants, refineries, power generating plants, ore processing plants, construction material processing plants, automobile assembly plants, foundries and waste processing sites.

1-216 **Fixed Capital Cost:** The capital needed to provide all the depreciable components of a plant.

1-217 **Modification:** Any physical change in existing plant or change in the method of operation which results or may result in either an increase in emission of any air pollutant subject to District control, or the emission of any such air pollutant not previously emitted. The following shall not be regarded as physical changes or changes in the method of operation:

217.1 Routine maintenance, repair or replacement with identical or equivalent equipment.

217.2 Increased production rate or increased hours of operation where there is no increase in fixed capital cost, unless such production and hours are limited by permit conditions.

1-218 **Opacity:** The decrease in the transmission of light through a gas stream, as indicated by the expression $(1-P/P_o)$ where P_o is the radiant power initially directed at the emission being measured, and P is the radiant power received after passing through the emission.

(Amended May 21, 1980)

1-219 **Operation:** Any physical action resulting in a change in the location, form, or physical properties of a material, or any chemical action resulting in a change of the chemical composition, or chemical or physical properties of a material. The following are given as examples, without limiting the generality of the foregoing: heat transfer, calcination, double decomposition, fermentation, pyrolysis, electrolysis, combustion, material handling, evaporation, mixing, absorption, filtration, screening and fluidization.

219.1 Heat transfer operation means any operation which (a) involves the combustion of fuel for the principal purpose of utilizing the heat of combustion-product gases by the transfer of such heat to the process

material; and (b) does not transfer a significant portion of heat by direct contact between the combustion product gases and the process material.

219.2 Incineration operation means any operation in which combustion is carried on for the principal purpose, or with the principal result, of oxidizing a liquid or solid waste material to reduce its bulk or facilitate disposal or both of such.

219.3 Salvage operation means any operation in which combustion is carried out for the primary purpose or result of salvaging metals, where the principal metal to be salvaged is not melted. Other metals present in small quantities may be melted.

219.4 General operation means any operation other than those defined in Sections 1-219.1, 219.2 or 219.3.

1-220 **Operating Day:** A 24 hour time period from midnight to midnight.

(Amended May 17, 2000)

1-221 **Person:** Any natural person, corporation, government agency, public officer, association, joint venture, partnership or any combination of such or such entities as are included in Section 39047, California Health and Safety Code.

1-222 **Plant:** The machinery and equipment, including tanks, necessary to carry out an operation.

1-223 **ppmv:** Parts per million by volume.

1-224 **Reconstruction:** Replacement of the components of an existing plant to such an extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable, entirely new plant.

1-225 **Sampling Point:** The location in a Type A emission point where the measurements of flow volume and contaminant concentrations can be made which are representative of the actual flow volume and contaminant concentrations.

1-226 **Sea Level Atmospheric Pressure:** 1.01 bar or 101 kilo pascals (14.7 psia).

1-227 **Source:** Any operation that produces and/or emits air pollutants.

1-228 **Standard Conditions:** A sea level atmospheric pressure and a temperature of 21 degrees Celsius (70 degrees Fahrenheit).

1-229 **Standard Dry Cubic Meter:** One m^3 of gas free of water vapor and at standard conditions.

1-230 **Type A Emission Point:** An emission point, having sufficiently regular geometry so that both flow volume and contaminant concentrations can be measured and where the nature and extent of air contaminants do not change substantially between a sampling point and the emission point.

1-231 **Type B Emission Point:** An emission point other than a type A emission point.

1-232 **Visible Emissions:** Emissions which are visually perceived by an observer. Restrictions on visible emissions in District Regulations are expressed as numbers on the Ringelmann Chart as published by the United States Bureau of Mines. Emissions may not be as dark or darker than the designated number on the Ringelmann Chart, or cannot be of such opacity as to obscure a trained observer's view to an equivalent or greater degree. Where the presence of uncombined water is the only reason for the failure of an emission to meet District limitations, those limitations shall not apply (see Section 1-114).

1-233 **Organic Compound:** Any compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

(Adopted March 17, 1982)

1-234 **Organic Compound, Non-Precursor:** Methylene chloride, 1,1,1, trichloroethane, 1,1,2 trichlorotrifluoroethane (CFC-113), trichlorofluoromethane (CFC-11), dichlorodifluoromethane (CFC-12), dichlorotetrafluoroethane (CFC-114), and chloropentafluoroethane (CFC-115). In addition, any compound designated as having a negligible contribution to photochemical reactivity by the U.S. Environmental Protection Agency as published in the Federal Register shall be considered a Non-Precursor Organic Compound.

(Adopted 3/17/82; Amended 9/2/98)

1-235 **Organic Compound, Precursor:** Any organic compound as defined in 1-233 excepting the non-precursor organic compounds, 1-234.

(Adopted March 17, 1982)

1-236 **Volatile Organic Compound (VOC):** Any organic compound, as described in Section 1-233, which would be emitted during use, processing, application, curing or drying of a solvent, surface coating, or other material.

(Adopted October 19, 1983)

1-237 **Reduced Sulfur Compounds:** All organic and inorganic sulfide compounds and mercaptans.

(Adopted October 19, 1983)

1-238 **Parametric Monitor:** Any monitoring device or system required by District permit condition or regulation to monitor the operational parameters of either a source or an abatement device. Parametric monitors may record temperature, gauge pressure, flowrate, pH, hydrocarbon breakthrough, or other factors.

(Adopted Sept. 2, 1998)

1-239 **Continuous Emission Monitor:** Any monitoring device or system, required by Regulation 1-520 and 521.

(Adopted September 2, 1998)

1-240 **Abatement Device:** Any equipment or process whose sole purpose is to reduce the amount of one or more pollutants from the source.

(Adopted 10/7/98; Amended 5/17/00)

1-241 **Owner or Operator:** Any person who owns, leases, operates, controls, or supervises a facility, building, structure, installation, or source which directly or indirectly results or may result in emissions of any air pollutant.

(Adopted May 17, 2000)

1-242 **Parametric Emission Monitoring System:** A monitoring system that continuously measures process parameters and uses a computer model to estimate emissions based on the parameters measured. Usually used as an equivalent to, and in lieu of, direct measurement of emissions using a continuous emission monitor.

(Adopted May 17, 2000)

1-300 STANDARDS

1-301 **Public Nuisance:** No person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or the public; or which endangers the comfort, repose, health or safety of any such persons or the public, or which causes, or has a natural tendency to cause, injury or damage to business or property. For purposes of this section, three or more violation notices validly issued in a 30 day period to a facility for public nuisance shall give rise to a rebuttable presumption that the violations resulted from negligent conduct.

(Adopted 3/17/81; Amended 5/2/90)

1-400 ADMINISTRATIVE REQUIREMENTS

1-401 **Violation Notice:** A notice of violation or citation shall be issued by the District for all violations of District regulations and shall be delivered to persons alleged to be in violation of District regulations. The notice shall identify the nature of the violation, the rule or regulation violated, and the date or dates on which said violation occurred.

1-402 **Status of Violation Notices During Variance Proceedings:** Except as provided below, where a person has applied for a variance, no notices shall be issued during the period between the date of filing for the variance application and the date of decision by the Hearing Board for violations covered by the variance application. However, during the period between the date of the filing for a variance and the date of the decision by the Hearing Board, evidence of additional violations shall be collected and duly recorded. Where the variance is denied, evidence of violations collected between the filing date and decision date shall be reviewed and a notice of violation issued for violations occurring during that period shall be served upon said person. Where the variance is granted, no notice of violation shall be issued for violations occurring during that period except in extraordinary circumstances as determined by the APCO.

402.1 Notwithstanding the foregoing, when the Hearing Board's proceedings on a variance application will require more than one day of hearing time, any party to the proceeding may request, or the Hearing Board on its own motion may require, that the provisions of this Section 1-402 shall not apply to any violations occurring during the course of the variance proceeding unless and until the applicant has satisfied the good cause standard for the granting of an interim variance, as provided in Health and Safety Code Section 42351. In the event that a variance is eventually granted in such a case, the Air Pollution Control Officer may rescind any notices of violation issued during the course of the variance proceeding.

(Adopted October 21, 1992)

1-410 **Registration:** A person responsible for the emission of air contaminants shall register with the District on forms provided by the APCO, and shall thereafter provide any information requested by the APCO regarding such emissions to the District on an annual basis. Plants or facilities requiring annual operating permits are exempt from registration.

1-411 **Permits May Be Needed:** Registration with the District shall not relieve a person from the requirements of Regulation 2, Permits, where applicable.

1-412 **Address For Service:** A person registered with the District may be served notices, including notices of hearings before the Hearing Board, by certified mail addressed to the address contained in the registration form on file with the District.

1-420 **Emission Source Data:** Upon the request of the APCO, a person responsible for the emission of air contaminants shall provide the District with any data concerning emissions from any operation under such person's control. The data shall be in such form as prescribed by the APCO, who may require that such data be certified by a registered professional engineer.

1-430 **Breakdown Procedures:** The APCO shall establish written procedures to insure that all reported breakdown occurrences are handled uniformly to final disposition.

1-431 **Breakdown Report:** A person seeking relief pursuant to Section 1-112 shall notify the APCO of the breakdown condition immediately, with due regard for public safety, including the hazard of fire and explosion. Such notification shall include the time, specific location, equipment involved and to the extent possible the cause of the breakdown.

1-432 **Written Breakdown Report:** Within 30 days of the occurrence of a breakdown, the person responsible shall submit a written report to the APCO including the following:

432.1 Sufficient information to enable the APCO to determine whether or not a breakdown occurred and the cause of the breakdown;

432.2 A summary of the corrective action taken following the breakdown;

432.3 Present status of the breakdown, and

432.4 A summary of actions taken to insure that such breakdowns will not occur in the future.

1-433 **Determination of Breakdown:** Following the report made pursuant to Section 1-431, the APCO shall promptly investigate to determine whether the occurrence reported constitutes a breakdown. The determination may be made based upon information developed by the investigation, or upon the basis of such information in addition to information reported in the written report made pursuant to Section 1-432. If the APCO determines that the occurrence does not constitute a breakdown, appropriate enforcement action may be taken.

1-434 **Administrative Violation, Breakdown:** Any person who knowingly files falsely, or without probable cause, a claim for relief pursuant to Section 1-112 shall be presumed to be in violation of these regulations. The burden of proof of establishing that a breakdown has occurred shall be upon the person who requests the breakdown relief.

1-440 **Right of Access to Premises:** The person responsible for emissions shall provide to the APCO reasonable access to any facility or equipment therein which is subject to the permit requirements of the District and which may cause or control or record such emissions for the purpose of investigating compliance with District regulations

or California law. Such access shall be granted with due consideration for the safety of District employees and minimum interference with the operations of the facility.

1-441 **Right of Access to Information:** The APCO may request in writing from a person responsible for emissions from any source: plans, specifications, records, samples or other information which will disclose the nature, extent, quantity or degree of air contaminants which are or may be emitted by the source. Such information may include, but is not limited to, process charts, in-stack monitoring data and operating logs which relate to emissions. If the person feels that trade secrets are unreasonably being requested by the APCO, the person may appeal directly to the Board of Directors.

441.1 When copies of monitoring charts are requested, the APCO may require that such charts immediately be properly identified and labeled in the presence of a District representative.

441.2 When samples relating to emissions are requested, the APCO may require that such samples be obtained in the presence of a District representative.

441.3 Information requested by the APCO shall be provided as soon as reasonable possible, but in any event within 30 days from the date of receipt of the request.

1-500 MONITORING AND RECORDS

1-501 **Sampling Facilities:** A person responsible for the emission of air contaminants for which emission limits have been established by these regulations shall, upon the request of the APCO, provide such sampling and testing facilities, exclusive of instruments and sensing devices, as may be necessary for the determination of the nature and quantity of such air contaminants.

1-502 **Sampling at Type B Emission Points:** Emissions from a Type B emission point shall be measured at the place and by procedures which show the highest measurement of air contaminants.

1-510 **Area Monitoring**: Persons subject to or seeking to come within the provisions of the area monitoring requirements of these regulations shall install, calibrate, operate, site and maintain all monitoring equipment in order to monitor continuously the concentration of the specified air pollutant. Such persons shall install suitable instruments, and meteorological stations to monitor continuously and record weather conditions if required by the APCO or the terms of the regulations.

1-520 **Continuous Emission Monitoring:** Persons responsible for the emissions from the following sources shall install monitors for the following air pollutants or analog thereof:

520.1 NOx, CO_2, or O_2, from steam generators with a rated heat input of 264 GJ's (250 million BTU) or more per hour; and opacity from steam generators with a rated heat input of 264 GJ's (250 million BTU) or more per hour which are permitted for discretionary combustion of a non-gaseous fuel. Firing of non-gaseous fuel permitted under the "test-firing" provisions of District rules is not considered to be "discretionary."

520.2 NOx from all new nitric acid plants, and existing plants having a production capacity in excess of 272 metric tons (300 T) per days as 100% nitric acid.

520.3 SO_2 from sulfuric acid plants.

520.4 SO_2 from sulfur recovery plants emitting more than 45 KG (100 lbs.) per day of SO_2.

520.5 SO_2 and opacity from the catalyst regenerators of fluid catalytic crackers.

520.6 SO_2 and opacity from fluid cokers with a fresh feed rate greater than 1600 m^3 (10,000 bbls) per day.

520.7 SO_2 from fossil fuel fired steam generators with a heat input of 264 GJ's (250 million BTU) or more per hour with a use factor of at least 30% and utilizing flue gas desulfurizing units, and

520.8 Monitors as required by Regulations 10, 12 and Section 2-1-403 of Regulation 2.

(Amended 3/17/82; 10/7/98)

1-521 **Monitoring May Be Required:** The APCO may require the installation of suitable instruments to monitor continuously the nature, quantity and opacity of any air pollutant controlled by District regulations where there is a reason to believe such emissions are in potential violation of such regulations.

1-522 **Continuous Emission Monitoring and Recordkeeping Procedures:** Persons responsible for installing continuous emission monitors pursuant to District regulations shall comply with the following:

522.1 Plans and specifications for monitoring selection and placement shall be submitted to the APCO for prior approval.

522.2 Installation scheduling shall be completed as specified in Volume V, Manual of Procedures (MOP).

522.3 Continuous emission monitors and their components shall be performance tested as specified in Volume V, MOP.

522.4 Continuous emission monitor periods of inoperation greater than 24 continuous hours shall be reported by the following working day, followed by notification of resumption of monitoring. Adequate proof of expeditious repair shall be furnished to the APCO for downtime in excess of fifteen consecutive days.

522.5 Monitors shall be calibrated daily except for velocity sensing instruments which shall be calibrated monthly.

522.6 Continuous emission monitors and their components shall be maintained to be accurate to within twenty percent when compared to the field accuracy test procedures of Volume V, MOP, or 10% of the applicable emission standard, or 5% of span in the absence of an emission standard.

522.7 Any indicated excess of any emission standard to which the source is required to conform, as indicated by the monitor, shall be reported to the APCO within 96 hours after such occurrence. The report shall include the nature, extent, and cause.

522.8 Monitoring data shall be submitted on a monthly basis in a format specified by the APCO. Reports shall be submitted within 30 days of the close of the month reported on.

522.9 Records shall be maintained for a period of at least two years and shall be made available to the APCO on request. They shall include:

1) Occurrence and duration of any startup, shutdown or malfunction.
2) Tests, calibrations, adjustments and maintenance.
3) Emission measurements.

522.10 Monitors required by Sections 1-521 or 2-1-403 shall meet the requirements specified by the APCO.

(Adopted 3/17/82; Amended 9/2/98; 11/15/00)

1-523 **Parametric Monitoring and Recordkeeping Procedures:** Persons responsible for installing parametric monitors pursuant to District permit conditions or regulations shall comply with the following:

523.1 Parametric monitor periods of inoperation greater than 24 continuous hours shall be reported by the following working day, followed by notification of resumption of monitoring to the Compliance and Enforcement Division.

523.2 Parametric monitor periods of inoperation shall not exceed 15 consecutive days per incident or 30 calendar days per consecutive 12-month period.

523.3 Any violation of permit conditions or District regulations to which the source is required to conform, as indicated by the monitor, shall be reported to the APCO within 96 hours after such occurrence. The report shall include the nature, extent, and cause.

523.4 Records shall be maintained for a period of at least two years and shall be made available to the APCO on request. They shall include:

1) Dates and duration of monitoring system periods of inoperation.
2) Tests, calibrations, adjustments and maintenance.

523.5 The person responsible for emissions being monitored shall maintain and calibrate all required monitors and recording devices in accordance with the applicable manufacturer's specifications and the District Manual of Procedures. In order to claim that a manufacturer's specification is not

applicable, the person responsible for emissions must have, and follow, a written maintenance policy that was developed for the device in question. The written policy must explain and justify the difference between the written procedure and the manufacturer's procedure.

(Adopted 9/2/98; Amended 5/17/00; 11/15/00)

1-530 **Area Monitoring Downtime:** Area monitoring downtime caused by instrument malfunction, where such downtime exceeds a continuous 24-hour period, shall be reported to the APCO within the next normal working day after discovery of the malfunction. Downtime due to maintenance or repair which is expected to exceed 5 days' duration shall be reported to the APCO prior to the commencement of such maintenance or repairs.

(Amended March 17, 1982)

1-540 **Area Monitoring Data Examination:** At intervals of no greater than seven days, data recorded by the instruments required pursuant to Section 1-510 shall be examined by the persons responsible for the instruments to determine compliance with District Regulations.

(Amended March 17, 1982)

1-542 **Area Concentration Excesses:** Excesses of air pollutant levels over limits prescribed in District regulations recorded on instruments required pursuant to Section 1-510 shall be reported to the APCO within the next normal working day following the examination of data made pursuant to Section 1-540.

1-543 **Record Maintenance for Two Years:** Monitoring records of the equipment required by Section 1-510 shall be kept for a period of two years and shall be made available to the APCO upon request.

(Amended March 17, 1982)

1-544 **Monthly Summary:** The person responsible for emissions being monitored pursuant to Section 1-510 shall provide in such form as prescribed by the APCO a summary of data obtained during each calendar month, as specified in the Manual of Procedures.

(Amended March 17, 1982)

1-545 **Deleted November 15, 2000**

1-600 MANUAL OF PROCEDURES

1-600 **Manual of Procedures:** As part of these regulations there shall be established and periodically updated a Manual of Procedures. The Manual of Procedures shall include laboratory techniques, source test procedures, instrument specifications, monitoring requirements, enforcement procedures and other relevant information to determine the basis for enforcement action by the District. References to the Manual of Procedures is to the version adopted by the Board of Directors of the Bay Area Air Quality Management District.

(Amended 12/18/85, 1/8/86, 12/2/87, 11/3/93, 9/2/98)

1-601 **Approval of Sampling Facilities:** The criteria by which the APCO shall determine the acceptability of sampling facilities are set forth in the Manual of Procedures as adopted by the Board of Directors of the Bay Area Air Quality Management District.

(Amended 1/8/86; 12/2/87; 9/2/98)

1-602 **Area and Continuous Emission Monitoring Requirements:** The procedures for selection and placement, installation scheduling, performance testing, reporting, records retention and instrument calibration are detailed in the Manual of Procedures as adopted by the Board of Directors of the Bay Area Air Quality Management District.

(Amended 1/8/86; 12/2/87; 9/2/98)

1-603 **Visible Emissions:** Procedures for reading of visible emissions by an observer are contained in the Manual of Procedures as adopted by the Board of Directors of the Bay Area Air Quality Management District.

(Amended 1/8/86; 12/2/87; 9/2/98)

1-604 **Opacity Measurements:** Specifications and calibration procedures for instruments to be used to measure P and P_O are to be found in the Manual of Procedures as adopted by the Board of Directors of the Bay Area Air Quality Management District.

(Amended 1/8/86; 12/2/87; 9/2/98)

1-605 **Laboratory, Source Test and Air Monitoring Procedures:** The procedures for laboratory, source test and air monitoring analysis are detailed in the Manual of Procedures as adopted by the Board of Directors of the Bay Area Air Quality Management District.

(Amended 1/8/86; 12/2/87; 1/18/89; 4/19/89; 9/2/98)

REGULATION 5
OPEN BURNING

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REGULATION 5
OPEN BURNING

5-100 GENERAL

5-101 Description: This Regulation forbids open burning within the District with certain exceptions.

(Amended November 2, 1994)

5-110 Exemptions: The following fires are exempt from this Regulation:

110.1 Fires set only for cooking of food for human beings. ~~Fires set for recreational purposes using only clean dry wood or charcoal, and a small amount of firestarter.~~

110.2 Fires burning as safety flares or for the combustion of waste gases.

110.3 The use of flame cultivation when the burning is performed with LPG or natural gas-fired burners designed and used to kill seedling grass and weeds and the growth is such that the combustion will not continue without the burner.

110.4 Fires set for the purposes of fire training using one gallon or less of flammable liquid per fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

5-111 Conditional Exemptions: The following special conditions must be met for fires allowed by subsections 5-401.1 through 401.17 unless specifically exempted, altered, or further restricted in that subsection, or unless otherwise waived in writing by the APCO prior to burning, and these conditions shall be complied with during any burning permitted under those subsections. In addition, a condition, requirement, or parameter stated in or imposed by a smoke management plan approved by the APCO may supersede any one of these conditions.

111.1 No burning shall take place before 10:00 a.m. local time on any day.

111.2 No additional materials or fuel shall be ignited, nor shall any material or fuels be added to any fire after two hours before sunset on any day.

111.3 No material or fuel shall be ignited, nor shall any material or fuel be added to any fire when the wind velocity is less than five (5) miles per hour except for crossfiring, or when the wind direction at the site shall be such that the direction of smoke drift is toward a populated area in order to minimize local nuisances caused by smoke and particulate fallouts.

111.4 Prior to ignition, all piled material shall have dried for a minimum of 60 days, and be managed to ensure that burning the material does not produce smoke after sunset on any day.

111.5 All material to be burned shall be reasonably free of dirt or soil.

111.6 Piled material shall be limited to a base area not to exceed 25 square yards and the height shall be at least 2/3 of the average width of the pile.

111.7 Ignition material shall be limited to those listed by the State Director of Forestry, as follows: orchard torches; drip torches; pressurized diesel torches; propane or LPG torches; commercial petroleum gel materials, pressurized or solid (napalm or blivets); commercial safety fuses; commercial type ignition grenades, e.g. Fenner, etc.; fuses; commercial fuse lighters and matches. All fires shall be ignited so as to burn as rapidly as possible within conditions of safety and minimum pollution.

111.8 Ignition shall be initiated at or near the top of the piled material. No additional material, except ignition material, shall be added to the fire.

111.9 Tonnage, volume or acreage of material burned on any given day and/or at any specified site is subject to limitations set by the APCO, but may not exceed any limits set by the ARB.

(Amended 12/19/90; 11/2/94;3/6/02)

5-112 Limited Exemption, Recreational Fires: A fire set for recreational purposes is exempt from the requirements of Section 301.

5-200 DEFINITIONS

5-201 Agricultural Fire: A fire used for the purpose of initiating, continuing or maintaining agriculture as a gainful occupation. Fuels are limited to materials grown on the site and shall not include feed or fertilizer containers, finished or treated wood, plastic or rubber products, plumage, hides, fur, offal or fecal material or refuse from plant or animal processing other than from initial crop harvesting, pruning or attrition of fruit and nut trees, vines and cane crops.

(Amended 11/2/94; 3/6/02)

5-202 Fire: Any combustion of combustible materials of any type outdoors ~~in the open, not in any enclosure, where the products of combustion are not directed through a flue~~.

5-203 Flue: Any duct or passages for air, gases, or the like, such as a stack or chimney.

5-204 Gainful Occupation: Any occupation from which there is proof of gross profit or loss as evidenced by tax receipts, sales slips or other such documents.

5-205 Deleted December 19, 1990

5-206 Permissive Burn Day: Any day that is so declared by the APCO when, in his opinion, air pollution caused by open burning will not adversely affect ambient air quality or downwind population. In declaring such permissive burn days, the meteorological criteria established by the ARB for the San Francisco Bay Area Air Basin shall be used as a guideline.

(Amended November 2, 1994)

5-207 Treated Brush: Material which has been felled, crushed or uprooted with mechanical equipment, or has been desiccated with herbicide.

5-208 Hazardous Material: For purposes of this Regulation, any combustible or flammable material which may pose a fire or explosion hazard including but not limited to, natural vegetation or other native growth cleared away to create or maintain a firebreak around any building or structure on a property as required to comply with Section 4291 of the State Public Resources Code to reduce the risk of a wildfire.

(Adopted 3/17/82; Amended 12/19/90; 11/2/94; 3/6/02)

5-209 Public Fire Official: An officer of a public agency charged with the responsibilities of setting or allowing fires. Public fire official includes but is not limited to, local, state, and federal officers.

(Adopted December 19, 1990)

5-210 Contraband: Any illegal or prohibited good that has been confiscated by a public law enforcement agency, including but not limited to explosives, pyrotechnics and illegal drugs.

(Adopted 12/19/90; Amended 11/2/94)

5-211 Deleted March 6, 2002

5-212 Stubble: The remaining stalk, stem, or trunk of a herbaceous plant or cereal grass (primarily oats, wheat and hay) after harvest of a field crop.

(Adopted November 2, 1994)

5-213 Prescribed Burning: The planned, controlled application of fire to vegetation to achieve a specific natural resource management objective(s) on land areas selected in advance of that application. The fire is conducted within the limits of a plan and prescription that describes both the acceptable range of weather, moisture, fuel, and fire behavior parameters to achieve the desired effects. For the purposes of this regulation, prescribed burning also means any Forest Management fire, Range Management fire, Hazardous Material fire not related to Public Resources Code Section 4291, or any Crop Replacement fire for the purpose of establishing an agricultural crop on previously uncultivated land, that is expected to exceed 10 acres in size or burn piled vegetation cleared or generated from more than 10 acres of land. These specific fire types shall be regulated as Wildland Vegetation Management fires and subjected to all of the requirements applicable to subsection 5-401.15. In addition, prescribed burning includes any naturally-ignited wildland fire managed for resource benefits that is subject to the applicable requirements in Section 5-408.

(Adopted 11/2/94; Amended 3/6/02)

5-214 **Backfiring:** A field crop burn ignition technique where the fire is ignited at the downwind side of the burn area, so that the fire must burn into the wind towards the fuel source.

(Adopted November 2, 1994)

5-215 **Stripfiring:** A field crop burn ignition technique where the fire is ignited in parallel strips by walking straight through the burn area into the wind.

(Adopted November 2, 1994)

5-216 **'X' or Crossfiring:** A field crop burn ignition technique where the fire is ignited in two semi-circle arch patterns that almost intersect in the middle of the burn area. The first fire is lit by walking into the wind from the downwind side. The second fire is lit by walking with the wind from the headwind side of the field. This technique is used during light (less than five miles per hour) and variable winds only.

(Adopted November 2, 1994)

5-217 **Property:** A single parcel of real property, as determined by the County Assessor. The term also includes contiguous parcels under the same ownership.

(Adopted November 2, 1994)

5-218 **APCO:** The Air Pollution Control Officer of the Bay Area Air Quality Management District or the designee thereof.

(Adopted November 2, 1994)

5-219 **ARB:** The Air Resources Board of the State of California.

(Adopted November 2, 1994)

5-220 **District:** The Bay Area Air Quality Management District.

(Adopted November 2, 1994)

5-221 **Forest:** A vegetation type or plant community covering a tract of land, which is named and described as a series, habitat or unique stand according to the California Native Plant Society (CNPS) classification system set forth in the most current edition of *A Manual of California Vegetation* published by CNPS, and dominated by trees growing more or less closely together. For the purposes of this regulation, the dominant vegetation form must be described as a broadleaf deciduous, broadleaf evergreen, conifer, or mixed broadleaf-conifer forest. Forest does not include chaparral, scrub and grassland communities, or the eucalyptus series, as these vegetation types are described in the CNPS classification system.

(Adopted March 6, 2002)

5-222 **Marshland:** A type of wetland ecosystem periodically or permanently inundated to a depth of up to 2 meters (6.6 feet) that supports a cover of low or tall emergent vegetation. Habitats within these water-land areas include diked, seasonally managed wetlands, unmanaged tidal wetlands, open bays, sloughs, and associated upland grasslands.

(Adopted March 6, 2002)

5-223 **Curtailment Period:** Any period so declared to the public by the APCO when a negative impact upon public health, resulting from particulate matter of 2.5 micrograms in size or less ($PM_{2.5}$), is forecast. In declaring such curtailment period, the APCO shall notify the public of each mandatory curtailment by any or all of the following methods:

223.1 Provide notice to newspapers, radio stations or television stations of general circulation within the Bay Area Air Quality Management District (BAAQMD);

223.2 Provide a recorded telephone message on the BAAQMD informational phone numbers;

223.3 Provide emails to recipients of the "Spare the Air" list server;

223.4 Provide a message posted on the District's website, www.sparetheair.org; and/or;

223.5 Any other such method as the APCO determines to be appropriate.

5-224 **Recreational Fires:** A fire used for social or cultural activities including campfires, bonfires, ceremonial fires, handwarming fires, raku or pit pottery curing fires, or fires conducted as part of an unusual event such as fire walking provided only clean dry wood and fire starter is used, and the activity is not part of a business for gainful occupation.

5-300 STANDARDS

5-301 Prohibition of Fires: Except as provided in this regulation:

301.1 A person shall not ignite, cause to be ignited, permit to be ignited, or suffer, allow, or maintain any fires within the District.

301.2 No burning shall take place within the District on other than a permissive burn day, or in excess of any acreage burning allocation or limitation.

301.3 A person shall not violate any condition, requirement, or parameter stated in or imposed by a smoke management plan approved by the APCO, or any special condition or administrative requirement in this regulation.

(Amended 11//94; 3/6/02)

5-302 Mandatory Curtailment for Recreational Fires: No person shall ignite, cause to be ignited, permit to be ignited, or suffer, allow, or maintain any recreational fires during curtailment periods.

5-400 ADMINISTRATIVE REQUIREMENTS

5-401 Allowable Fires: The following fires may be allowed on permissive burn days:

401.1 Disease and Pest: Agricultural fires set for the purpose of disease and pest prevention. The fire must be set or allowed by the Agricultural Commissioner of the County in the performance of official duty. Prior reporting pursuant to Section 5-406 must be made to the APCO, by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.2 Crop Replacement: Agricultural fires set for the purpose of establishing an agricultural crop in a location that formerly contained another type of agricultural crop or on previously uncultivated land. The fire must be set or allowed by the public fire official having jurisdiction, in the performance of official duty, and must be necessary for the crop replacement to proceed. Fires are limited to a period beginning October 1 and ending April 30; however, upon the determination of the APCO that heavy winter rainfall has prevented such burning, the burn period may be extended to no later than June 30. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.3 Orchard Pruning and Attrition: Agricultural fires set for the purpose of disposal of periodic prunings and attrition losses from fruit trees, nut trees, vineyards and cane fruits. Fires must be set or allowed by the public fire official having jurisdiction, in the performance of official duty, and must be necessary to maintain and continue the growing of the fruit trees, vineyards and cane fruits as a gainful occupation. Fires are limited to a period beginning November 1 and ending April 30; however, upon the determination of the APCO that heavy winter rainfall has prevented such burning, the burn period may be extended to no later than June 30. When pruning is performed between February 15 and April 30 for integrated pest management purposes, the following minimum drying time periods shall apply: trees and branches over six inches in diameter: 30 days; for grape vines and branches less than or equal to six inches in diameter: 15 days. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 3/15/81; 12/19/90; 11/2/94; 3/6/02)

401.4 Double Cropping Stubble: Agricultural fires set for the purpose of disposal of grain stubble from agricultural land from which both grain and vegetable crops are harvested during the same calendar year. Fires must be set or allowed by a public fire official having jurisdiction, in the performance of official duty, and must be necessary to remove the grain stubble and straw before a field vegetable crop can be planted. All material to be burned shall be free of visible surface moisture. No fires shall take place before 10:00 a.m. local time on any day. Fires are limited to a period beginning June 1

and ending August 31. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.5 Stubble: Agricultural fires set for the purpose of disposal of stubble and straw. Fires must be set or allowed by a public fire official having jurisdiction, in the performance of official duty, and must be necessary to maintain and continue the growing of field crops as a gainful occupation. Fire ignition techniques shall be limited to backfiring, stripfiring, and 'X' or crossfiring unless an alternate technique is approved by the APCO in writing where a specific field condition is determined not to lend itself to these techniques in a given year. All material to be burned shall be free of visible surface moisture. After 0.15 inches or more rainfall, the material must pass the "crackle" test pursuant to Section 5-601 prior to burning. No fires shall take place before 10:00 a.m. local time on any day. Fires are limited to a period beginning September 1 and ending December 31. Outside of Sonoma County, no more than 100 acres of any property shall be burned in a single day. Within Sonoma County, no person shall conduct a burn without receiving an acreage burning allocation from the APCO and no more than 500 acres total of all properties shall be burned in a single day. In addition, no more than 100 acres of any property shall be burned in a single day. If by 12:00 p.m. local time the daily 500-acre burn acreage limitation has not been allocated, up to 200 acres of any property may be burned in a single day provided:

a. the additional acreage burning allocation has been approved verbally by the APCO; and
b. no more than two fields exceeding 100 acres total are burned simultaneously on the same property.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.6 Hazardous Material: Any fires set for the purpose of the prevention or reduction of a fire hazard, including the disposal of dangerous materials. The fire must be set or allowed by any public fire official having jurisdiction, in the performance of official duty. The fire must, in the opinion of such officer, be necessary, and the fire hazard not able to be abated by any other means. However, these fires may also be conducted to dispose of materials generated to comply with an order or notice issued by an fire official pursuant to Section 4291 of the State Public Resources Code provided all of the following conditions are satisfied:

a. only natural vegetation or other native growth may be burned;
b. the amount of material to be burned shall be greater than 5 cubic yards cleared annually from a single property;
c. the material is burned where it was grown without being moved to a different location unless approved by the APCO;
d. the material is inaccessible for removal by vehicle and available alternatives to burning such as shredding, chipping, composting, disking, plowing, and harrowing are not feasible; and
e. the material, if ignited accidentally, would result in a fire of such magnitude as to immediately threaten life or adjacent improved property or resources and require an excessive fire suppression effort.

No fires involving piled material shall be ignited or take place before 9:30 a.m. local time on any day. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.7 Fire Training: Fires set for the exclusive purpose of instruction of either public or industrial employees in fire fighting methods. The fire must be set or allowed by the public fire official having jurisdiction, in the performance of official duty, and must be, in his opinion, necessary. Notwithstanding contrary provisions of Section 5-111, a fire fighting agency may set one fire per quarter calendar year for the purpose of training volunteer or seasonal fire fighters. This may be done on other than a permissive burn day if the

APCO is notified in writing or facsimile at least two weeks in advance. Fires may be conducted outside of the burn hour limits in subsections 5-111.1 and 111.2 if the APCO is notified in writing or facsimile at least seven calendar days in advance. Prior reporting pursuant to Section 5-406 must also be made to the APCO for other fire training by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.8 Flood Debris: Agricultural fires set for the purpose of removing wood and vegetation debris deposited by floodwaters. The fire must be set or allowed by the public fire official having jurisdiction, in the performance of official duty, and must be necessary for the continuing or maintaining of agriculture as a gainful occupation. Fires are limited to a period beginning October 1 and ending May 31. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.9 Irrigation Ditches: Agricultural fires set for the purpose of controlling growth of vegetation in irrigation ditches and canals. The fire must be set or allowed by a public fire official having jurisdiction, in the performance of official duty, and must, in the opinion of such officer, be necessary to avoid interference with water flow or drainage into irrigated land. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.10 Flood Control: Fires set for the purpose of disposal of material which is lying or growing within natural channels or flood control channels. The fire must be set or allowed by a public official in charge of flood control activities. The fire must, in the opinion of such official, be a necessary incident to the clearing and maintenance of water courses and flood control channels for preventing or eliminating a flood hazard. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94)

401.11 Range Management: Fires set for the purpose of range management and grazing. The fire must be set or allowed by the State Director of Forestry, or public fire official having jurisdiction, in the performance of official duty, and must be necessary to maintain and continue the grazing of animals as a gainful occupation. Brush to be burned shall be treated at least six months prior to burn if determined to be technically feasible by the State Director of Forestry or public fire official. Unwanted trees over 6 inches in diameter shall be felled prior to burn and dried for a minimum of six months. Feasibility shall be subject to the approval of the APCO. Subsections 5-111.1 and 5-111.6 may be waived by the State Director of Forestry or fire official when determined necessary in the public interest. Fires are limited to a period beginning July 1 and ending April 30. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.12 Forest Management: Fires set for the purpose of removing forest debris and for forest management. The fire must be set or allowed by a public fire official having jurisdiction, in the performance of official duty, and must, in his opinion, be necessary. Subsections 5-111.1 and 5-111.6 may be waived by the fire official when deemed necessary in the public interest. All materials shall be piled or windrowed unless deemed poor practice by the fire official. Fires are limited to a period beginning November 1 and ending April 30. Prior reporting pursuant to Section 5-406 must be made to the APCO by the person setting the fire.

(Amended 12/19/90; 11/2/94; 3/6/02)

401.13 Marsh Management: Fires set for the purpose of improvement of marshland for wildlife habitat. The fire must be declared necessary by the California Department of Fish and Game. No such fire may be allowed on a given piece of land more than once in any 2 year period. The California Department of Fish and Game shall provide the APCO such information as may be deemed necessary by the APCO to verify the necessity of each burn

and land area burning frequencies. Any person seeking to set fires under this provision shall also comply with the requirements of Section 5-410 and receive written APCO approval of the smoke management plan prior to any burn. No fires shall take place before 10:00 a.m. or after 3:00 p.m. local time, nor shall any existing burning be allowed to continue after 3:00 p.m. local time on any day. Fires are limited to a Spring burning period beginning February 1 and ending March 31, and a Fall burning period beginning September 1 and ending October 15; however, upon the determination of the APCO in consultation with the California Department of Fish and Game and the Solano County Mosquito Abatement District, that heavy winter rainfall has prevented such burning, the burn period beginning February 1 and ending March 31 may be extended to no later than June 30. Outside of the Suisun Resource Conservation District (SRCD), no person shall conduct a burn without receiving an acreage burning allocation from the APCO and no more than 100 acres of any property shall be burned in a single day. For fires conducted within the boundaries of the SRCD:

a. no person shall conduct a burn without receiving an acreage burning allocation from the APCO;

b. total daily acreage to be burned shall be determined by the APCO, but in no case shall the total acreage burning allocation exceed 300 acres/day during the Fall burning period and 600 acres/day during the Spring burning period. In addition, no more than 100 acres of any property and no more than 100 acres of all properties designated by the same SRCD hundred-series ownerships shall be burned in a single day during the Fall or Spring burning period.

(Amended 3/15/81; 5/20/81; 8/3/83; 11/2/94; 3/6/02)

401.14 Contraband: Fires set for the purpose of disposing of contraband. The fire must be set or allowed by any peace officer or public fire official, in the performance of official duty. The fire must, in the opinion of such officer, be necessary and the material not be able to be disposed of by any other means. Prior reporting must be made to the APCO by the person setting the fire pursuant to Section 5-406.

(Adopted 12/19/90; Amended 11/2/94)

401.15 Wildland Vegetation Management: Prescribed burning by a state or federal agency, or through a cooperative agreement or contract involving the state or federal agency, conducted on land predominately covered with chaparral, trees, grass, coastal scrub, or standing brush. Any person seeking to set fires under this provision shall comply with the requirements of Section 5-408 and receive written approval of the smoke management plan by the APCO prior to any burn. Until June 1, 2002, this fire may be conducted on other than a permissive burn day, as defined in Section 5-206, if approved by the APCO pursuant to subsection 5-408.2. Effective June 1, 2002, fires may not be conducted on other than a permissive burn day.

(Adopted November 2, 1994)

401.16 Filmmaking: Fires set as part of commercial film or video production activities for motion pictures and television. The fire shall be set or allowed by the public fire official having jurisdiction, in the performance of official duty. Any person seeking to set fires under this provision shall comply with the requirements of Section 5-409 and receive APCO approval in writing at least 10 working days prior to the burn. This fire may be done on other than a permissive burn day, as defined in Section 5-206, if approved by the APCO pursuant to subsection 5-409.2.

(Adopted November 2, 1994)

401.17 Public Exhibition: Fires set as part of a planned civic event designed to educate or otherwise benefit the public. The fire shall be set or allowed by the public fire official having jurisdiction, in the performance of official duty. Any person seeking to set fires under this provision shall comply with the

requirements of Section 5-409 and receive APCO approval in writing at least 10-working days prior to the burn. This fire may be conducted on other than a permissive burn day, as defined in Section 5-206, if approved by the APCO pursuant to subsection 5-409.2.

(Adopted 11/2/94; Amended 3/6/02)

5-402 **Deleted November 2, 1994**

5-403 **Agricultural Land Use:** Debris from land clearing shall not qualify under subsections 5-401.1, 5-401.2, 5-401.3, 5-401.4 or 5-401.5 unless applicant certifies, under penalty of perjury, that said land is to remain in agricultural use for a gainful occupation for a period of one year subsequent to the burning, and that applicant has not caused or contributed to the need for the burning of the material for any reason other than the promotion of agricultural use of the land for a gainful occupation. However, the County Agricultural Commissioner may waive this Section by certifying that burning of the material under subsection 5-401.1 is, in his opinion, the only safe method of disposal. Failure to comply with the conditions of this Section shall be considered a violation of this Regulation. Each pile burned in violation shall be cited as a separate offense.

(Amended 11/2/94; 3/6/02)

5-404 **Emergency Waivers:** A public officer authorized under subsections 5-401.1, 5-401.6 and 5-401.10 to grant permission for open burning may grant waivers from subsections 5-111.1 through 5-111.9 when, in his judgment, such emergency or summary action is necessary for the public safety. When such action is taken, the authorizing authority shall certify the following in a written report submitted to the APCO within 10 calendar days following the completion of burning: a description and quantity of the material burned and an explanation of the reasons for granting the permission.

(Amended 11/2/94; 3/6/02)

5-405 **Deleted March 6, 2002**

5-406 **Prior District Notification; Disease and Pest, Crop Replacement, Orchard Pruning and Attrition, Double Cropping Stubble, Forest Management, Flood Debris, Fire Training, Flood Control, Irrigation Ditches, Range Management, Hazardous Material, and Contraband:** The person setting the fire shall provide electronic, typewritten, legibly handwritten, or computer printed notification to the District prior to the burn on a District-approved form or facsimile thereof. If notification is submitted by mail, the document must be postmarked at least 5 calendar days prior to the burn. The notification form must be completely filled out with accurate information to satisfy this requirement. For structural fire training, written notification shall also be made to the APCO at least 10 working days prior to the burn pursuant to the requirements of Regulation 11-2-401.3 (Asbestos Demolition, Renovation and Manufacturing).

(Adopted 12/19/90; Amended 11/2/94; 3/6/02)

5-407 **Deleted November 2, 1994**

5-408 **Wildland Vegetation Management Burn Requirements:** Any person who seeks to conduct or conducts prescribed burning pursuant to subsection 5-401.15 shall comply with the following requirements:

408.1 Submit a smoke management plan to the APCO for review at least 30 calendar days prior to the proposed burning that is consistent with the most current USEPA guidance on wildland and prescribed fires (*Interim Air Quality Policy on Wildland and Prescribed Fires*, USEPA 1998, or any subsequent document that supersedes this document), and provides the following information:

a. location and specific objectives of each proposed burn;
b. acreage, tonnage, type, and arrangement of vegetation to be burned;
c. directions and distances to nearby sensitive receptor areas;
d. fuel condition, combustion and meteorological prescription elements for the project;
e. projected burn schedule and expected duration of project ignition, combustion, and burn down (hours or days);

f. specifications for monitoring and of verifying critical parameters including meteorological conditions and smoke behavior before and during the burn;
g. specifications for disseminating project information to public;
h. contingency actions that will be taken during the burn to reduce exposure if smoke intrusions impact any sensitive receptor area;
i. certification by a qualified professional resource ecologist, biologist, or forester that the proposed burning is necessary to achieve the specific management objective(s) of the plan;
j. a copy of the environmental impact analysis prepared for the plan that includes an evaluation of alternatives to burning, if such an analysis was required by state or federal law or statute;
k. project fuel loading estimate (tons vegetation/acre) by vegetation type(s) and a description of the calculation method; and
l. particulate matter emissions estimate including referenced emission factor(s) and a description of the calculation method used.

408.2 Until June 1, 2002, permission to burn on other than a permissive burn day shall be governed by the 48-hour forecast issued by the APCO. Effective June 1, 2002, permission to burn shall be governed by the acreage burning allocation issued by the APCO.

408.3 Until June 1, 2002, prior to ignition, notify the APCO on the day of each burn. Effective June 1, 2002, receive an acreage burning allocation from the APCO prior to ignition.

408.4 For each day on which burning occurs, report the total acreage and tonnage of vegetation actually burned to the APCO by telephone no later than 12:00 p.m. local time the following day.

408.5 Within 30 calendar days following completion of the burn project, provide a written post-burn evaluation to the APCO that addresses whether the project objectives were met and describes actual smoke behavior.

Effective June 1, 2002, any fire official seeking to conduct prescribed burning in a geographical area considered for a potential naturally-ignited wildland fire managed for resource benefits that is expected to exceed 10 acres in size shall annually register each burn project in writing with the APCO by December 31 each year, with updates as they occur. Once a decision is made to manage the fire for resource benefits, the fire official shall provide a smoke management plan for the burn project to the APCO, upon request.

(Adopted 11/2/94; Amended 3/6/02)

5-409 Filmmaking and Public Exhibition Burn Petitions: Any person seeking to conduct a fire pursuant to subsection 5-401.16 or 401.17 shall comply with the following requirements:

409.1 Submit an open burning petition to the APCO that provides the following information, as applicable:
a. date(s) and specific location(s) of each proposed burn;
b. type and quantity (tonnage, acreage, or volume) of each material to be burned;
c. the projected fuel use rate in BTU per hour, if known, calculated using the higher heating value of each fuel; and
d. the burn duration.

409.2 Permission to burn on other than a permissive burn day shall be subject to written approval of the open burning petition by the APCO.

409.3 Prior to ignition, notify the APCO on the day of each burn.

409.4 If the APCO grants written approval, such approval shall be available at the burn location for inspection by the APCO, upon request.

(Adopted 11/2/94; Amended 3/6/02)

5-410 Marsh Management Burn Requirements: Effective June 1, 2002, any person who seeks to conduct or conducts a fire pursuant to Subsection 5-401.13 shall:

410.1 In order to receive an acreage burning allocation, at least 30 calendar days prior to the proposed burning, submit a smoke management plan to the APCO for review using a District-approved form;

410.2 In securing the written necessity statement required by California Health and Safety Code Section 41861, submit to the California Department of Fish and Game (DFG) and the APCO information that (1) identifies the non-burning alternatives considered by the property owner(s) given the recommendations or needed improvements described in existing Individual Ownership Management Plans, updated Individual Ownership Adaptive Management Habitat Plans, Wildlife Management Plans or other resource management plans as applicable; and (2) explains why water management practices and non-burn vegetation management practices cannot currently achieve the management objective(s) of the proposed fire and the property. Where DFG is conducting a burn on state lands, this information shall be submitted by DFG to the APCO prior to the proposed burning;

410.3 Prior to the proposed burning, submit the written statement required by Health and Safety Code Section 41861 to the APCO;

410.4 For each day on which burning occurs, report the total acreage of vegetation actually burned to the APCO by telephone no later than 12:00 p.m. local time the following day.

(Adopted March 6, 2002)

5-500 MONITORING AND RECORDS

5-501 Open Burning Records: Effective June 1, 2002, any person subject to Section 5-408 or 5-410 shall comply with the following requirements:

501.1 The person who conducts the fire shall maintain records on a daily basis that document and verify the actual acreage burned. Such documentation shall include the following information:

a. date and location of burn
b. a description of the method(s) or technique(s) used to verify the actual acreage burned
c. data collected that supports the burn acreage determination, and
d. type of vegetation and acreage actually burned.

501.2 Such records shall be retained for twelve months and made available to the APCO, upon request.

(Adopted 12/90; Amended 11/2/94; 3/6/02)

5-600 MANUAL OF PROCEDURES

5-601 Appraisal of Field Crop Fuel Moisture; The "Crackle" Test: Any person who wants to conduct an evaluation of fuel moisture in field crop stubble or straw remaining after harvest pursuant to subsection 5-401.5 shall satisfy the following criteria prior to burning:

601.1 Sampling: To ensure representative sampling, sample in accordance with the following requirements:

a. obtain samples from several different areas of the field
b. select some samples from underneath the straw mat including the bottom layer
c. a handful of sample material is considered a sufficient size to test.

601.2 Evaluation: The field is considered dry enough to burn, or passes the "crackle" test when:

a. each sample is tested just prior to burning
b. each sample tested makes an audible "crackle" when it is bent sharply.
c. If the sample does not pass the test, then the area from which the sample was selected cannot be burned until such material is considered dry enough to burn.

(Adopted November 2, 1994)

REGULATION 6
PARTICULATE MATTER AND VISIBLE EMISSIONS
RULE 3
WOOD-BURNING DEVICES

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REGULATION 6
PARTICULATE MATTER AND VISIBLE EMISSIONS
RULE 3
WOOD-BURNING DEVICES

6-3-100 GENERAL

6-3-101 Description: The purpose of this rule is to limit emissions of particulate matter and visible emissions from wood-burning devices.

6-3-110 Limited Exemption, Natural Gas Unavailability: Wood-burning devices in areas where natural gas service is not available, as determined by gas utility service to an area or household, are exempt from the requirements of Section 6-3-301.

6-3-111 Limited Exemption, Sole Source of Space Heat: Wood-burning devices relied upon as the sole source of heat for residential space heating are exempt from the requirement of Section 6-3-301. A household claiming this exemption cannot contain another means of functioning space heating.

6-3-112 Limited Exemption, Startup of New Fire: Visible emissions from the startup of a new fire for a period that is not to exceed twenty minutes in any four-hour period is exempt from the requirements of Section 6-3-302.

6-3-200 DEFINITIONS

6-3-201 Builder: Any individual or company that constructs and/or sells any residential or commercial, single or multi-dwelling unit with a wood-burning device.

6-3-202 Curtailment Period: Any period so declared to the public by the Air Pollution Control Officer (APCO) when a negative impact upon public health, resulting from levels of particulate matter of 2.5 micrograms in size or less ($PM_{2.5}$), is forecast. In declaring such curtailment period, the APCO shall notify the public of each curtailment by providing any or all of the following communications:

202.1 Notices to newspapers, radio stations or television stations of general circulation within the Bay Area Air Quality Management District (BAAQMD);

202.2 Recorded telephone messages on BAAQMD informational phone numbers;

202.3 Emails to recipients of the BAAQMD "Spare the Air" list server;

202.4 Message posted on the BAAQMD website, www.sparetheair.org; and/or;

202.5 Any other such communication as the APCO determines to be appropriate.

6-3-203 Fireplace: Any installed masonry or factory built wood-burning device designed to operate with an air-to-fuel ratio greater than or equal to 35-to-1.

6-3-204 Garbage: Any solid, semisolid, or liquid waste generated from residential, commercial, and industrial sources, including trash, refuse, rubbish, industrial wastes, asphaltic products, manure, vegetable or animal solid or semisolid wastes, and other discarded solid or semisolid wastes.

6-3-205 Low Mass Fireplace: Any fireplace and attached chimney, as specified in American Society for Testing and Materials (ASTM) E 2558-07, "Determining Particulate Matter Emissions from Fires in Low Mass Wood-burning Fireplaces", that can be weighed (including the weight of the test fuel) on a platform scale.

6-3-206 Masonry Heater: Any site-built or site-assembled, solid-fueled heating device constructed mainly of masonry materials in which the heat from intermittent fires burned rapidly in its firebox is stored in its structural mass for slow release to the site. Such solid-fueled heating devices must meet the design and construction specifications set forth in ASTM E 1602-03, "Guide for Construction of Solid Fuel Burning Masonry Heaters."

6-3-207 Pellet-Fueled Device: Any solid-fueled burning device which is operated on pellet-fuel, is either U.S. EPA Phase II certified, or exempted under U.S. EPA requirements set forth in Title 40 Code of Federal Regulation (CFR), Part 60, Subpart AAA.

6-3-208 **Real Property**: The land and anything permanently affixed to the land, such as building and structures.

6-3-209 **Seasoned Wood:** Fire wood that has a moisture content of 20 percent or less using the testing method specified in Section 6-3-602.

6-3-210 **Solid Fuel:** Any wood, wood-based product, non-gaseous, or non-liquid fuel, including but not limited to: seasoned wood, manufactured logs, wood or other pellet products. This definition does not include solid fuel intended for cooking food, such as charcoal.

6-3-211 **Treated Wood:** Wood of any species that has been chemically impregnated, painted, or similarly modified to improve resistance to insects and/or weathering.

6-3-212 **U.S. EPA Phase II Certified Device:** Any device certified by the U.S. EPA to meet the performance and emission standards as set forth in Title 40 CFR, Part 60, Subpart AAA.

6-3-213 **Wood-Burning Device:** Any wood-burning stove or heater, pellet-fueled device, fireplace, or any indoor permanently installed device used to burn any solid fuel for space-heating or aesthetic purposes.

6-3-300 STANDARDS

6-3-301 **Mandatory Solid Fuel Burning Curtailment:** No person shall operate (combust wood or solid-fuel products in) any wood-burning device during a curtailment period.

6-3-302 **Prohibition of Exceeding Ringelmann No. 1 (20 Percent Opacity):**

302.1 No person(s) shall cause or allow a visible emission from any wood-burning device that exceeds No. 1 on the Ringelmann Chart for a period or periods aggregating more than six minutes in any one-hour period in any building or structure.

302.2 Smoke visible from a chimney, flue or exhaust duct in excess of the Ringelmann No. 1 limitation is presumed to be unlawful operation of a wood-burning device. This presumption may be refuted by demonstration that the smoke was not caused by a wood-burning device.

6-3-303 **Criteria for Sale, Transfer or Installation of Wood-burning Devices:** Effective <six months after rule adoption>, no person shall sell, offer for sale or resale, supply, install, or transfer a new or used wood-burning device unless it is one of the following:

303.1 A U.S. EPA Phase II certified wood-burning device;

303.2 A pellet-fueled device;

303.3 A masonry heater;

303.4 A low mass fireplace of a make and model that meets EPA low mass fireplace emission targets and has been approved in writing by the APCO.

The requirements of Section 6-3-303 are not intended to apply if a wood-burning device is a fixture included in the sale or transfer of any real property.

6-3-304 **Criteria for Wood-burning Devices in New Building Construction:** Effective for construction permits issued after <six months after rule adoption>, no person or builder shall commence construction of a new building or structure designed to contain a wood-burning device unless the device meets the requirements of Section 6-3-303.

6-3-305 **Prohibition Against Burning Garbage and/or Certain Materials:** No person shall cause or allow any of the following materials to be burned in a wood-burning device: garbage, treated wood, non-seasoned wood, used or contaminated wood pallets, plastic products, rubber products, waste petroleum products, paints and paint solvents, coal, animal carcasses, glossy and/or colored paper, salt water driftwood, particle board, and any material not intended by a manufacturer for use as a fuel in a wood-burning device.

6-3-306 **Requirement for Seasoned Wood:** No person shall sell, offer for sale, or supply any seasoned wood intended for use in a wood-burning device that does not have a moisture content of 20 percent or less by weight.

6-3-400 ADMINISTRATIVE REQUIREMENTS

6-3-401 Device Sale/Installation, Public Awareness Information: Effective <three months after rule adoption>, any person or builder offering for sale, selling or installing new or used wood-burning devices subject to the provision listed in Section 6-3-303 shall:

401.1 Provide public awareness information to each purchaser of a wood-burning device in the form of pamphlets, brochures, or fact sheets.

401.2 Include in public awareness information the following: proper sizing, installation, operation, and maintenance of the wood-burning device and its use; and the health effects of wood smoke.

6-3-402 Device Manufacturer's Certification: The manufacturer and seller of any wood-burning device shall provide documentation to any purchaser that the device is U.S. EPA Phase II certified or that the device meets the equivalent U.S. Phase II emission limits.

6-3-403 Solid Fuel, Public Awareness Information: Effective <three months after rule adoption>, any person offering for sale, selling or providing solid fuel for use in a wood-burning device shall:

403.1 Attach a label to each package of wood or solid fuel sold that states the following:

> **Solid Fuel Labeling Requirement**
>
> HEALTH WARNING: Wood smoke contains harmful particulate matter. On cold, windless days the Bay Area Air Quality Management District may announce a curtailment on burning wood or any solid fuel. On these days you should not burn either indoors in your fireplace or wood-burning device or outdoors in fire pits.
>
> Burning during a curtailment is a violation of air quality regulations, unless it is the only source of heat.
>
> **CHECK BEFORE YOU BURN**
>
> **LISTEN** to local TV or Radio New
> **CALL** 1-800-HELP-AIR
> **CHECK** www.spareheair.org.

403.2 If the solid fuel is seasoned wood, then the label must also state the following in addition to the requirements of Section 6-3-403.1:

> This wood has been tested to ensure it meets air quality regulations for moisture content to be less then 20 % (percent) by weight for cleaner burning.

6-3-600 MANUAL OF PROCEDURES

6-3-601 Determination of Ringelmann No 1 (20 Percent Opacity): Ringelmann No 1 standard shall be determined by Manual of Procedures-Volume 1 – Enforcement Procedures, Evaluation of Visible Emissions.

6-3-602 Determination of Moisture Content: Moisture content of wood shall be determined by ASTM Test Method D 4442-92.

REGULATION 6
PARTICULATE MATTER AND VISIBLE EMISSIONS
RULE 3
WOOD-BURNING DEVICES

6-3-100 GENERAL

6-3-101 Description: The purpose of this rule is to limit emissions of particulate matter and visible emissions from wood-burning devices.

6-3-110 Limited Exemption, Natural Gas Unavailability: Wood-burning devices in areas where natural gas service is not available, as determined by gas utility service to an area or household, are exempt from the requirements of Section 6-3-301.

6-3-111 Limited Exemption, Sole Source of Space Heat: Wood-burning devices relied upon as the sole source of heat for residential space heating are exempt from the requirement of Section 6-3-301. A household claiming this exemption cannot contain another means of functioning space heating.

6-3-112 Limited Exemption, Startup of New Fire: Visible emissions from the startup of a new fire for a period that is not to exceed twenty minutes in any four-hour period is exempt from the requirements of Section 6-3-302.

6-3-200 DEFINITIONS

6-3-201 Builder: Any individual or company that constructs and/or sells any residential or commercial, single or multi-dwelling unit with a wood-burning device.

6-3-202 Curtailment Period: Any period so declared to the public by the Air Pollution Control Officer (APCO) when a negative impact upon public health, resulting from levels of particulate matter of 2.5 micrograms in size or less ($PM_{2.5}$), is forecast. In declaring such curtailment period, the APCO shall notify the public of each curtailment by providing any or all of the following communications:

202.1 Notices to newspapers, radio stations or television stations of general circulation within the Bay Area Air Quality Management District (BAAQMD);

202.2 Recorded telephone messages on BAAQMD informational phone numbers;

202.3 Emails to recipients of the BAAQMD "Spare the Air" list server;

202.4 Message posted on the BAAQMD website, www.sparetheair.org; and/or;

202.5 Any other such communication as the APCO determines to be appropriate.

6-3-203 Fireplace: Any installed masonry or factory built wood-burning device designed to operate with an air-to-fuel ratio greater than or equal to 35-to-1.

6-3-204 Garbage: Any solid, semisolid, or liquid waste generated from residential, commercial, and industrial sources, including trash, refuse, rubbish, industrial wastes, asphaltic products, manure, vegetable or animal solid or semisolid wastes, and other discarded solid or semisolid wastes.

6-3-205 Low Mass Fireplace: Any fireplace and attached chimney, as specified in American Society for Testing and Materials (ASTM) E 2558-07, "Determining Particulate Matter Emissions from Fires in Low Mass Wood-burning Fireplaces", that can be weighed (including the weight of the test fuel) on a platform scale.

6-3-206 Masonry Heater: Any site-built or site-assembled, solid-fueled heating device constructed mainly of masonry materials in which the heat from intermittent fires burned rapidly in its firebox is stored in its structural mass for slow release to the site. Such solid-fueled heating devices must meet the design and construction specifications set forth in ASTM E 1602-03, "Guide for Construction of Solid Fuel Burning Masonry Heaters."

6-3-207 Pellet-Fueled Device: Any solid-fueled burning device which is operated on pellet-fuel, is either U.S. EPA Phase II certified, or exempted under U.S. EPA requirements set forth in Title 40 Code of Federal Regulation (CFR), Part 60, Subpart AAA.

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6-3-211 **Treated Wood:** Wood of any species that has been chemically impregnated, painted, or similarly modified to improve resistance to insects and/or weathering.

6-3-212 **U.S. EPA Phase II Certified Device:** Any device certified by the U.S. EPA to meet the performance and emission standards as set forth in Title 40 CFR, Part 60, Subpart AAA.

6-3-213 **Wood-Burning Device:** Any wood-burning stove or heater, pellet-fueled device, fireplace, or any indoor permanently installed device used to burn any solid fuel for space-heating or aesthetic purposes.

6-3-300 STANDARDS

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302.1 No person(s) shall cause or allow a visible emission from any wood-burning device that exceeds No. 1 on the Ringelmann Chart for a period or periods aggregating more than six minutes in any one-hour period in any building or structure.

302.2 Smoke visible from a chimney, flue or exhaust duct in excess of the Ringelmann No. 1 limitation is presumed to be unlawful operation of a wood-burning device. This presumption may be refuted by demonstration that the smoke was not caused by a wood-burning device.

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303.1 A U.S. EPA Phase II certified wood-burning device;

303.2 A pellet-fueled device;

303.3 A masonry heater;

303.4 A low mass fireplace of a make and model that meets EPA low mass fireplace emission targets and has been approved in writing by the APCO.

The requirements of Section 6-3-303 are not intended to apply if a wood-burning device is a fixture included in the sale or transfer of any real property.

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6-3-305 **Prohibition Against Burning Garbage and/or Certain Materials:** No person shall cause or allow any of the following materials to be burned in a wood-burning device: garbage, treated wood, non-seasoned wood, used or contaminated wood pallets, plastic products, rubber products, waste petroleum products, paints and paint solvents, coal, animal carcasses, glossy and/or colored paper, salt water driftwood, particle board, and any material not intended by a manufacturer for use as a fuel in a wood-burning device.

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6-3-400 ADMINISTRATIVE REQUIREMENTS

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401.1 Provide public awareness information to each purchaser of a wood-burning device in the form of pamphlets, brochures, or fact sheets.

401.2 Include in public awareness information the following: proper sizing, installation, operation, and maintenance of the wood-burning device and its use; and the health effects of wood smoke.

6-3-402 Device Manufacturer's Certification: The manufacturer and seller of any wood-burning device shall provide documentation to any purchaser that the device is U.S. EPA Phase II certified or that the device meets the equivalent U.S. Phase II emission limits.

6-3-403 Solid Fuel, Public Awareness Information: Effective <three months after rule adoption>, any person offering for sale, selling or providing solid fuel for use in a wood-burning device shall:

403.1 Attach a label to each package of wood or solid fuel sold that states the following:

> **Solid Fuel Labeling Requirement**
>
> HEALTH WARNING: Wood smoke contains harmful particulate matter. On cold, windless days the Bay Area Air Quality Management District may announce a curtailment on burning wood or any solid fuel. On these days you should not burn either indoors in your fireplace or wood-burning device or outdoors in fire pits.
>
> Burning during a curtailment is a violation of air quality regulations, unless it is the only source of heat.
>
> **CHECK BEFORE YOU BURN**
>
> **LISTEN** to local TV or Radio New
> **CALL** 1-800-HELP-AIR
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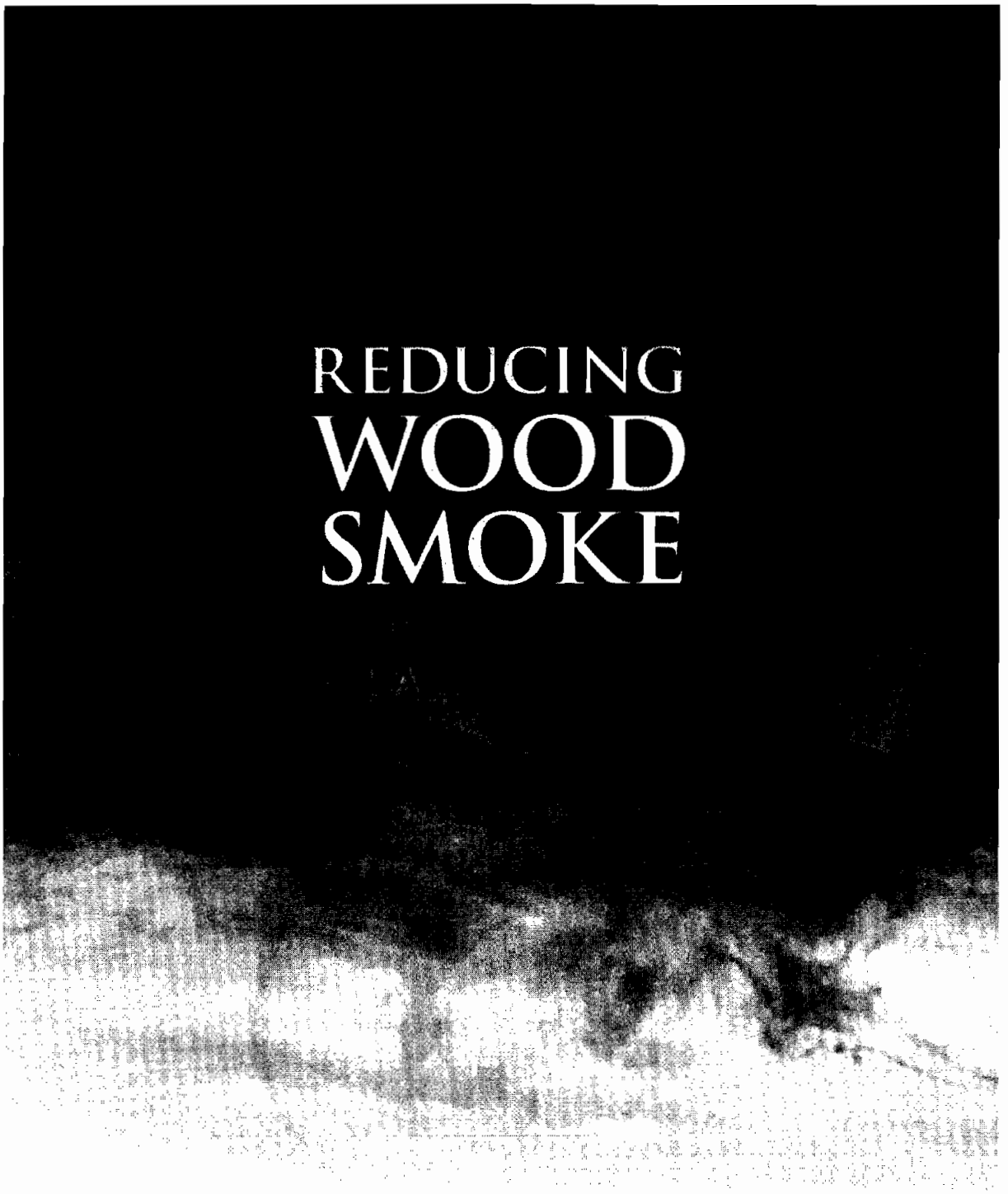
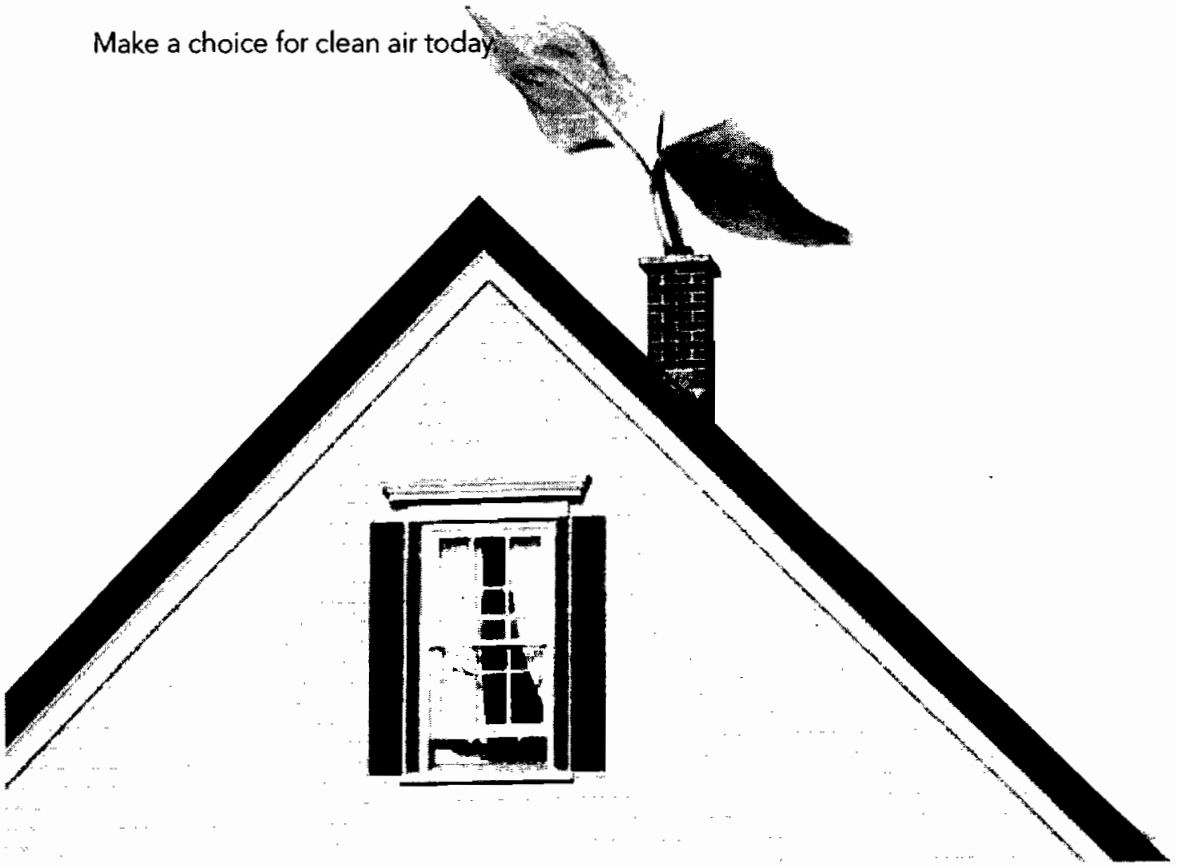
6-3-602 Determination of Moisture Content: Moisture content of wood shall be determined by ASTM Test Method D 4442-92.

REDUCING WOOD SMOKE



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

One little log, cut to fit and tossed into a fireplace or wood stove, doesn't look like much. Yet, that wood chunk contains a bundle of gases, soot and smoke that can make a mess of air quality across the Bay Area. Wood fires provide a pleasant aroma and ambiance, but chimney exhaust is a chief source of wintertime air pollution. Communities across the country have restricted wood burning as medical studies link smoke to health problems. The Bay Area Air Quality Management District has a plan to clean it up, but to succeed we need your help. Just as each individual action contributes to smoky skies, you can make a big difference. Make a choice for clean air today.



WHAT'S WRONG WITH BURNING WOOD?

One chimney may seem inconsequential, but multiply by 1.2 million fireplaces and wood stoves across the Bay Area and that constitutes a lot of air pollution. In cold weather, the region's residents burn about 1,400 cords of wood daily — enough to fill 2,800 pickup trucks. Burned wood releases about 6,000 tons of sooty particles annually — more than the entire region's vehicles and businesses emit. The problem is greatest when polluted air cools at night and settles near the ground. In the wintertime, wood smoke contributes between one-third and one-half of the Bay Area's particle pollution.

Smoke can also contribute to indoor air pollution, inside your home as well as your neighbor's.

How can you reduce your contribution to air pollution? The Air District issues Spare the Air Tonight advisories when air quality conditions are forecast to be unhealthy. Visit www.sparetheair.org to get the latest forecast or to sign up for e-mail AirAlerts. Please don't burn when an advisory is issued.

IS WOOD SMOKE HARMFUL?

Smoke is more than just an irritant. It is a complex chemical mixture linked to serious health problems. In the Bay Area, clean air standards were exceeded 20 times in the winter of 2006–07, mostly due to smoke from residential chimneys.

Smoke contains millions of microscopic particles, called PM 2.5, or particulate matter 2.5 microns or smaller. A micron is one-millionth of a meter; thousands could fit on the dot of an [illegible]. The EPA's limit for PM 2.5 is 35 micrograms per cubic meter of air per day (a smattering of flecks in a space the size of a refrigerator).

The tiny particles can easily bypass filters in your nose and throat and penetrate into your lungs. Epidemiological studies have linked long-term exposure to particle pollution to loss of lung function, bronchitis, lung disease, heart attacks, and premature death. It also causes eye and throat irritation and headaches.

California health investigators found when wood burning increases, emergency room visits for asthma rose as much as 40 percent. Asthma is the leading cause of hospitalization and emergency room visits for children in the Bay Area; about one person in seven in the region has a respiratory condition that makes them susceptible to smoke, according to the American Lung Association of California.

ARE THERE ALTERNATIVES TO WOOD BURNING?

Older wood stoves and fireplaces emit far more air pollution than heaters using other fuels. Consider heating your home without burning wood. Or consider a natural gas fireplace which burns clean, starts easy and costs less to operate. They come in many sizes and styles, fit inside an existing fireplace, and produce lots of heat and little smoke.

New wood stoves have advanced well beyond the traditional pot-bellied model. These stoves produce abundant heat, little ash and use less wood. For example, old wood stoves produce up to 3 grams of particulate per hour, but an EPA-certified wood stove produces no more than 7 grams per hour by controlling air flow and temperature for an efficient burn. Pellet stoves, which use a renewable fuel, are among the cleanest burning — they produce about 1 gram of particulate per hour. For a list of EPA-certified wood stoves and fireplaces, visit [illegible].

The best way to reduce emissions is to not light at all. Keep warm by adding insulation to your attic, caulking leaks or weather-stripping doors, windows and pipes. To learn how to insulate a home, visit [illegible].

Also, consider a sweater or warm blanket on chilly nights. And please don't burn when a Spare the Air Tonight advisory has been issued.

IS BURNING WOOD [illegible] EFFICIENT?

Overall, a fireplace or wood stove costs more than using your furnace. Direct costs for burning include money spent for wood, fireplace tools, chimney sweeps and insurance. Add to that indirect costs, including splitting and stacking wood, cleaning out ash and health impacts and wood-burning is no bargain.

Ironically, a fireplace can empty your house of heat. The flames cause strong updrafts that pull warm indoor air up the chimney. While you may feel warm by the fire, the rest of the house will become cooler as heat escapes through the flue.

Most of the heat in a fireplace pulls moisture and gases out of a log and up the chimney, rather than heating the room. New EPA-certified stoves have an 80 percent heating efficiency and get more energy per unit of wood burned.

WHAT IS BEING DONE TO REDUCE WOOD SMOKE?

The Bay Area Air Quality Management District has developed strategies to reduce residential wood smoke in the region. The District and local governments developed ordinances requiring new and remodeled homes to switch to low-polluting technologies. Currently, 42 cities in the region have adopted such ordinances. The District is developing draft rules to limit wood burning on some winter nights.

The District encourages residents to replace their older fireplaces and woodstoves with cleaner burning devices. The District will be offering rebate incentives help pay for the change in early 2008. Visit www.sparetheair.org to learn more about the rebates for cleaner air.

The District also issues Spare the Air Tonight advisories when air quality is forecast to be unhealthy. Visit www.sparetheair.org to find out about advisories and to receive AirAlerts by e-mail.

HOW CAN I REDUCE SMOKY POLLUTION?

Wood smoke is the biggest source of air pollution that individuals have the greatest power to control. Here are 10 things you can do to restore blue skies to the Bay Area:

1. Give your fireplace or wood stove the night off during Spare the Air Tonight advisories.
2. Switch to an EPA-certified wood stove, which emits up to 70 percent less particulate and uses 30 percent less fuel.
3. Insulate your house to keep warmth in.
4. Save energy and reduce pollution by wearing a sweater on chilly nights.
5. Watch smoke signals; if your chimney billows dark smoke 30 minutes after ignition, adjust dampers or fuel until you see wispy white emissions.
6. Properly dispose of painted wood, particle board, plastic, gift wrap or rubbish; burning them releases toxic chemicals.
7. Install a pellet stove — the cleanest wood burning technology available.
8. Switch to dry hardwood fuel such as oak or cherry, which produce less smoke.
9. Keep your chimney swept and ash bin clean to improve air flow and reduce emissions.
10. Replace your wood-burning fireplace with a natural gas insert.

WHERE CAN I GET MORE INFORMATION?

To learn more about wood smoke pollution and what you can do to reduce emissions, visit these Web sites:

Wood smoke basics
www.epa.gov/woodstoves/basic.html

Cleanup strategies
www.epa.gov/woodstoves/pdfs/epa_bcflyer_press_rev4.pdf

Health effects
www.ecy.wa.gov/pubs/92046.pdf

Spare the Air Tonight advisories
www.sparetheair.org

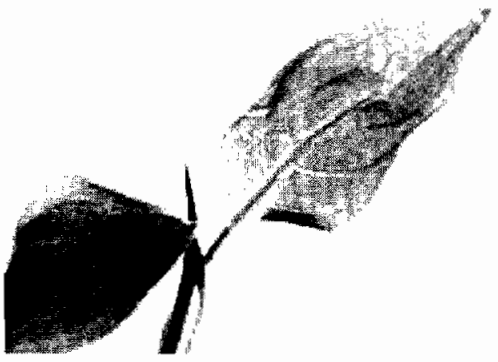
Rebates and incentives
www.sparetheair.org/changeout.htm

CHOOSE CLEAN AIR

Residential chimney smoke is a major source of air pollution in the Bay Area. More than a nuisance, the microscopic particles it contains have been linked to serious health injury. The good news is that your choices can do a lot for clean air. Choose to minimize unnecessary burning and share information about the effects of wood smoke pollution with your friends and family. Working together, we can reduce air pollution and restore blue skies for everyone in the region.

SPARE AIR

On nights when pollution is expected to approach unhealthy levels, the Air District will issue a "Spare the Air Tonight" advisory asking Bay Area residents not to burn wood. Call 1-800-Help-Air (1-800-435-7247) for the latest air quality forecast.



http://www.epa.gov/woodstoves/programs.html
Last updated on Wednesday, August 29th, 2007.

Clean Burning Wood Stoves and Fireplaces

For Air Quality Program Officials

As an air quality program official, you know that in some parts of the United States, smoke from wood stoves and fireplaces is the largest source of outdoor air pollution from residential sources. During a typical wood heating season (especially nights and weekends), wood smoke can account for as much as 80% of the particulate matter (PM) emissions in a residential area, depending on usage patterns.

Residents in your area may simply not realize that burning wood inefficiently contributes to air pollution and endangers public health. Many jurisdictions are now seeking the appropriate mix of public education, incentives (rebates), and legal actions that will minimize PM emissions from wood burning stoves and fireplaces.

You can take advantage of the voluntary strategies outlined below to help communities under your responsibility reduce pollution from wood smoke.

- Public Education on Clean Burning Wood Stoves and Fireplaces
- Incentives for Changing to Cleaner Wood Burning Options
- Community Action - Laws and Ordinances
- State Action - Laws, Fees and Taxes
- 2007 Residential Wood Smoke Workshop

The emissions reduced through changing out wood stoves could help your jurisdiction meet or maintain the PM NAAQS - something you may want to consider in your air quality planning. To help with this, EPA has developed a document entitled, "Guidance for Quantifying and Using Emission Reductions from Voluntary Wood Stove Changeout Programs in State Implementation Plans." (PDF, 22 pp, 202 KB) Using this guidance with the assistance of your EPA Regional Office could help your jurisdiction satisfy the requirements of the Clean Air Act.

EPA's Wood Stove Changeout Campaign: Incentives to replace older stoves with cleaner stoves.

EPA Resources for Air Quality Regulators

How-To Guide for Implementing a Wood Stove Changeout Campaign

Wood Stove Compliance

Particulate Matter Standards

National Ambient Air Quality Standards

Regional Haze Program

A Guide to Good Indoor Air Quality (IAQ) from EPA's IAQ Program

Guidance for states to incorporate a wood stove changeout program into state implementation plans (PDF, 22 pp, 202 KB)

Public Education on Clean Burning Wood Stoves and Fireplaces

A public information campaign to inform local residents about reducing wood smoke can include workshops, community newsletters, media releases, panel discussions and product

demonstrations on the local cable access channel, community events at the beginning of the wood heating season, or a special Web site devoted to this topic.

EPA's Web site — Clean Burning Wood Stoves and Fireplaces — is a one-stop resource for consumers. Why not provide a link to it on every town, city, or county Web site within your jurisdiction?

EPA will publish a consumer factsheet in 2005, which you can tailor to local needs, or select language from to use in your pamphlets, handouts, newsletters, or newspaper articles.

Typical themes in a public outreach campaign to reduce wood smoke, which are described more fully on the main pages of this site, can include:

- **Replace Stoves Manufactured before 1988.** All wood stoves manufactured since 1988 must be EPA certified, which means they use 1/3 less wood than older stoves to produce the same heat. And EPA certified wood stoves emit 50% to 60% less air pollution. EPA certified stoves are easy to identify because they carry a special label and hang tag.

- **Purchase only an EPA certified stove.** Local residents in the market for a first wood stove should demand to see the EPA label.

- **Upgrade a conventional fireplace with an EPA certified fireplace insert.** These function like certified wood stoves.

- **Stop burning wood altogether.** Where practical and/or available, some local residents can choose cleaner heating options such as natural gas.

- **Change the way wood is burned.** Residents can reduce the amount of pollution produced by their wood stove or fireplace by changing how they burn wood. You can encourage them, for example, to use clean, dry, seasoned hardwood in a wood stove because it generates the most heat and the least pollution.

  Burning small, hot fires produces more heat and less pollution than burning large smoldering fires.

- **Properly maintain the wood stove or fireplace.** Improperly maintained systems can leak smoke into the home and cause the buildup of creosote, a combustible residue that can fuel a chimney fire. EPA recommends that anyone who burns wood have the chimney professionally cleaned EXIT Disclaimer each year to keep it in good working order.

- **Weatherize the home.** Insufficient insulation and gaps around doors and windows can make a home even colder in the winter. Sealing gaps and holes can cut down on heating needs from wood stoves.

Incentives for Changing to Cleaner Wood Burning Options

Through wood stove changeout campaigns, communities encourage wood stove users to turn in older stoves for recycling and to replace them with either EPA-certified wood stoves or non-wood burning equipment.

Wood stove changeout programs typically provide financial incentives to consumers in the

form of rebates, usually 10% to 15% of the purchase price of the new stove.

The campaign costs, including advertising, are covered by a combination of government agencies, gas utilities, and wood stove manufacturers, distributors, and retailers.

If you are considering a local changeout program, learn from others' experiences by visiting the sites below.

Santa Clara, California EXIT Disclaimer
Truckee, California EXIT Disclaimer
North Coast Unified Air Quality Management District (Del North, Humboldt, and Trinity counties, CA) - scroll down half way to the wood stove changeout story EXIT Disclaimer
Northern California Changeout Case Study
Oregon and Washington Great Wood Stove Changeout
The Pacific Northwest Tribal Air Network Workshop (August 1-3, 2006) featured several presentations on programs and practices to reduce residential wood smoke.

A feasibility study EXIT Disclaimer undertaken for the Clean Air Foundation provides details on changeout program development.

For information about the 2001 Great Wood Stove and Fireplace Changeout campaign in the Great Lakes area (including parts of Canada), visit
http://www.woodstovechangeout.org/index.html and
http://www.woodstovechangeout.org/materials/

Wood Stove Changeout Campaign - EPA is working with partners across the country to encourage homeowners to replace older wood stoves with newer, cleaner burning stoves. Learn more about these changeout campaigns and how they can improve air quality. Also, check for updates on changeout pilot programs in your area.

Community Action - Laws and Ordinances

Certain jurisdictions have established legal requirements to reduce wood smoke. For example, some communities have restrictions on installing wood burning appliances in new construction. The most common and least restrictive action is to limit wood stove and fireplace use at those times when air quality is threatened. The appropriate agency issues an alert, similar to the widespread Ozone Action Day alerts.

Model legislative language EXIT Disclaimer has been developed by the Bay Area Air Quality Management District in California for communities wishing to take such action.

In 1998 the Bay Area Air Quality Management District, with stakeholder input, developed a model wood smoke ordinance for fireplaces and wood stoves as a guidance document for cities and counties that wish to regulate sources of particulate matter in their communities. The ordinance does not ban wood burning in fireplaces but seeks to take advantage of new, cleaner technologies that have been developed to effectively reduce wood smoke pollution.

This model ordinance template contains language pertaining to reduction of air pollution (PM10 is cited) by regulating the installation or replacement of wood burning appliances. This model ordinance covers all wood burning appliances:

- installed in new residences and commercial buildings

- being added to existing residences and commercial buildings
- that replace wood burning appliances in existing residences and commercial buildings.

Certain Bay area cities EXIT Disclaimer have already adopted model ordinances.

Bay Area Air Quality Management District EXIT Disclaimer
Bans during "Spare the Air Tonight" advisories; requirements for new construction; replacement wood stoves must be EPA certified. Fireplaces must be certified by EPA to have emissions no greater than those of an EPA certified wood stove (wood heater).

Additional links to similar programs:

Denver, CO EXIT Disclaimer
Mandatory bans on "red" advisory days during the annual high air pollution season, with some exceptions.

Glendale, AZ EXIT Disclaimer
User restrictions on high air pollution days.

Lagrande, OR EXIT Disclaimer
Voluntary curtailment of wood stove use for heat based on daily advisories.

Puget Sound, WA EXIT Disclaimer
Air-quality burn bans temporarily restrict some or all indoor and outdoor burning, usually called when weather conditions are cold and still.

Santa Clara County and The City of Palo Alto, CA EXIT Disclaimer
Burn bans: Stage 1, use only certified stoves; Stage 2, use wood stove only if it's the primary heat source. Have banned the installation of new wood burning stoves or fireplaces.

San Joaquin County, CA EXIT Disclaimer
Existing wood stoves must be replaced with an EPA certified wood stove when a home is sold.

Bernalillo County (Albuquerque), NM EXIT Disclaimer
Winter Advisory/No Burn Program from October through February restricting use of non-EPA certified fireplaces or stoves.

Yolo-Solano AQMD EXIT Disclaimer has initiated "Don't Light Tonight" - a voluntary program to encourage residents not to use wood stoves and fireplaces when air pollution approaches unhealthy levels. The district also encourages clean burning techniques and switching to cleaner burning technology.

For cities and counties not mentioned above, EXIT Disclaimer find contact information for local air quality representatives.

State Action - Laws, Fees and Taxes

Washington
The State of Washington has established wood stove emission performance standards EXIT Disclaimer that are more stringent than the Federal Rule. In addition, the State of

Washington assesses a flat fee EXIT Disclaimer on the sale of every wood burning device to fund the education of citizens about wood smoke health and air quality impacts and the benefits of clean burning wood stoves.

Montana
The State of Montana offers an Alternative Energy Systems Credit EXIT Disclaimer against income tax liability for the cost of purchasing and installing an energy system in a Montana resident's principal home that uses " . . . a low emission wood or biomass combustion device such as a pellet or wood stove."

Idaho
The State of Idaho offers taxpayers who buy new wood stoves, pellet stoves, or natural gas or propane heating units for their residences a tax deduction EXIT Disclaimer to replace old, uncertified wood stoves.

Colorado
The Colorado Department of Public Health and Environment posts woodburning advisories EXIT Disclaimer on its website. During red advisories, mandatory residential burning restrictions generally apply to everyone in the 7-county Denver-Boulder metro area below 7,000 feet. There are exceptions for those who use Colorado Phase III (Phase II EPA) EXIT Disclaimer certified woodburning stoves, state-approved pellet stoves, approved masonry heaters or those whose stoves or fireplaces are their primary source of heat.

Utah
Utah has a "Red Light, Green Light" program EXIT Disclaimer to curtail wood burning along the Wasatch Front during winter inversions. RED: No residential/commercial burning. The Division of Air Quality staff inspect the valleys for smoke coming from chimneys. The staff also investigate complaints made to the Division. Offenders are ticketed, and fines may be levied. First-time offenders face a fine of $25; second-time offenders pay $50 to $140; and third-time offenders face fines from $150 to $299. YELLOW: reduce burning; GREEN (clearing index high): burning allowed.

Prince Edward Island, Canada
Through their Residential Energy Assistance Program, the Canadian province of Prince Edward Island offers assistance to low-income Islanders EXIT Disclaimer in the form of a home energy efficiency upgrade, low interest loans (maximum $5,000 in Canadian dollars per household at 6% interest rate), and a sales tax exemption on alternative heating systems such as wood stoves, pellet stoves, solar panels and geothermal units.

2007 Residential Wood Smoke Workshop - March 14-15, 2007, in Reno, NV

This third in a series of annual workshops brought together Federal, State, local, and Tribal air quality and health officials to share their experiences and knowledge about residential wood smoke and wood stove changeout programs. With each year, the base of knowledge and expertise in planning, managing, and evaluating wood stove changeouts expands, making these workshops an excellent opportunity to learn and network with others. For your reference, presentations used at the workshop are provided below.

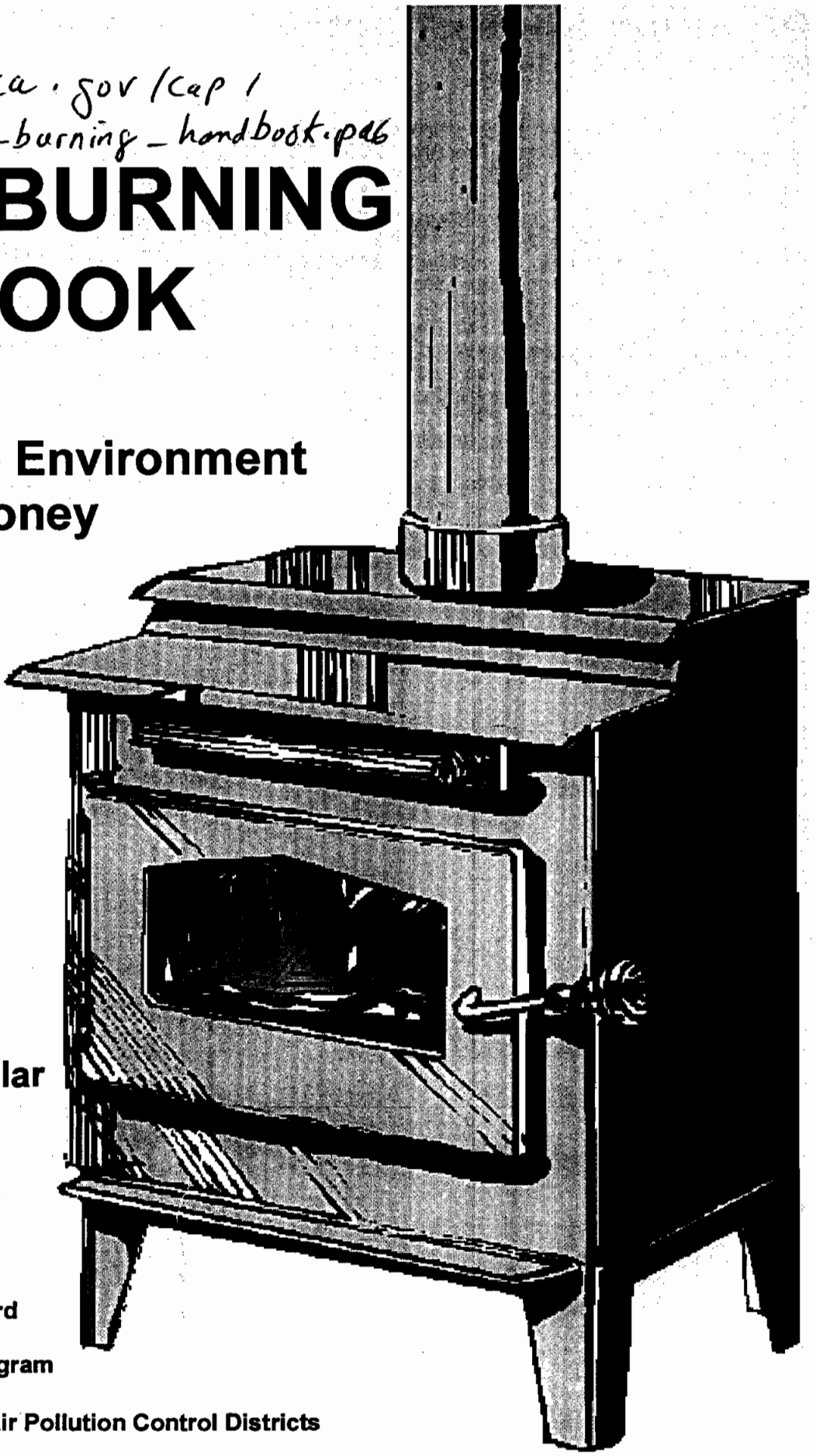
You will need Adobe Acrobat Reader to view the Adobe PDF files on this page. See EPA's PDF page for more information about getting and using the free Acrobat Reader.

- Bay Area Woodstove Changeout Program (PDF) (24pp, 1.0 MB) J. Colbourn and R. Borrmann, Bay Area Air Quality Management District
- Libby, Montana Woodstove Changeout Program (PDF) (40pp, 2.5 MB) J. Marquez and R. Anderson, Lincoln County Health Department
- Measurable Outcomes of a Woodstove Changeout on the Nez Perce Reservation (PDF) (30pp, 3.3 MB) T. Moliga, Nez Perce Environmental Restoration and Waste Management
- Oneida Woodstove Changeout Program (PDF) (42pp, 6.2 MB) J. Mears, Oneida Environmental Health and Safety Division
- PM2.5 Monitoring Data for Libby, MT (PDF) (15pp, 57k) J. Coefield, Montana Department of Environmental Quality
- Sacramento Wood Stove/Fireplace Change Out Program (PDF) (29pp, 980k) A. Kennard, Sacramento Metropolitan Air Quality Management District
- Social Marketing and Woodstove Exchange (PDF) (41pp, 3.5 MB) T. Wakelin, British Columbia Ministry of Environment
- USDA Rural Development Overview (PDF) (20pp, 148k) M. Ramme, U.S. Department of Agriculture
- Warm Homes, Clean Air: An Oakridge Community Project (PDF) (20pp, 1.1 MB) Sally Markos, Lane Regional Air Pollution Authority
- Washoe County Woodstove Changeout Program (PDF) (6pp, 89k) A. Goodrich, Washoe County District Health Department

www.arb.ca.gov/cap/handbooks/wood_burning_handbook.pdf

WOOD BURNING HANDBOOK

Protecting the Environment and Saving Money



Alternatives to Burning Wood

Reducing Wood Smoke Pollution

Getting More Heat For Your Fuel Dollar

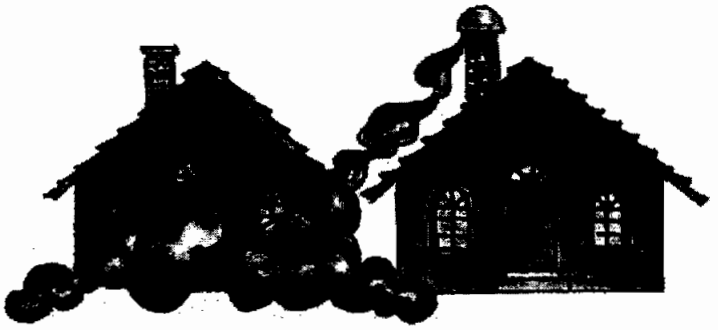
Cal/EPA Air Resources Board
Enforcement Division
Compliance Assistance Program

In Cooperation With Local Air Pollution Control Districts

Burning Wood Produces Wood Smoke and Air Pollution!

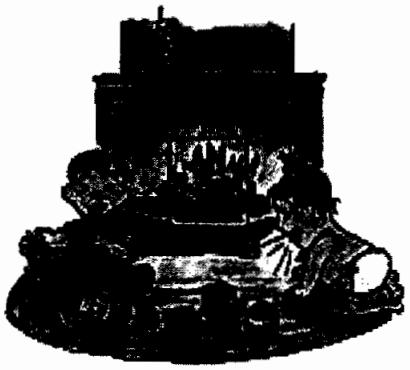
The California Environmental Protection Agency and your local air district are asking you to help clear the air of wood smoke. In this handbook you will find information about the air pollutants in wood smoke, health effects of smoke, how wood burns, why it smokes and how you can reduce wood smoke pollution.

Smoke from neighborhood stoves and fireplaces, a common source of both odor and reduced visibility, greatly contributes to the air pollution problems people complain about most. When you include the health-related problems caused by inhaling smoke pollutants, health costs for individuals and the community can be significant. To be a good neighbor, eliminate wood burning. If you do burn, learn to limit the amount of wood smoke produced.



Sources of Wood Burning and Air Pollution...

Air pollution affects millions of Californians every day. It damages our health, our crops, our property and our environment. In neighborhoods everywhere across California, residential wood burning is a growing source of air pollution. Most wood heaters, such as woodstoves and fireplaces, release far more air pollution, indoors and out, than heaters using other fuels. In winter, when we heat our homes the most, cold nights with little wind cause smoke and air pollutants to remain stagnate at ground level for long periods.



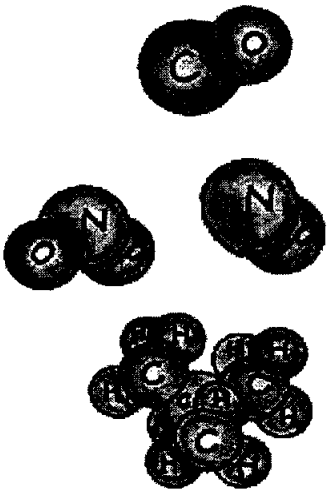
Burning Wood Causes Indoor Air Pollution

High levels of smoke pollutants leaking from stoves and fireplaces have been measured in some wood burning homes. If you or family members suffer from chronic or repeated respiratory problems like asthma or emphysema, or have heart disease, you should not burn wood at all. If you must burn wood, make sure your stove or fireplace doesn't leak and that you operate it correctly.

Remember - If you can smell smoke, you are breathing smoke!

What Happens when Wood Burns?

Complete combustion gives off light, heat, and the gases carbon dioxide and water vapor. Because when wood burns complete combustion does not occur, it also produces wood smoke, which contains the following major air pollutions, regulated by State and federal rules because of their known health effects:



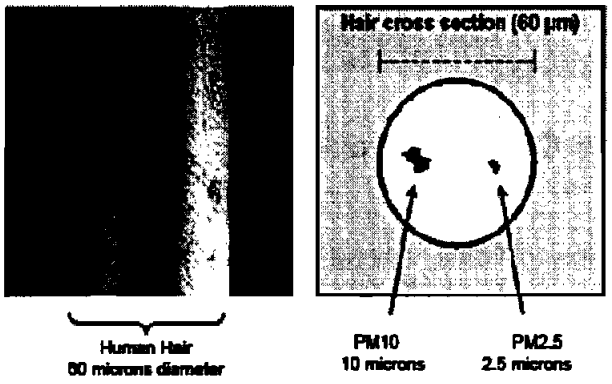
Carbon Monoxide (CO) – An odorless, colorless gas, produced in large amounts by burning wood with insufficient air. CO reduces the blood's ability to supply oxygen to body tissues, and can cause stress on your heart and reduce your ability to exercise. Exposure to CO can cause long-term health problems, dizziness, confusion, severe headache, unconsciousness and even death. Those most at risk from CO poisoning are the unborn child, and people with anemia, heart, circulatory or lung disease.

Oxides of Nitrogen (NOx) – NOx impairs the respiratory system and its ability to fight infection. NOx also combines with VOCs to make ozone and with water vapor to form acid rain or acid fog.

Volatile Organic Compounds (VOCs) – Evaporated carbon compounds which react with NOx in sunlight to form ozone (photochemical smog). Ozone injures the lungs and makes breathing difficult, especially in children and exercising adults. NOx and VOCs also form particulate matter through reactions in the atmosphere.

Toxic Pollutants - Wood smoke also contains VOCs which include toxic and/or cancer-causing substances, such as benzene, formaldehyde and benzo-a-pyrene, a polycyclic aromatic hydrocarbon (PAH). Manufactured fireplace logs, for instance, are not recommended for burning because they produce toxic fumes, including PCBs (polychlorinated biphenyls). Researchers are now studying these and other smoke products to learn more about their effects on human health.

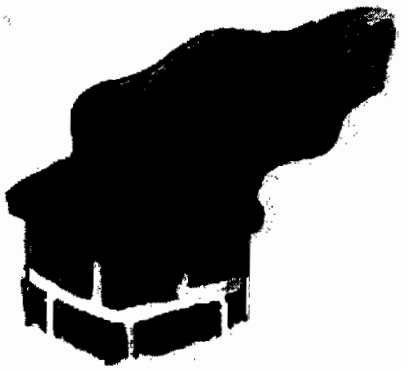
Relative Size of Particulate Matter



Particulate Matter less than 10 microns in diameter (PM10) are very small droplets of condensed organic vapors of wood tar and gases. These particles are a result of unburned fuel and have a diameter of 10 microns or smaller (the diameter of a human hair is about 50 to 100 microns), which allows them to be inhaled into the lungs. Exposure to PM10 aggravates a number of respiratory illnesses.

PM10 includes a smaller group of particles called **PM2.5**, particles with diameters of 2.5 microns and less. These finer particles pose an increased health risk because they can lodge deep in the lungs and contain substances that are particularly harmful to human health, contributing to lung diseases and cancer. Exposure to PM2.5 may even cause early death in people with existing heart and lung disease.

Fireplaces and Old Woodstoves Are Inefficient, Expensive Heaters!



Why...Because of the Way Wood Burns -

As the fire temperature rises, different stages occur:

Stage 1 – Water Boils Off

As the log heats, moisture contained in the log vaporizes, and escapes through the log's surface as water vapor. More energy is used up vaporizing the moisture than is used to burn the log. That heat energy could be warming your house instead of drying your wood before it burns.

Stage 2 - Vaporizes Wood Gases

Before burning, firewood "cooking" creates and releases hundreds of new volatile organic gases, which contain VOCs, tars and charcoal or carbon. Because the log temperature at this stage is too low to burn gases and tars, they escape up the flue. As they cool, some of the gases will combine with water vapor to form highly flammable **creosote** that sticks to the flue walls; other gases condense into smoke particles.

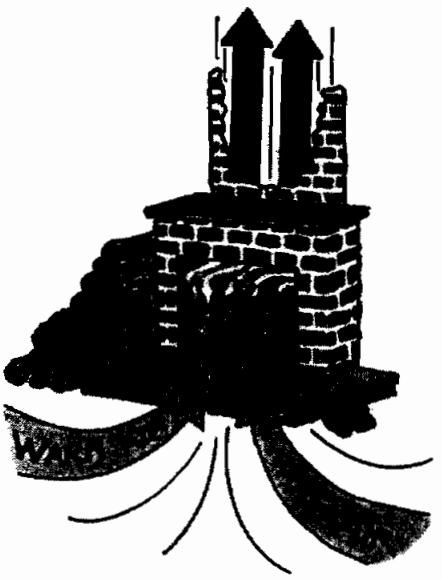
Stage 3 - Log Charcoal Burns

At temperatures above 600 degrees Fahrenheit the escaping gases start burning, ignited by nearby flames. As the temperature reaches 1000 degrees, the log charcoal burns and emits heat. Burning the charcoal produces most of the fire's usable heat.

As you can see, most of your investment in wood goes up in smoke. This is an expensive way to produce a little heat!

Most Fireplaces are Not Good Heaters!

Most fireplaces rob your house of heat because they draw air from the room and send it up the chimney! Yes, you'll be warmed if you sit within six feet of the fire, but the rest of your house is getting colder as outdoor air leaks in to replace the hot air going up the chimney.



The key to burning clean and hot is to control the airflow. Most fireplaces waste wood because of unrestricted airflow. A lot of air helps the fire burn fast, but a load of wood will last only one or two hours.

Some older fireplaces actually pollute more if you install glass doors on an old fireplace insert that is not a certified clean-burning model. Restricting the air supply causes the fire to smolder and smoke. Make sure you install a new, certified clean-burning fireplace insert.

Where Does Your Heat Go? Check your Insulation and Weather-Stripping

Warm air is always escaping from your house, and is replaced by unheated outdoor air. The typical house has one-half to two air exchanges per hour, and more on windy and/or very cold days. If your house has little insulation and many air leaks, you are paying to heat the outdoors. **And if the outside air is smoky, soon your air inside will be too.**

Some air exchange is necessary because of the many sources of air pollution in the home (wood heater, gas stove, consumer products, cigarettes, etc.) Sufficient fresh air inlets are needed to replace air forced out of the house by exhaust fans, dryers, furnaces, water heaters, or wood fires. Here are some suggestions to minimize excess air exchange:

Install Ceiling Insulation. When hot air rises, much of the heat is lost through the ceiling and roof. Wall and floor insulation also reduce heat loss. Recommended amounts of insulation have increased in recent years, so be sure your house has all it needs.

Caulk around all windows, doors, pipes, and any opening into the house.

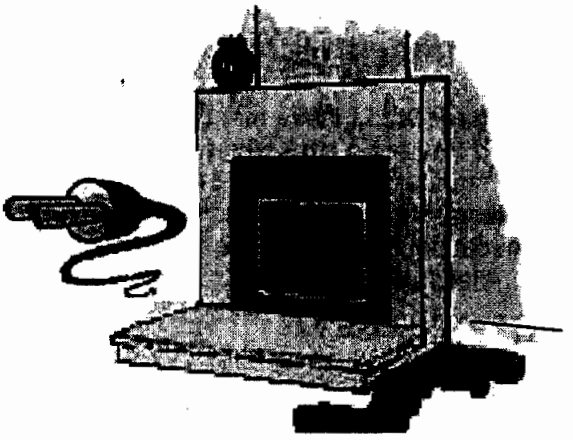
Weather-strip all door and window openings. Consider installing double-paned glass, outdoor or indoor storm windows, and/or insulated curtains.

Close the damper tightly when the heater is not in use. Stoves and fireplaces allow air to leak out of the house even when they are not operating, unless they are literally airtight.

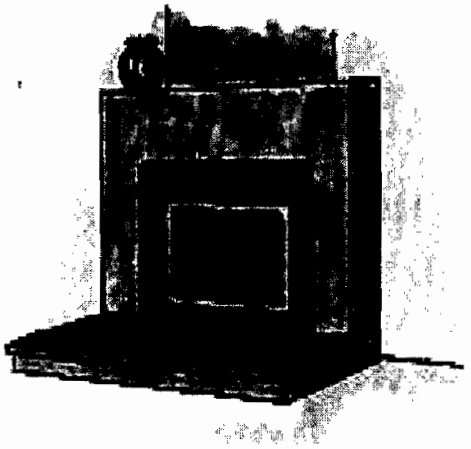
Close off unused rooms if you do not use central heating – Don't waste the heat!

Clean up your Air Guzzling Fireplace by Trying Alternate Heating Methods...

Use an Electric Fireplace



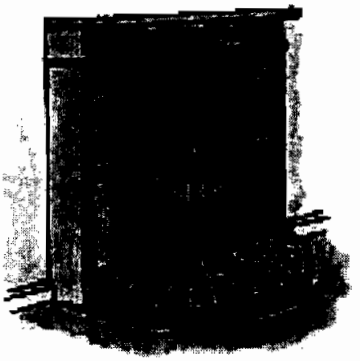
Electric fireplaces can be installed anywhere, and no vent is required. They can be plugged into any standard household electrical (120V) outlet and can operate with or without heat. Most fireplaces are made with an adjustable thermostat that maintains room temperatures. The fireplace glass does not absorb heat, so is safe to touch whether or not the heater is operating.



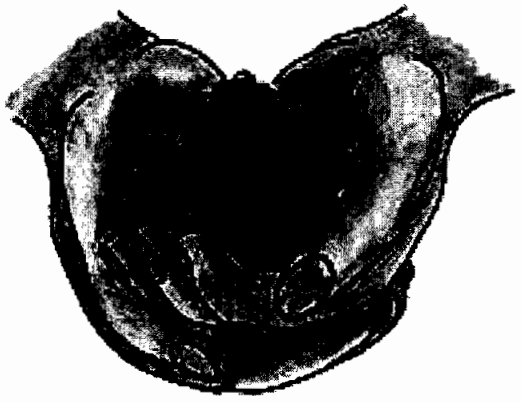
Switch to Gas

Gas fireplaces are very popular and look like a real wood fire! They are self-contained units, which can be fitted into your existing (vented) fireplace. They send less of your heated air up the chimney. This equipment burns cleaner, is easy to start, convenient, safe and inexpensive to operate, and is a good source of heat. Gas fireplaces are also a good choice if you're remodeling a home and replacing a wood fireplace.

Install a Certified Wood Burning Fireplace Insert



Fireplace inserts have been developed which meet federal emission standards and provide high fuel efficiency. They are available in many sizes and styles to fit into your masonry fireplace. They provide excellent fire viewing and heat output with very little smoke.



Try a Pellet Stove

Pellet stoves are the most efficient and least polluting of the new stove designs. Most are exempt from certification because they provide less than 1 gram per hour of particulate emissions. Usually these stoves have some moving parts and require electricity. The fuel, which is made from compressed wood waste and formed into pellets, automatically feeds into the firebox. Combustion air is drawn in and the fire burns hot and clean. Another fan blows room air through a heat exchanger and into the room.

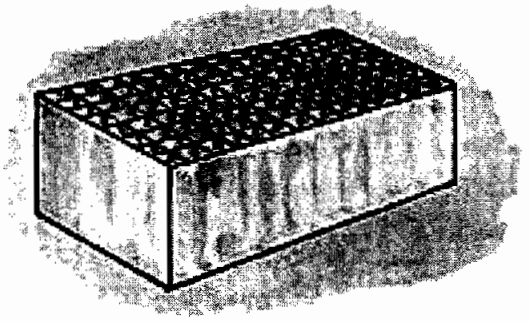
U.S. EPA Certified Wood Stoves

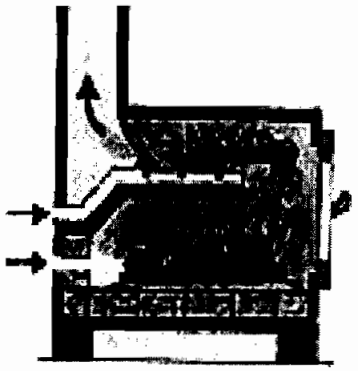
U.S. EPA Certified Wood Stoves Heat More and Pollute Less

U.S. EPA requires wood stove manufacturers to conduct a quality assurance program for wood heaters. Wood heaters must be certified. A permanent label on a wood heater indicates that it meets the emission standards. A consumer information label is also required that specifies the emission rate, the heating range of the wood heater, and overall efficiency. Certified stoves heat better with less wood because they burn more of the combustible gases that would otherwise become smoke in fireplaces and old stoves. There are two types of certified wood stove designs to choose from:

Catalytic Stoves

Similar to the smog control device on new cars, the catalytic combustor in these stoves allows the volatile gases to burn at lower temperatures. Smoke passes through a ceramic honeycomb coated with a rare-metal catalyst, which allows complete smoke combustion and heat release at only 500-700 degrees F. Their efficiency does drop over time and the catalyst device requires replacement after three to seven years of use.





Non-Catalytic Stoves

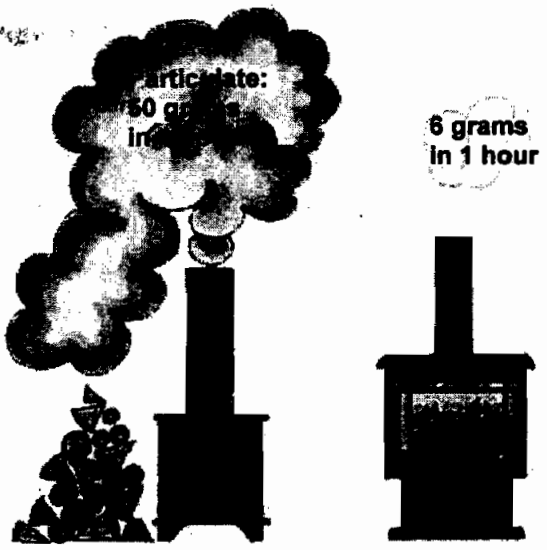
These stoves are designed with baffles and/or secondary combustion chambers, which route the burnable gases through the hottest part of the firebox and mix them with sufficient air to burn them more completely. They can attain up to four stages of combustion and completely burn the wood smoke before it escapes.

If your woodstove is not U.S.EPA certified, you should consider buying a new certified woodstove. A new U.S. EPA certified stove will increase combustion efficiency, produce far less smoke and creosote buildup, and reduce air pollution. It uses the latest and best technology available on transfer efficiency, and will provide more heat for your house and less for your flue. If you want to pollute less and save money on fuel, you should insist on an EPA Certified device, which will be clearly labeled as such.

For a list of U.S. EPA certified stoves see:
http://www.epa.gov/Compliance/monitoring/programs/woodstoves/index.html

U.S. EPA Certified Wood Stoves Release Fewer Particulate Emissions

Because of incomplete combustion, old wood stoves can produce up to 50 grams of particulate per hour. EPA Certified fireplace inserts and EPA Certified wood stoves are considerably more efficient, producing only 6 grams per hour. EPA Certified devices create the right conditions for complete combustion; the right amount of air, high temperature, and time to allow the gases to fully burn.



Non-Certified Stove U.S.EPA Certified Stove

Check How Much Heat You Get ...

The heating efficiency of any wood heater depends on combining two factors:

- How completely it burns the firewood (combustion efficiency), and
- How much of the fire's heat gets into the room, rather than going up the flue (transfer efficiency).

How efficiently your wood heater operates depends on 2 more factors:

- Installation – is it located on an outside wall? Too big for house? Flue draws well?
- Operation – Is the wood green? Is the stove stuffed with wood? Is the fire starved for air?

Your operating techniques account for the largest variations in your woodstove's heating efficiency.

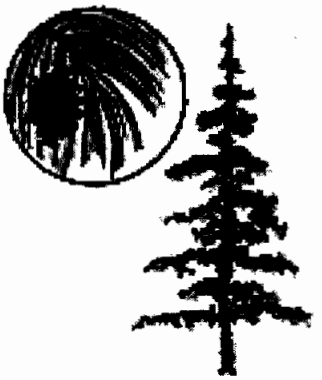
HEATING EFFICIENCY	
Masonry Fireplace	**-10% to 10%**
Manufactured Fireplace	**-10% to 10%**
Freestanding Fireplace	**-10% to 30%**
Antique Stove	**20% to 40%**
Fireplace Insert	**35% to 50 %**
Airtight Stove	**40% to 50%**
Certified Stoves, Inserts, Fireplaces	**60% to 80%**
Gas Heater	**60% to 90%**
Pellet Stove	**75% to 90%**
Electric Fireplace	**100%**

Look for the Permanent U.S.EPA Label on Certified Devices!

For maximum safety and efficiency have a professional installer calculate the correct stove size for the area, install the stove, and design and install the chimney.

If you Still Must Burn Wood, Follow These Tips on Clean Burning – To Heat More Efficiently and Reduce Air Pollution!

➢ Start Your Fire With Softwood Kindling



Softwoods (pine, fir) are generally low in density, ignite easily, burn fast and hot and will heat the firebox and flue quickly. They are ideal for kindling and starting your fires, but form creosote easily due to the high resin (sap) content.

➢ Burn Longer and Cleaner With Hardwood

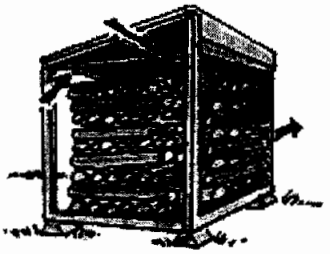
Hardwoods (oak, cherry) are denser and take longer to ignite, but burn slower and more evenly, producing less smoke. They also provide more heat energy than softwood logs of the same size.

➢ Burn Only "Seasoned" Firewood

Firewood should dry, or "season" a minimum of 6 to 12 months after splitting. Hardwoods dry more slowly than softwoods and may take over a year to dry. Seasoned firewood by definition contains 20 percent moisture or less by weight. Wood dries faster in a warmer storage area with more air circulation.

➢ To Speed Drying:

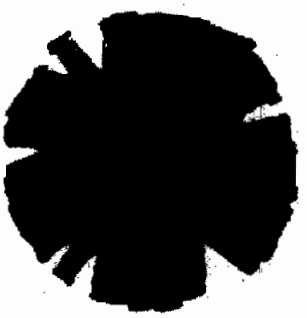
Split and Stack – logs dry from the outside in, so split big logs right away for faster drying. Stack loosely in a crosswise fashion to get good air circulation.



Store High & Dry – Stack a foot or more above the ground and away from buildings in a sunny, well-ventilated area. Cover the top to keep dew and rain off the wood, but leave the sides open to breezes.

➢ Be Careful when Buying Wood Advertised as "Seasoned". *Look for:*

- **Dark colored, cracked ends**, with cracks radiating from the center like bicycle spokes.
- **Light in weight**, meaning there is little moisture left; hardwood logs will weigh more than softwood.
- **Sound** - Hit two pieces together. Wet wood makes a dull "thud" sound. Dry wood rings with a resonant "crack," like a bat hitting a baseball.
- **Easily peeled or broken bark**. No green should show under the bark.



➢ Build a Small, HOT Fire First...

- **Open Damper Wide** - allow in maximum air to fuel the fire. And leave it and other air inlets open for 30 minutes.
- **Start Small and Hot** - leave a thin layer of ash for insulation. Crumple a few sheets of newspaper and add some small pieces of kindling, then light. Add bigger kindling a few at a time as the fire grows. Get it burning briskly to form a bed of hot coals. Now add 2 or 3 logs.
- **Position the next logs carefully** - place logs close enough together to keep each other hot, but far apart enough to let sufficient air (oxygen) move between them.

➢ Refuel While the Coals Are Still Hot!

If a fireplace insert or glass door is present, open it slightly for a minute to prevent back puffing of smoke into the room. When smoke subsides, then open the door fully.

Preheat again by placing a few pieces of kindling onto the red-hot coals. Add more as they catch fire, then add a few larger pieces. Small, frequent loading causes less smoke than a big load in most older stoves.

After refueling, leave the dampers and inlets open for about 30 minutes. The fire will get plenty of air and burn hot, retarding creosote formation (which forms early in a burn).

Light & Refuel your fire quickly and carefully.
These are the times it will smoke the most.

➢ Don't Burn Anything but Clean, Seasoned Wood, Fireplace Logs, and Non-glossy White Paper

- *No Garbage*
- *No Rubber*
- *No Particleboard*
- *No Glossy Paper*
- *No Solvent or Paint*
- *No Coal or Charcoal*
- *No Plastics*
- *No Waste*
- *No Plywood*
- *No Colored Paper*
- *No Oil*
- *No Painted/ Treated Wood*

Burning these materials can produce noxious, corrosive smoke and fumes that may be toxic. They can foul your catalytic combustor, your flue, and the lungs of your family and neighbors.

Warning: Kiln-Dried Lumber vaporizes too rapidly, causing creosote buildup.

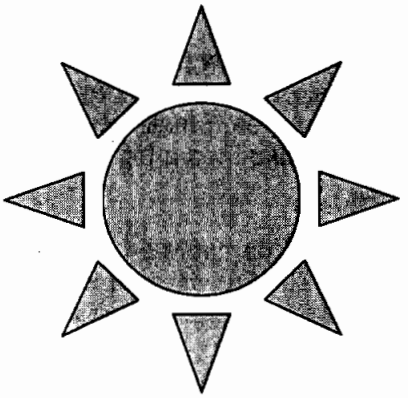
Overnight Heating

When using an open fireplace, DO NOT burn overnight unattended - it's a major fire hazard. This can also lead to a back draft of the smoke into your own home, causing very hazardous indoor air pollution.

Build a small, hot fire and let it burn out completely. Rely on your home's insulation to hold in enough heat for the night. When the fire is out, close the damper tightly.

➢ Heating in Warmer Weather

If you do need extra heat in warmer weather, and a small space heater will not suffice, open the air controls wide, build a small, hot fire, using more finely split wood, and let it burn out.
DO NOT try to reduce the heat from a big fire by reducing its air supply because this leads to smoldering, creosote buildup and air pollution.



➢ Maintain Your Fire Properly – Watch the Temperature

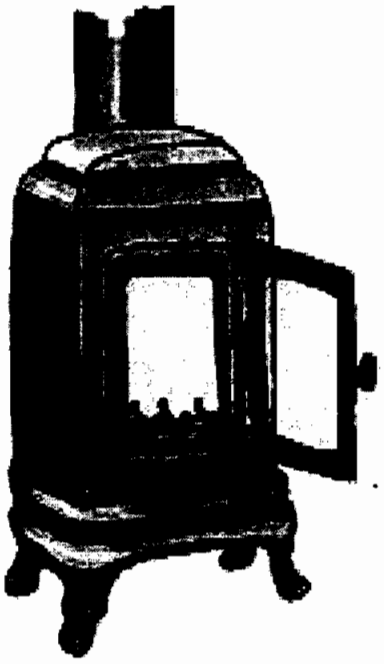
- **Do Not Close the Damper or Air Inlets Too Tightly** - The fire will smoke from lack of air.
- **Follow the Wood Stove or Fireplace Manufacturer's Instructions Carefully** - Be sure that anyone who operates it is also familiar with these instructions.
- **Your Actions Determine How Efficiently Your Fireplace or Wood Stove Will Operate** - A good wood stove/fireplace is designed to burn cleanly and efficiently, but it can not do its job right if you do not cooperate.

➢ Watch for Smoke Signals!

Get into the habit of glancing out at your chimney top every so often. Apart from the half hour after lighting and refueling, a properly burning fire should give off only a thin wisp of white steam. If you see smoke, adjust your dampers or air inlets to let in more air. The darker the smoke, the more pollutants it contains and the more fuel is being wasted.

➢ Inspection and Upkeep - For Safety's Sake

Periodic inspection of your wood stove or fireplace is essential to ensuring its continued safe and clean-burning operation. Keep in mind the following points when performing your fireplace inspection:



- **Chimney Caps** can be plugged by debris, which will reduce draft.
- **Chimneys** should be cleaned professionally at least once a year to remove creosote buildup. **Remember – Creosote can fuel a chimney fire that can burn down your house!**
- **Catalytic Combustor** holes can plug up; follow instructions to clean.
- **Stovepipe** angles and bolts are particularly subject to corrosion.
- **Gaskets** on airtight stove doors need replacement every few years.
- **Seams** on stoves sealed with furnace cement may leak. Eventually the cement dries out, becomes brittle, and may fall out.
- **Firebricks** may be broken or missing.
- **Grates** or stove bottoms can crack or break.

Local Wood Burning Regulations

In light of growing evidence of health effects, the smell of wood smoke no longer has the pleasant associations it once had. Some California cities and counties have enacted local ordinances to limit the growing wood smoke problem. Mammoth Lakes, Squaw Valley, Cloverdale, Healdsburg, Petaluma, Fresno, and many cities and counties in the Bay Area, for instance, permit installation of only U.S.EPA certified wood-fired appliances in all new construction. Since 1991, the Bay Area AQMD has issued advisories for a voluntary no-burn program, called "Spare the Air Tonight", on poor air quality nights. The San Joaquin Valley APCD and Mammoth Lakes ban wood burning when the air quality is poor. And, both the Northern Sierra AQMD and the North Coast Unified AQMD have implemented a "Wood Stove Replacement Incentive Program". The following air pollution control districts have specific wood burning rules, regulations and/or ordinances:

BAY AREA AIR QUALITY MANAGEMENT DISTRICT, A Model Ordinance Pertaining to the Reduction of Air Pollution by Regulating the New Construction or Replacement of Woodburning Appliances. http://www.baaqmd.gov/pio/wood_burning/modelord_woodsmoke.pdf

BUTTE COUNTY AIR QUALITY MANAGEMENT DISTRICT, RULE 207 – Residential Wood Combustion

FEATHER RIVER AQMD, RULE 3.17 – Wood Stove Heating

GLENN COUNTY APCD, ARTICLE 4, Section 99.2 – Fireplace and Solid Fuel Heating Device Usage

GREAT BASIN APCD, RULE 431, - Particulate Emissions – Town of Mammoth Lakes

KERN COUNTY APCD, RULE 416.1 – Wood Burning Heaters and Wood Burning Fireplaces

MONTEREY BAY UNIFIED APCD, RULE 1009 – Burning of Treated Wood

NORTHERN SONOMA APCD, REGULATION 4 – Control Measure for Wood Fixed Appliance Emissions

PLACER COUNTY APCD, RULE 225 – Wood Fired Appliances

SAN JOAQUIN VALLEY APCD, RULE 4901 – Wood Burning Fireplaces and Wood Burning Heaters

SAN LUIS OBISPO COUNTY APCD, RULE 504 – Residential Wood Combustion

SHASTA COUNTY AQMD, RULE 3:23 – Fireplace and Solid Fuel Heating Device Usage

YOLO-SOLANO AQMD, RULE 2.40 – Wood Burning Appliances

YOLO-SOLANO AQMD, A Proposed Model Ordinance Regulation of Wood Burning Appliances http://www.dcn.davis.ca.us/go/ysaqmd/ProposedModelWBA.pdf

Your State and local air pollution control agencies urge you to burn clean, burn safe, and burn smart. Remember...

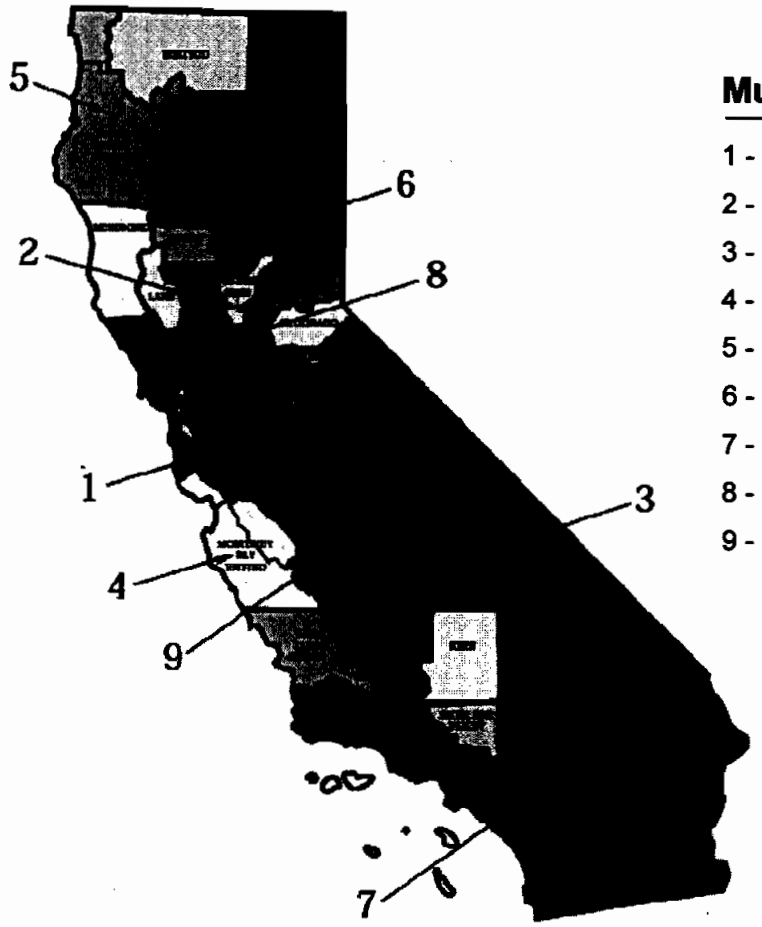
Choose Not to Burn When Air Quality is Already Poor.

For more information contact your local building inspector, fire department, county agricultural extension office, woodstove retailer, chimneysweep, or air pollution control district office.

Need More Information?

Air Resources Board (800) 952-5588

District: _____



Multi-County Air Districts

1 - Bay Area (415) 771-6000
2 - Feather River (530) 634-7659
3 - Great Basin (760) 872-8211
4 - Monterey Bay (831) 647-9411
5 - North Coast (707) 443-3093
6 - Northern Sierra (530) 274-9360
7 - South Coast (909) 396-2000
8 - Yolo-Solano (530) 757-3650
9 - San Joaquin Valley (559) 230-6000

County Air Districts

Amador (209) 257-0112
Antelope Valley (661) 723-8070
Butte (530) 891-2882
Calaveras (209) 754-6504
Colusa (530) 458-0590
El Dorado (530) 621-6662
Glenn (530) 934-6500
Imperial (760) 482-4606
Kern (661) 862-5250
Lake (707) 263-7000
Lassen (530) 251-8110
Mariposa (209) 966-2220
Mendocino (707) 463-4354
Modoc (530) 233-6419
Mojave Desert (760) 245-1661
No. Sonoma (707) 433-5911
Placer (530) 889-7130
Sacramento (916) 874-4800
San Diego (858) 650-4700
San Luis Obispo (805) 781-4247
Santa Barbara (805) 961-8800
Shasta (530) 225-5789
Siskiyou (530) 841-4029
Tehama (530) 527-3717
Tuolumne (209) 533-5693
Ventura (805) 645-1400

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