PM Advance Action Plan

June 2015

Lewis & Clark Public Health

DEQ Montana Department of Environmental Quality

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Last Updated: 6/16/15

Contents

Figures

One. PM Advance Overview

In early 2013, the Environmental Protection Agency (EPA) announced the inception of the Particulate Matter (PM) Advance Program. The PM Advance Program continues EPA's collaboration with states and local programs to proactively reduce emissions of $PM_{2.5}$ and its precursors in attainment areas so they can continue to meet the National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$. According to EPA, participation in PM Advance is likely to have multiple benefits for an area. Improvements in air quality that result from participation in the program could:

- Help ensure continued health protection over the long term,
- Provide state, tribal, and local governments with a cushion against potential future violations of the $PM_{2.5}$ NAAQS,
- Better position an area to achieve air quality concentrations that enable it to avoid a nonattainment designation with respect to any future revised NAAQS,
- Allow for greater ability to choose from control measures and programs that make the most sense for the area and that are cost-effective, and
- Result in multi-pollutant benefits; for example, reductions in nitrogen oxides can lead to lower ambient fine particle matter levels as well as lower ambient ozone levels.[1]

The PM Advance Program affords participating areas an opportunity to work closely with EPA to achieve these potential benefits. In Montana, two areas signed up to participate in the program. Lewis and Clark County and the City-County of Butte-Silver Bow both agreed to work with EPA, in coordination with the state of Montana and local stakeholders, to implement measures and programs to reduce emissions of $PM_{2.5}$. This Action Plan describes the process and outcomes of that effort and lays out a course of action to implement the measures and programs identified herein.

Background & Purpose

Particle pollution, also known as particulate matter or PM, consists of solid particles and liquid droplets suspended in air. Particulate matter is made up of components such as soil and dust, acids, chemicals, metals, and allergens like pollen or mold spores. These microscopic particles are a health concern because they are small enough to pass through the nose and throat and enter the lungs, potentially affecting both the heart and the lungs. According to EPA, a variety of health effects can result from exposure to particle pollution. The agency explains that "numerous studies link particle pollution to increased hospital admissions and emergency room visits – and even to early death. Research indicates that obesity or diabetes may increase risk."[2]

[1] Environmental Protection Agency, "PM Advance Basic Information," last updated May 13, 2013, www.epa.gov/ozoneadvance/basicPM.html.
[2] Environmental Protection Agency, Burn Wise Program, "Wood Smoke Awareness Kit."

For purposes of regulation, EPA separates fine particles (those with a diameter of 2.5 micrometers or smaller, known as $PM_{2.5}$) from coarse particles (those with a diameter larger than 2.5 micrometers and smaller than 10 micrometers, known as PM_{10}). This is in part because coarse and fine particles often come from different sources. For example, PM_{10} may be found near dusty roadways and industries whereas $PM_{2.5}$ is generally found in smoke and haze. $PM_{2.5}$ can enter the air directly from sources such as forest fires, or can form when gases emitted from industries and automobiles react in the air. Because these fine particles have a variety of direct sources and sources of precursors, they can be difficult to control.

The focus of the PM Advance Program is on reducing ambient levels of $PM_{2.5}$, the fine particles, in areas that are currently attaining the NAAQS but that may be at risk of exceeding healthy levels of the pollutant in the future. Generally speaking, the mountain valleys of western Montana and associated cities/towns are at risk of frequently accumulating high ambient levels of $PM_{2.5}$ due to a combination of emission sources, geography, and meteorological conditions that trap potentially harmful emissions low in the atmosphere resulting in increased public exposure. Various studies conducted by the Montana Department of Environmental Quality (DEQ) in collaboration with local/City-County health departments point to smoke from prescribed open burning, wildfires, and residential heating devices/practices as the major sources of $PM_{2.5}$ pollution in these areas.

Of primary concern related to these at risk areas are wintertime impacts resulting from residential wood-fuel heating practices during prolonged mountain valley meteorological inversion events. Due to the unique and often localized nature of the emissions, efforts to reduce impacts on public health are being led by local health agencies with guidance from DEQ. In these communities, building trust between residents and local health authorities is essential to the success of $PM_{2.5}$ mitigation efforts and local programs have expressed to DEQ that a nonattainment designation would add undue administrative burden and may even harm or stall ongoing efforts to proactively address these problems.

The PM Advance Program continues this focus on local action, addressing $PM_{2.5}$ emissions at a level that corresponds to the very localized impacts of the pollutant. Participation in the PM Advance Program allows Montana's at risk areas to continue their on-the-ground outreach, in coordination with both DEQ and EPA, to reduce $PM_{2.5}$ emissions through timely and effective action and potentially avoid unhealthy ambient air quality and future nonattainment designation.

Improving local control of $PM_{2.5}$ emissions can have multiple positive outcomes. EPA's NAAQS are health-based standards and improved air quality is most frequently associated with improved health, especially in sensitive groups such as elderly residents and young children. However, the strategies and action items discussed in this plan have many co-benefits in addition to health, including efficiency, safety, and savings of time and money, to name a few. Cleaner burning stoves and clean burning techniques not only reduce $PM_{2.5}$ emissions, but improve the efficiency of home heating – generating more heat for the amount of fuel used. This often means that less wood is needed during the heating season, which equates to savings in money spent to purchase wood and time and effort

spent chopping, splitting, and stacking the wood. High-efficiency stoves are often also safer as they burn more completely, creating less buildup of creosote that can cause chimney fires.

Process/Methodology

The PM Advance Program provides a framework that participating areas can use to develop local strategies and actions to reduce $PM_{2.5}$ and its precursors. Because $PM_{2.5}$ pollution has the potential to come from a diverse assortment of sources, it is often more difficult to control than industrial pollutants that can be controlled through air quality permits. Controlling $PM_{2.5}$ requires a unique approach that may differ from community to community depending on the primary sources of the pollutant. Over the past few years, Lewis & Clark County and the state of Montana have conducted various studies to pinpoint the primary local sources of particle pollution. These are discussed in further detail in the next chapter.

Just as the local sources of $PM_{2.5}$ often differ from community to community, so to do the methods for controlling the pollutant. Control measures that are successful in one city may not work as well in another location for a variety of reasons. As such, the PM Advance Program encourages coordination with local stakeholders to determine the actions that will work best in the particular community. Frequent, early stakeholder engagement helps to achieve results that are not only effective but also widely supported. Lewis & Clark County has already begun outreach efforts to gain a better understanding of local perspectives. For example, in 2012 the county reached out to residents in a residential wood burning survey. The survey gathered local viewpoints on air pollution and sought information on local wood burning habits that may contribute to PM pollution. The information the county gathered through the survey has and will continue to help inform the development of public education efforts. It will be further discussed in the following chapter of this plan.

To further engage local residents and stakeholders, the area is in the process of creating a PM Task Force, comprised of members from diverse segments of the community. Stakeholders include local wood burning appliance merchants, interested members of the public, representatives from the American Lung Association and American Heart Association, fire department personnel, state and federal air agencies, and health department staff. The main role of the group will be the implementation and maintenance of this PM Advance Action Plan.

Lewis & Clark County coordinated with the Montana Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) to develop this plan. DEQ staff facilitated the planning process and provided technical support in analyzing local air quality data. EPA provided insight and feedback throughout the plan development process.

The program timeline began when the county signed up for the PM Advance program in April 2013. The program began selecting control measures and drafting this action plan in the fall of 2013 and worked through the summer and fall of 2014. The area is already implementing some of the control measures identified in this plan and the intent is that implementation of new measures will begin in

preparation for the 2015-2016 heating season. Further detail on the implementation schedule for each control measure is provided in the final chapter of this plan, as well as in Appendix A.

Plan Maintenance

This action plan represents an ongoing effort to reduce ambient $PM_{2.5}$ concentrations in Lewis & Clark County. As such, this is a living document that will be updated as necessary. Implementation of the measures included in this plan will take place over a five-year trial period, during which the local air quality program will provide EPA with annual updates on progress.

To ensure that the plan remains current over the course of the initial five-year period and that successes and challenges are taken into account during implementation, the program selected a plan maintenance committee. Members of the committee include staff from the local air quality program as well as from DEQ. The committee is committed to meeting biannually for the first few years of implementation and will reassess meeting schedule thereafter.

The purpose of the plan maintenance committee is to periodically check in on the progress of selected control measures and determine whether changes need to be made based on implementation experience. The committee will be the primary group responsible for measuring the success, failure, and/or completion of specific measures and the plan overall.

Two. $PM_{2.5}$ in Lewis & Clark County

This chapter provides context for the plan both through discussion of the geographic, atmospheric, and socioeconomic setting as well as through presentation of ambient $PM_{2.5}$ data collected in the area for many years.

Context

Lewis & Clark County is located in western Montana (see map in Figure 2-1). The county has an approximate population of 64,000.[3] Over 80% of the county's population resides in the City of Helena and surrounding areas, located at the south end of the county in the valley just east of the Great Continental Divide and west of the Big Belt Mountains. Between 2000 and 2010, the population in Lewis & Clark County increased by nearly 14%, placing the county among the top for population growth in the state during that period.[4]

Helena and the surrounding urban area are located in a mountain valley, with an elevation more than 3500' above sea level. The urban terrain slopes down from the Continental Divide into a relatively flat valley. The area has a semi-arid climate with wide daily temperature swings. Due to its location in a mountain valley, the area is also subject to temperature inversions during the fall and winter months that trap air pollutants low in the atmosphere.

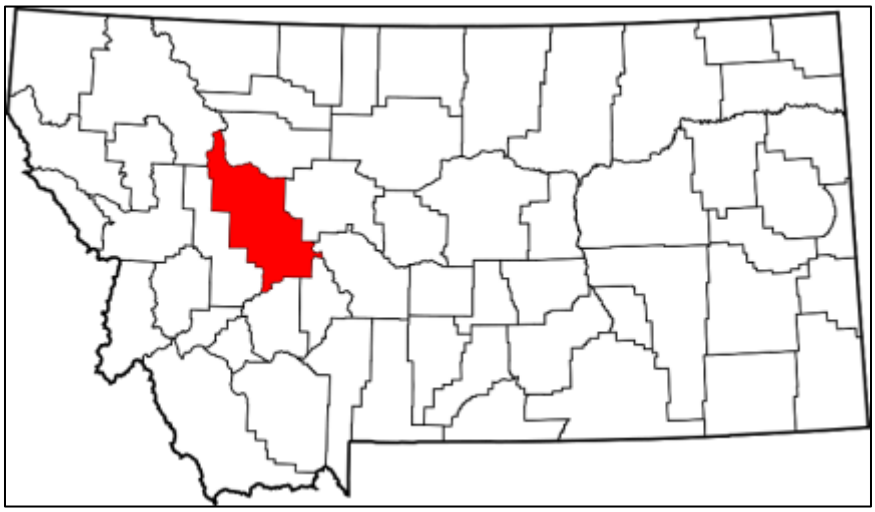


Figure 1. Lewis & Clark County

Local Air Quality Trends

Lewis & Clark County has a history of $PM_{2.5}$ troubles. Given that the urban area is located in a mountain valley prone to wintertime temperature inversions, any excess emissions can quickly add up during those times. The area is also situated near vast wood resources, making wood a relatively cheap and readily available fuel for winter heating. As discussed earlier in this plan, wood smoke is a direct source of $PM_{2.5}$ air pollution. As the National Ambient Air Quality Standards (NAAQS) have

[3] U.S. Census Bureau, 2010-2012 American Community Survey, www.census.gov.
[4] Ibid, 2010 and 2000 Census, www.census.gov.

been refined over the years, the area has had to take additional measures to better control PM emissions.

In response to the strengthening of the 24-Hour PM2.5 NAAQS in 2006, Lewis & Clark County began to consider the use of regulatory action as an effective way of controlling emissions. In the summer of 2010, both the Health Department and the local Board of Health recommended revising existing rules to ensure ongoing compliance with the NAAQS. The revision included the existing the Air Pollution Control District (APCD), mapped in Figure 2-2, and affected solid fuel-burning devices such as wood stoves, outdoor wood-fired boilers, and incinerators. Idling diesel engines could also be subject to the new regulations. The APCD encompasses Helena and the surrounding area. The revised regulations took effect in September of 2011 and are included in Appendix C of this report.

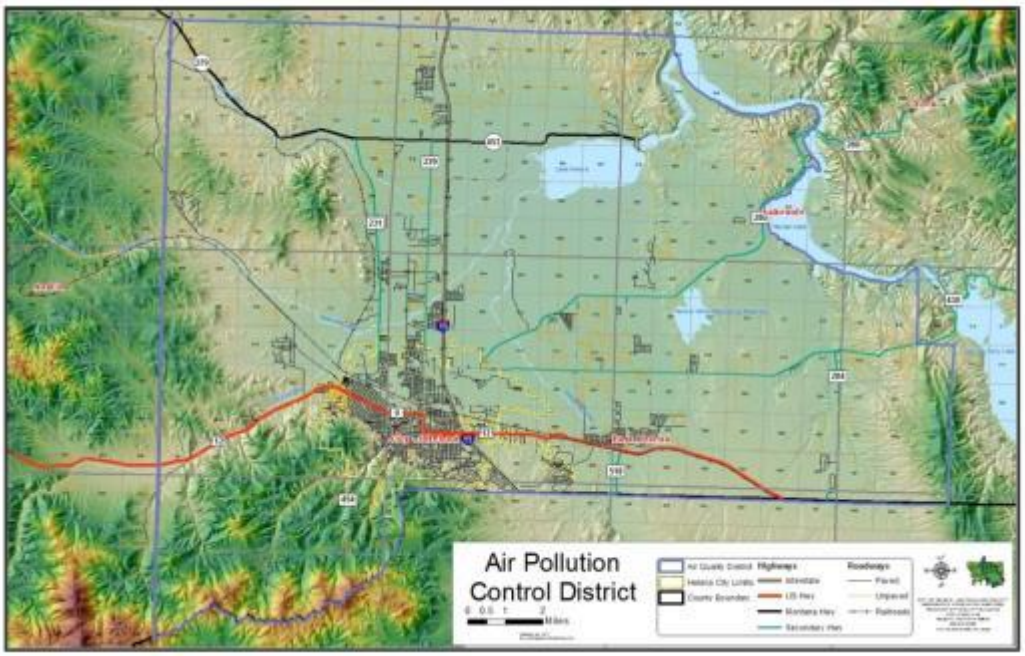


Figure 2. Air Pollution Control District

The Environmental Services Division of the Health Department monitors ambient PM2.5 within the APCD and is responsible for implementing and enforcing the local outdoor air quality regulations. Year-round monitoring of fine particle pollution has been ongoing in the area for more than a decade. Initially, the area used a monitor sited at the Lincoln Elementary School in the center of the Helena city limits. For a few years, the program monitored simultaneously at the Rossiter School Pumphouse, which is located further from the city center in the Helena valley. Seeing very little difference in monitored values, the program, in cooperation with the Montana Department of Environmental Quality, decided only one monitor was necessary. The program made the decision to maintain the Rossiter monitor because the increasing urban development in the Helena valley was very likely to impact air quality. Additionally, other factors contributed to a decision that the Lincoln School location was not ideal.

Ambient Monitoring Data

The data presented in the following charts was collected at the former Lincoln School monitoring site and at the current Rossiter Pumphouse site. It is useful to show trends in ambient $PM_{2.5}$ over the last several years. The area benefits from having over a decade of monitoring at the two nearby sites, which will be useful when analyzing the success or failure of current and future control measures.

Figure 2-3 displays the annual $PM_{2.5}$ design values dating back to 2001. The data is displayed with (dark blue) and without (light blue) exceptional events, which, in western Montana, comprise mostly summer wildfire activity. Exceptional events are removed from the data to better represent ambient concentrations that can be controlled by human activity. Not shown in the chart is the primary annual NAAQS, which was 15 µg/m^3 until EPA lowered it to just 12 µg/m^3 in 2012. Clearly, the area has been well below the annual standard since monitoring began at the early site.

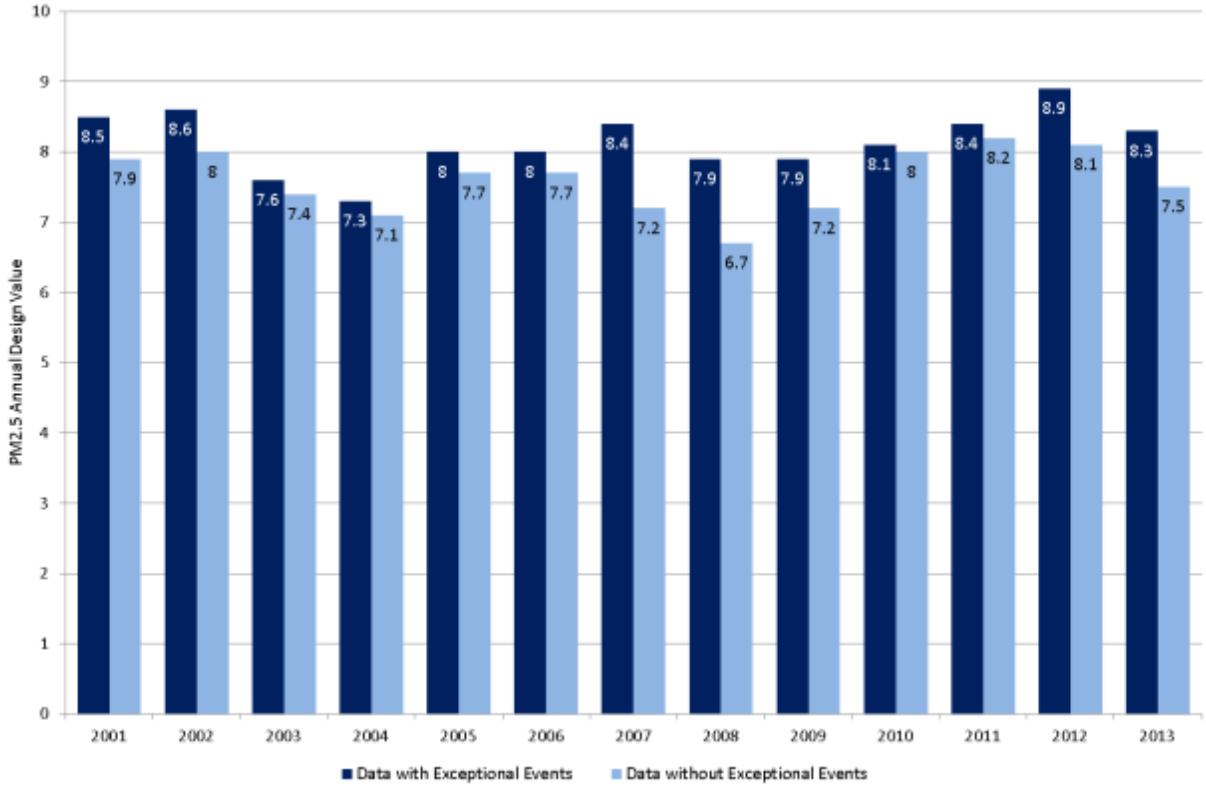


Figure 3. 2001-2013 Lewis & Clark Annual $PM_{2.5}$ Design Values

Although Lewis & Clark County has historically been well below the annual standard for $PM_{2.5}$, the area has struggled to stay below the 24-hour standard in recent years. In 2006, EPA chose to retain the 1997 annual fine particle standard, but strengthen the 24-hour standard from the 1997 level of 65 µg/m^3 to 35 µg/m^3. The 2006 change represented a significant change in what was considered an adequate limit to protect public health and welfare. Before the change, the county had no problem meeting the standard. However, as Figure 2-4 shows, the Rossiter Pumphouse monitor has recently picked up ambient values that hover at or above the 24-hour standard. Figure 2-4 plots the most

recent five years' design values against the 2006 24-hour standard with flagged wildfire data removed. There is a tapering-off after 2011, the year the county's outdoor air quality regulations took effect. Future years will show whether the lower monitored values after 2011 were a result of the local program's stepped-up efforts or fortunate meteorological circumstances.

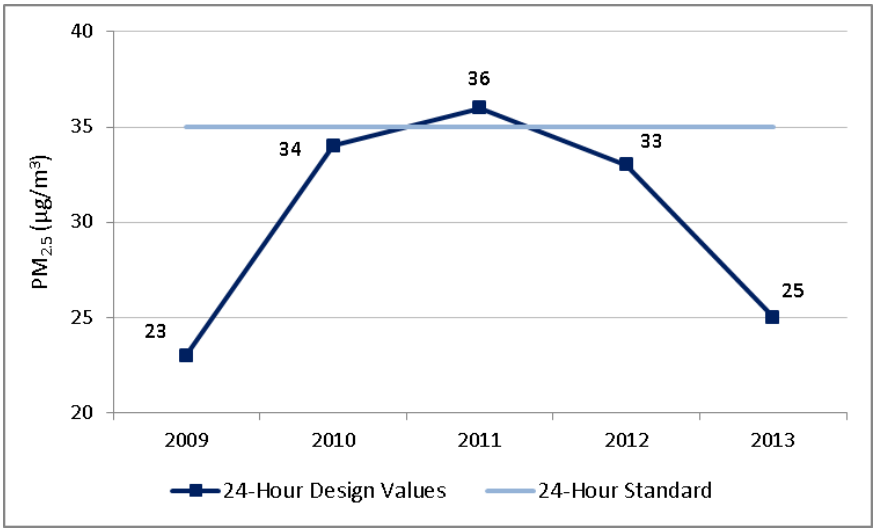


Figure 4. 2009-2013 Lewis & Clark PM2.5 24-Hour Design Values w/NAAQS

Figure 2-5 displays the same design values with and without exceptional events. Again, there is a drop in design value in the years following 2011.

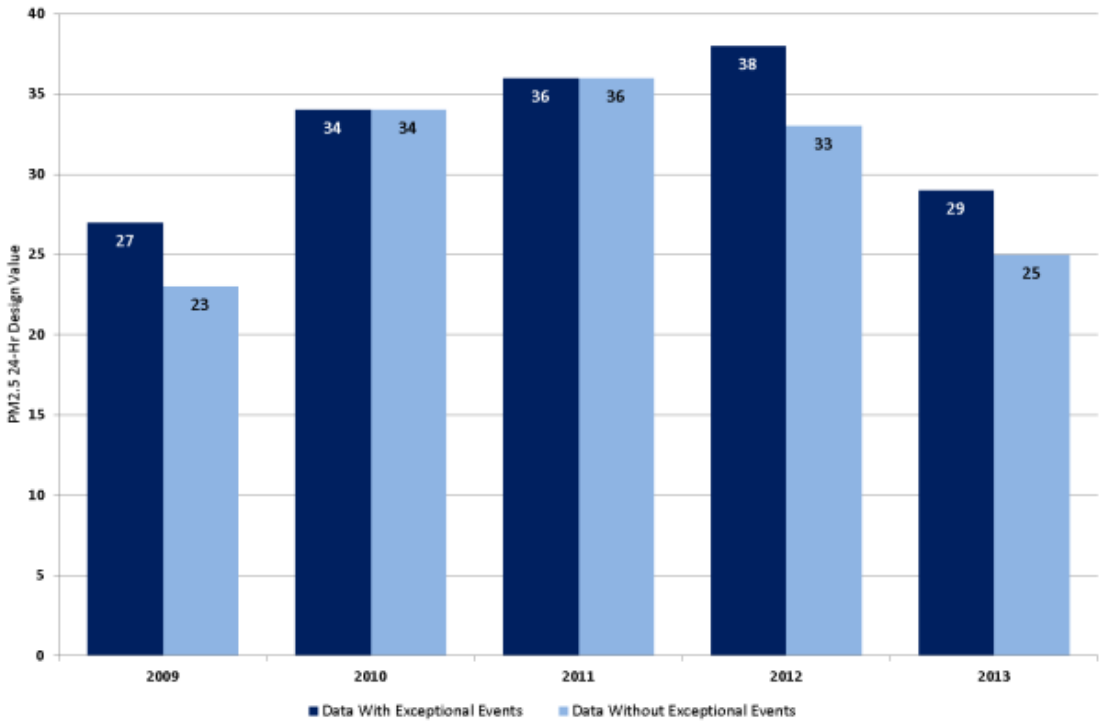


Figure 5. 2009-2013 Lewis & Clark $PM_{2.5}$ 24-Hour Design Values

Viewing the design values over the last decade gives us a picture of the trends on a macro level, but does not say much about why the values are higher in some years than in others. Figure 2-6 provides a more detailed look at the daily $PM_{2.5}$ values in 2013 that go into the design value. The chart is more telling about the time of year when high values occur. As is the case with many mountain valleys in western Montana, the highest $PM_{2.5}$ concentrations occur in the winter months. In 2013, for example, Lewis & Clark County monitored very high values throughout the month of January and relatively low values during the spring and summer with elevated values beginning again in November. This data clearly shows that $PM_{2.5}$ issues are a wintertime problem in the area.

There is a spike in daily average $PM_{2.5}$ concentration in August due to wildfire smoke; however, looking back to Figures 2-3 and 2-5 on the preceding pages, which show data with and without exceptional events, Figure 2-7, on the following page, shows the most recent three years of daily averages with exceptional events highlighted. This provides an even clearer representation of the impact of summer wildfires on monitored $PM_{2.5}$ values. Comparing the 2013 daily averages below with the exceptional events data, we see that without wildfire impacts, there is an even starker difference between summer and winter $PM_{2.5}$ values.

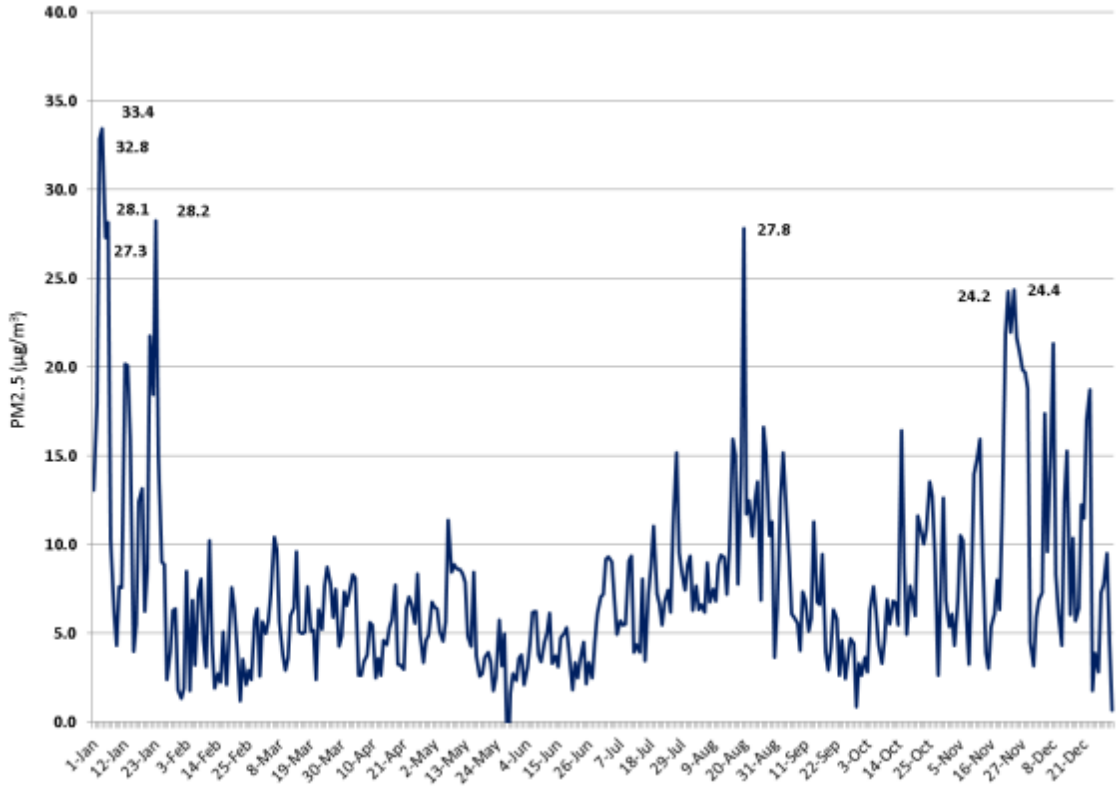


Figure 6. 2013 Lewis & Clark $PM_{2.5}$ Daily Averages

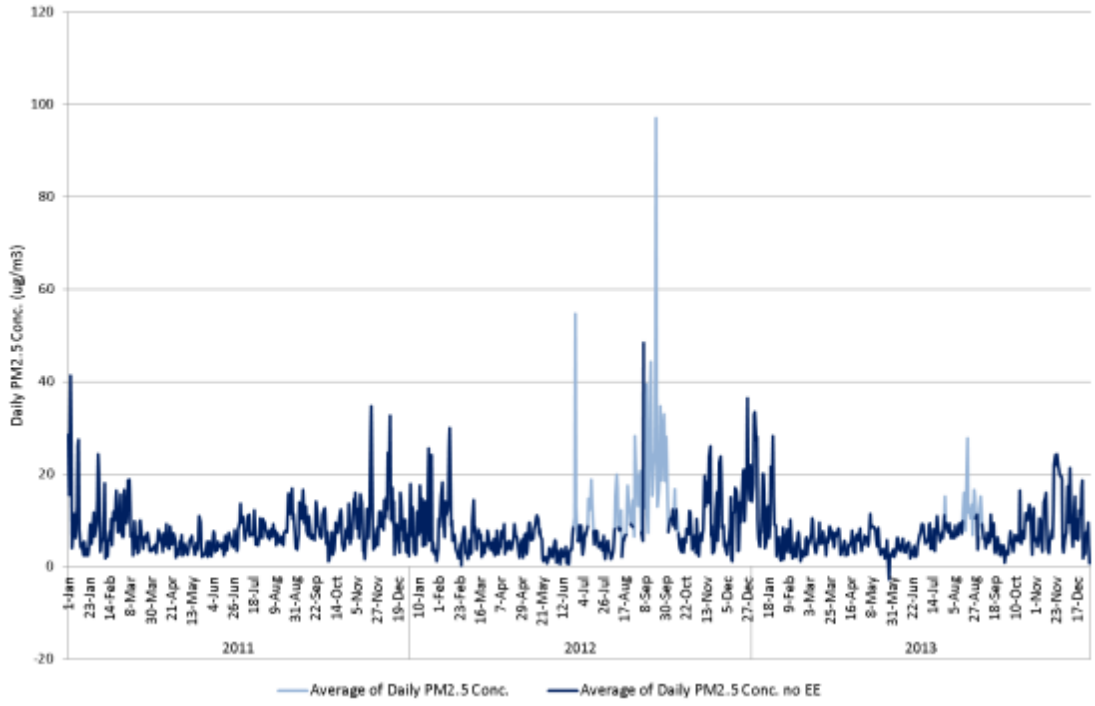


Figure 7. 2011-2013 Lewis & Clark Daily PM2.5 with and without Exceptional Events

In summary, the monitoring data from the stations at Lincoln School and Rossiter Pump, presented in this section, shows that Lewis & Clark County, while currently attaining both the annual and 24-hour standards, has struggled with high values in recent years. The data also shows that the highest values occur during winter months, not including summer values caused by wildfires.

Chemical Mass Balance (CMB) Studies

The monitoring data on its own does not provide any insight into what types of sources contribute to the elevated $PM_{2.5}$ values. As discussed in the introduction to this plan, $PM_{2.5}$ can enter the air directly or as a product of chemical reactions between other types of emissions. To tackle the $PM_{2.5}$ problem, Lewis & Clark County needed to gain a better understanding of where it was coming from. The program accomplished this by conducting a chemical mass balance (CMB) analysis. This study analyzed the chemical makeup of ambient $PM_{2.5}$ to determine its primary source. Figure 2-8 on the following page summarizes the findings of the recent CMB study.

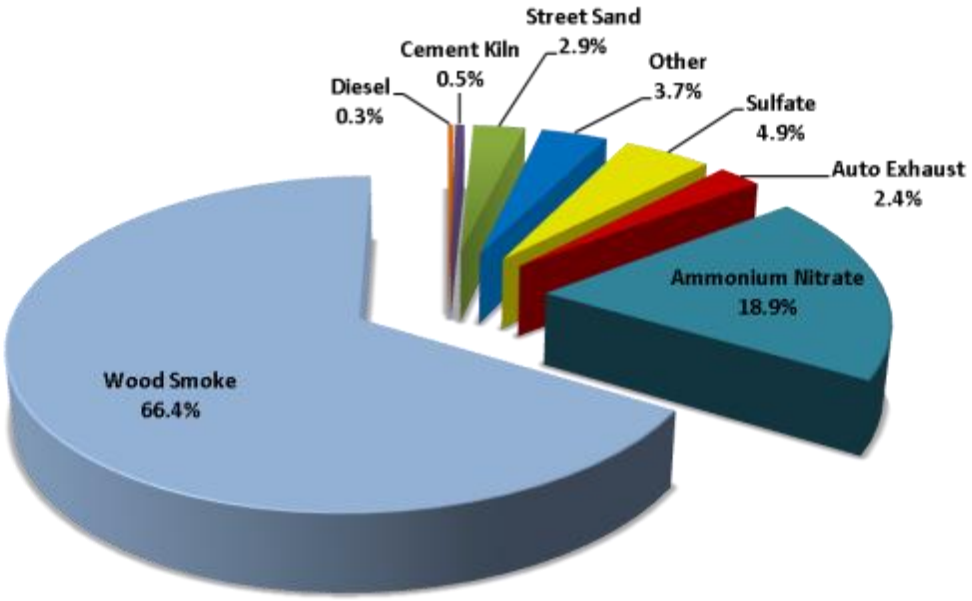


Figure 8. Lewis & Clark County Winter 2007-2008 PM2.5 CMB

Because the majority of elevated $PM_{2.5}$ values occur during winter months, Lewis & Clark County focused on those months for the CMB studies. As presented in Figure 2-8, more than 60% of the ambient $PM_{2.5}$ entered the air directly as wood smoke in the winter of 2007-2008. In winter months, wood smoke almost exclusively comes from residential wood heaters like woodstoves, fireplaces, and wood-fired boilers or furnaces. As previously discussed, the abundance of wood in western Montana makes it a relatively cheap source of heat and one that has been used for generations, especially in low-income areas.

The CMB study also showed a large portion of ammonium nitrate, nearly 20% of the ambient $PM_{2.5}$. Generally, nitrates are formed from nitrogen oxide emissions from motor vehicles and power plants. In Lewis & Clark County, it is likely that the nitrates discovered in the CMB are from motor vehicle emissions, but the local program does not have enough information to pinpoint the exact source. This is in part why the program intends to do further research on the source of local ambient particulate matter by performing an updated CMB study, discussed in the following chapter. With regard to motor vehicle emissions, the program has undertaken several control efforts in recent years. For example, Lewis & Clark County has a regulatory restriction on idling diesel engines (automobiles, trains, etc.) for more than 2 hours. With recent changes in diesel technology, most modern engines do not idle for long and local concerns are primarily restricted to older automobiles, as opposed to train engines and buses, which have been updated and to which anti-idling policies

apply.[5] In addition, the local program confirmed that the school district maintains its own anti-idling policy for school buses.

Directional Analyses

The monitored concentrations coupled with the wind direction provide a pollution rose, which shows the frequency and intensity of the $PM_{2.5}$ along with the direction during the monitoring. Figure 2-9 below places the pollution rose over a map of the area around the Rossiter pump monitoring location. The figure shows that the monitored $PM_{2.5}$ values generally come from the west and northwest residential areas surrounding the monitor with a smaller component coming from the east. Analysis of the PM2.5 concentrations when the wind was calm showed no correlation to high concentrations.

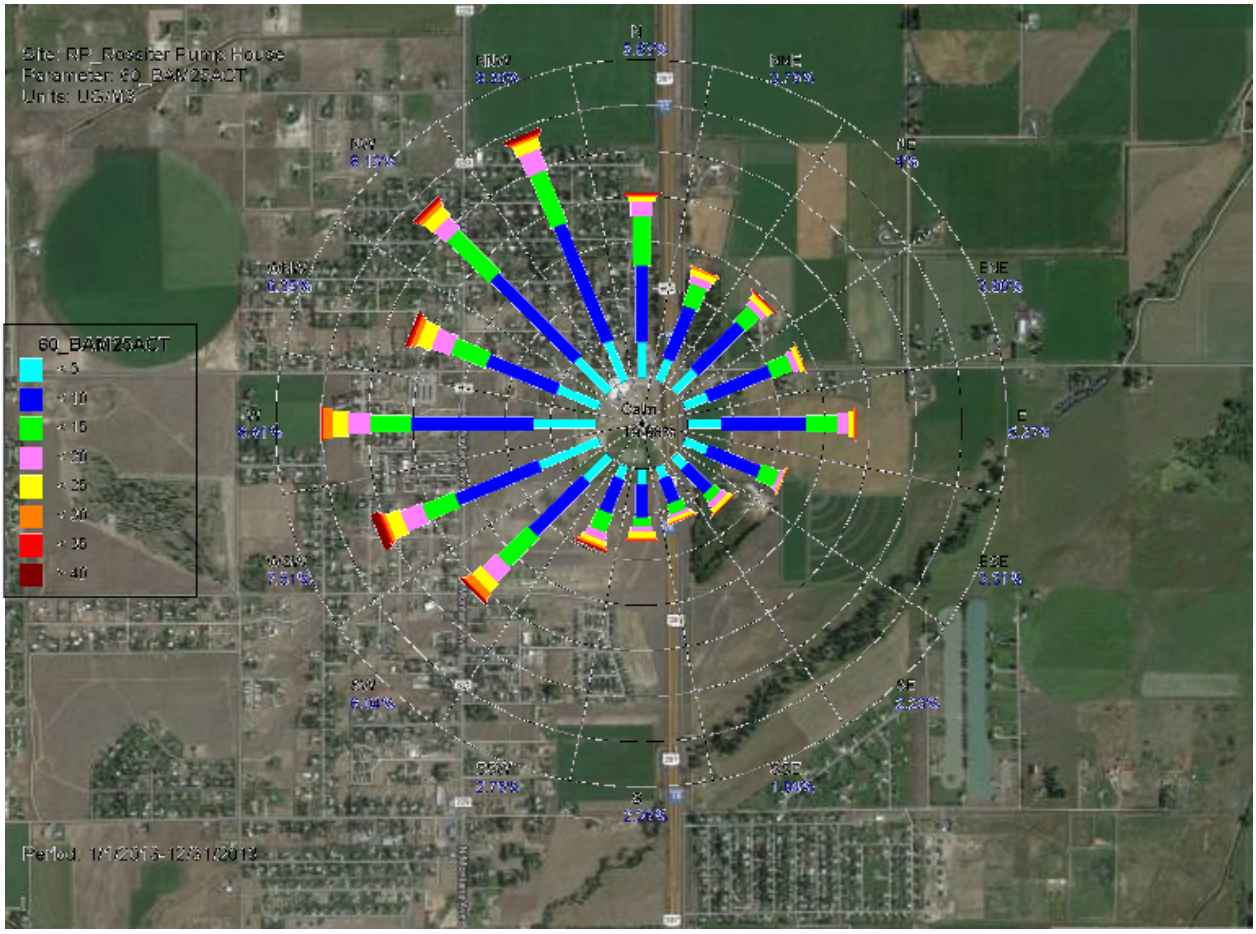


Figure 9. Lewis & Clark 2013 PM2.5 Pollution Rose

[5] In a November 5, 2014, letter from Montana Rail Link to Melanie Reynolds, Lewis & Clark County Health Officer, MRL explained that the company has purchased fuel-efficient, low-emission locomotives and uses auxiliary power units, which keep engines warm during the winter and reduce engine idling time.

Community Practices and Perspectives

In August of 2012, the air program contracted with a consulting group to conduct a telephone survey of homes in Lewis & Clark County. The survey questions were designed to solicit information about numbers, types, and use of appliances; frequency of burning; types of materials burned; wood storage practices; willingness to change wood burning practices; and perceptions about air quality. The survey was designed to target residents with at least one wood burning appliance on the premises. Based on initial screening questions, it is estimated that 41% of the target population had at least one wood burning appliance in the home.[6]

The random digit telephone survey was conducted between August 3 and August 9, 2012, within a defined geographic area of Lewis & Clark County, including the City of Helena. Of the 270 completed surveys, 31% of respondents lived in the City of Helena while the remaining 69% lived outside of city limits. Generally, respondents having at least one wood burning appliance in the home are between the ages of 55 and 74 with no young children in the home. Of those that responded to a question about household income, 57% earned less than $75,000 annually.[7]

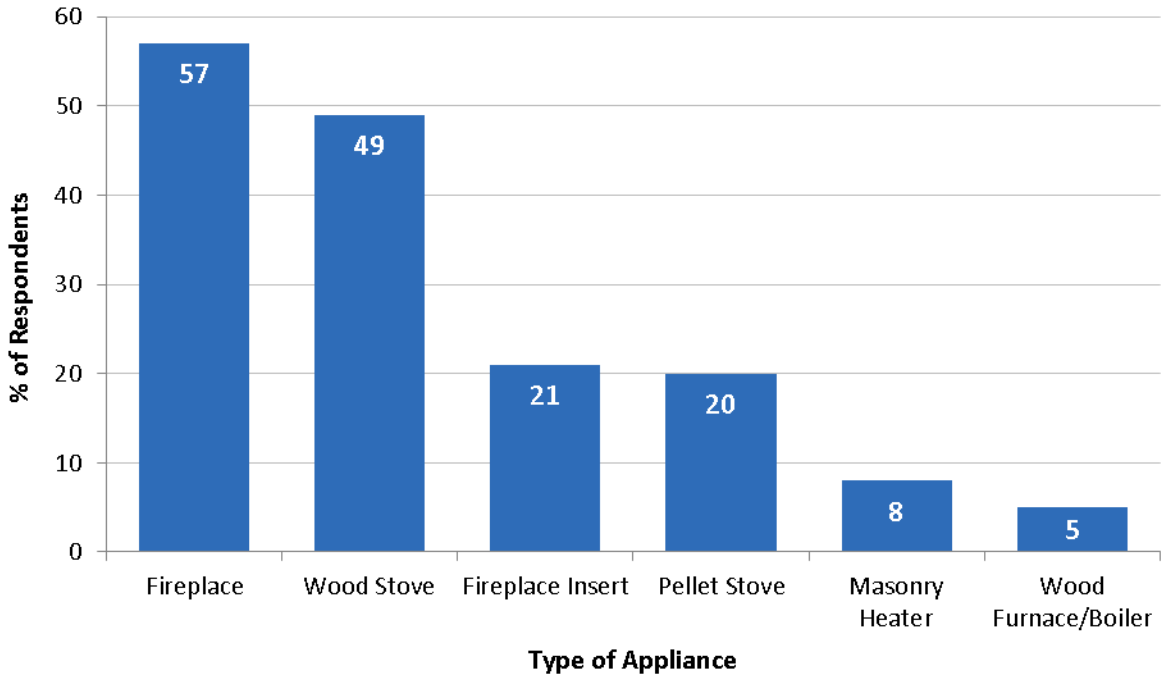


Figure 10. Most Common Types of Wood Burning Appliance

The survey found that most homes with at least one wood burning appliance have more than one device. On average, respondents had 1.8 wood burning appliances on the premises. As displayed in

[6] Frause, "Lewis and Clark County Residential Wood Burning Survey of Households," August 2012, p. 7. The survey had a margin of error of ± 5% at the 90% confidence level.
[7] Ibid, pp. 3-6.

Figure 2-10 (above), fireplaces and wood stoves were the most common types of device, followed by fireplace inserts and pellet stoves, then masonry heaters and wood boilers.[8]

According to survey results, although many homes have wood burning appliances, most do not use them as a primary heat source. There are, of course, several exceptions to this finding. For example, 92% of respondents with wood furnaces/boilers and 90% of respondents with masonry heaters use those appliances as a primary heat source. In addition, 51% of respondents with wood stoves use them as a primary heat source.[9]

In addition to questions about wood burning appliances, they survey asked respondents the perceptions about air quality. A large majority (83%) of respondents said they do not think there is an air pollution problem in their area. Of those that recognized an air pollution problem, nearly half (49%) responded that it is not serious. Although more than half (58%) of respondents believe wood smoke is a main or significant contributor to air pollution, most (66%) did not know if it poses any health concerns.[10] These responses point to a need for increased or improved outreach and education. This need is recognized in this plan and is the focus of many of the control measures identified in the following chapter.

The survey results indicated ± 5% at the 90% confidence interval, meaning that if all residents with a wood burning appliance had been surveyed, there is a 90% chance the results would be within ± 5% of the results in this survey. The U.S. Census Bureau statistical standard for published data is to use the 90% confidence and ± 5% error levels.

Consulting U.S. Census data for 2012, the same year as this survey, 4.9% of the population used wood as a source of home heating fuel. According to the survey commissioned by Lewis and Clark County, approximately 8,800 ± 440 homes in the county may use wood as the primary heating fuel, while the U.S. Census data indicated that about 1,954 ± 252 rely on wood heat as the primary heat source.

The difference between the two sources is significant – 5% in the case of the U.S. Census versus about 30% in the case of the Helena area survey. Therefore, the survey results do not seem to be particularly reliable, with the commissioned survey potentially overestimating the number of residents who relied on wood as their primary source of heat.

The survey also indicated that respondents did not believe there was an air quality problem in the Helena area, which was unexpected. In the past, air pollution control efforts and outreach programs assumed that residents agreed there was a problem. However, the survey indicated that even though the Rossiter School site exceeds 24-hour standards for $PM_{2.5}$ several days each year, and even though these exceedances have moved Lewis and Clark County close to non-attainment in at least one year,

[8] Frause, p. 7.
[9] Ibid.
[10] Ibid, pp. 9-10.

residents feel that no air pollution problem exists. Even for those who believe there is some problem, only 36% of them feel it is a serious problem.

Interestingly, the survey commissioned by Lewis and Clark County found the most common wood burner could be classified as older (55-75 years), living with a spouse/partner in a home without children, earning $25,000-$75,000 per year, Caucasian, and without a college degree. This demographic information has already been helpful in targeting advertising efforts. For example, radio ads are played on specific stations at particular times of day to reach the target audience indicated by the survey.

The survey discussed here, taken together with recent Census data, helps provide a foundational understanding of the issues at play, from which the local program can develop additional tools and outreach efforts. The program intends to perform a more targeted survey, discussed in the following chapter, in the winter of 2015 to improve their understanding of how the issues of air pollution and wood smoke are perceived in the community. The program believes these baseline surveys are important in order to develop outreach efforts targeted to fill specific gaps in community understanding. In the future, surveys will help measure the success of outreach efforts.

Three. $PM_{2.5}$ Control Measures

In EPA's document, "Strategies for Reducing Residential Wood Smoke," the agency recommends a program for addressing PM2.5 issues related to wood smoke that involves several strategies. Areas should start by implementing an education and outreach campaign. Education helps raise awareness of the issue and of any other steps the area is taking to address it. The next strategy involves a replacement or retrofit program for wood burning appliances. Change-out programs take old stoves off the market and replace them with newer, cleaner-burning appliances. EPA then recommends that areas implement a wood smoke curtailment program followed by additional regulations for other types of wood burning appliances, such as hydronic heaters.[11] These strategies generally fall into three "buckets," (1) education and outreach, (2) voluntary measures, and (3) regulatory measures.

Lewis & Clark County has long recognized local issues with particulate matter pollution. As described in the previous chapter, both the state and the local air quality program have studied ambient PM pollution and its various sources. The local program has also engaged the community about residential wood burning practices and understanding of air quality issues. It is clear through recent monitoring data that local efforts have been successful, but more is needed to ensure reductions in ambient $PM_{2.5}$ are permanent and thereby avoid violating the health-based National Ambient Air Quality Standards (NAAQS). To that end, in collaboration with the state of Montana and the EPA, Lewis & Clark County developed a proactive program of existing and future control measures.

The program comprises both long- and short-term measures, as well as both regulatory and voluntary measures. Given survey results that show a lack of understanding of the key issues, the program focuses primarily on outreach and education. The two-pronged goal of the program is to improve year-round air quality and engage the community in that effort, which will help ensure ongoing success. Currently, there is a lack of understanding of the relationships between wood smoke, air quality, and public health. This will need to be addressed in order for larger regulatory or voluntary measures to succeed. Measures that are currently being implemented and measures that are in development for future implementation under this plan are described on the following pages.

Education & Outreach Measures

As discussed above, educating the community and building awareness of the issues is the main focus of this plan. Education on the key issues related to $PM_{2.5}$ in the area will ease the way for future voluntary or regulatory efforts, should they be needed, by developing an understanding of the problem, its sources, and how it can be addressed. The local air quality program either is already implementing the following measures (indicated using **bold type**) or is planning to implement them

[11] U.S. Environmental Protection Agency (2013), "Strategies for Reducing Residential Wood Smoke" (Publication no. EPA-456/B-13-001). Retrieved from http://www.epa.gov/burnwise/pdfs/strategies.pdf.

under the PM Advance program. Existing measures will be maintained or expanded over the course of the program's commitment to PM Advance.

EM1. Update and Implement a Long-Range Outreach/Education Campaign

Informed and engaged residents will be better equipped to practice behaviors that reduce PM pollution. To better plan and prioritize communication efforts, the air quality program will develop an overarching communication plan in collaboration with Lewis & Clark County communications staff. In the past, Lewis & Clark County developed the 2013 Air Quality Program Outreach/Education Campaign, which summarized outreach and education goals and budget and listed potential control strategies as well as their expected cost and reach. As part of PM Advance and ongoing efforts, the program plans to update the document in time for the start of the 2016 winter heating season.

Wood burning appliances that are operated properly and used with well-seasoned wood produce less PM pollution, thereby reducing ambient PM in the airshed and within homes of wood burners. The air quality program is currently using printed and online materials from the Burn Wise program through EPA. Part of the Education/Outreach Plan will be to take a strategic look at prioritizing educational materials (types of materials, message, distribution routes, etc.). To build on current understanding of community perspectives, the local program will prepare and distribute a survey (VM3) during the 2015-2016 winter heating season to gage resident understanding of the local air quality conditions, type of burning conducted and understanding of health impacts of $PM_{2.5}$. The program intends to engage the newly formed air quality committee to help select the most effective questions and incentives for the survey.

EM2. **Set Up Electronic Air Quality Sign**

The air quality program installed an electronic sign outside of the Health Department in 2012. The primary purpose of the sign was to provide updates on current ambient PM levels and associated health messages. At the end of the 2014 winter burning season, construction at the site of the existing sign forced the sign to be taken down and placed into storage. The air quality program will reinstall it at the same location when construction is complete. In the meantime, the program is collaborating with the state and the sign company to assess the potential to update the sign remotely or automatically from the monitoring site. The target date for reinstallation is July 2015.

EM3. **Prioritize Workforce Development**

This measure focuses on ongoing training of City-County Health Department staff. Trained, knowledgeable staff are best able to provide reliable information to the public to assist with making the right decisions related to wood burning practices. Attending training and working directly with trainers helps staff maintain a network of experts in the field. Ongoing workforce development also keeps staff engaged and up-to-date with the most current topics and standards. Short-term opportunities include Method 9 smoke school, residential wood smoke specialty conference, Montana environmental health association conference, etc.

EM4. Shared Air Quality Educational Trunk

Educational trunks provide effective air quality education methods and props for use among target audiences. Such a trunk can be shared between state and county air quality programs, reducing costs to individual local programs. The Montana Museum of Natural History in Missoula has an existing trunk available for loan that targets third-fifth grades. The air quality program will use this as an example when developing a trunk for broader audiences. As funding allows, the target implementation date will be January 2016.

EM5. Host a Public Workshop on Clean, Safe Residential Wood Heating

The goal of this measure is to provide homeowners and interested persons with information on safe and efficient wood burning practices. The program will collaborate with the fire department, local stove vendors, health officials, and the forest service, to provide useful, timely information to participants. The program plans to target October 2015 for an inaugural workshop – October is National Fire Prevention Month and the program anticipates that the timing will be a good way to get involvement from the local fire department. The purpose will be to encourage residents to prepare for the burning season. The program intends to follow the examples provided by EPA and Burn Wise.

EM6. Update the Chemical Mass Balance Study

The air quality program contracted with local experts several years ago to analyze the chemical makeup of ambient PM2.5. The purpose was to gain a better understanding of the specific sources of PM pollution in the area. The original study was conducted during winter of 2007-2008 at the old Lincoln School monitoring site. That study is currently outdated and should be updated to assess whether there have been any significant changes. A new analysis will help the air quality program better understand the types of emissions to target through PM Advance.

EM7. Develop and Pilot an Elementary/Middle School Air Quality Program

The purpose of this measure is to increase awareness of air quality issues and remedies among school-age children. The hope is that educating children will also help the air quality program reach parents in the community who may change their behavior related to wood burning. This measure builds on an existing partnership with the school district. Developing a partnership with the school district is a priority for the program as it presents an opportunity to reach members of the community who may not otherwise participate in outreach efforts. As such, the program is looking to begin development of the curricula in the summer of 2015 and anticipates significant coordination with the schools. The program is also researching the possibility of implementing EPA's school flag program, possibly in conjunction with air quality curricula.

EM8. Today's Air Mobile Phone Application

The state of Montana is in the process of developing a mobile phone version of the popular Today's Air website, which provides $PM_{2.5}$ concentrations at monitors across the state as current as the last hour. The details of this measure are still being worked out at the state level, but an app should be ready for public use by the 2015-2016 heating season. Such an app will allow users who download it to access air quality data from their mobile phones via their mobile network. This will allow users, such as a coach or parent concerned about elevated concentrations during sports practice, to access

up-to-date information while on the run. It may also benefit mobile phone users who do not have access to a computer or dependable internet connection. The app will also include notifications that can be set up by the user to signal when air quality reaches a pre-defined level.

Voluntary Measures

Voluntary programs are not based in regulations but instead encourage specific actions or behavior that may be beneficial to reducing $PM_{2.5}$ concentrations.

VM1. **Provide Wood Moisture Meters to Forest Service Wood Harvest Permit Holders**

To harvest firewood from the Helena National Forest, residents are required to purchase a permit from the Forest Service. The air quality program intends to use existing funds to buy a number of moisture meters to give permitees, which will help them determine when firewood is dry enough to be burned efficiently. The program will combine this with ongoing distribution of educational materials from the Burn Wise program and other sources related to clean burning practices.

In 2014, three hundred meters were purchased and given away to county residents who obtained permits at local retail businesses and at the Forest Service office. Educational material was also distributed with the meters. The names and mailing addresses of the recipients will be used to follow up and determine if the educational material was helpful and if the meters helped recipients improve wood storage and burning practices. The local program intends to conduct follow-up activities in the fall of 2015.

VM2. Implement a Bounty Program for Old Wood Stoves

Newer, more efficient stoves burn fuel more completely, creating less PM pollution both indoors and outdoors. This program intends to provide an incentive for homeowners to replace an old stove with a new, certified stove, by allowing them to sell their old stove to the county for a small sum (around $200). The county will recycle the old stoves, taking them completely off the market and receiving a small payment for the scrap metal. Essentially the program will buy old stoves for a set amount, have the old stoves crushed at the recycling center, and issue a coupon toward the purchase of a new, certified wood stove capable of achieving 2-7g/hour or gas stove. However, no funding options have yet been identified and such a measure will be dependent on the amount of funding available. This measure is on hold for implementation until funding is available for a pilot. The program will continue to research funding opportunities and will develop an implementation plan for the bounty program should funding come through.

VM3. Conduct a Periodic Consumer Survey of Residents with Wood Burning Devices

The purpose of this measure is to document baseline understanding of issues related to wood smoke and air pollution so as to better target specific community needs. The initial survey would also serve as a baseline for measuring success or failure of future education and outreach efforts. Establishing a baseline will help the program determine whether their efforts are paying off in increased awareness of the issues, and, if so, which measures are most worth the effort.

Regulatory Measures

The air program in Lewis & Clark County has been proactive about developing regulatory air pollution control mechanisms. The program revised its air rules in 2011 to update control measures for limiting PM emissions. The main obstacle for the program has been enforcement, both finding the staff time to monitor for compliance and the political will to issue penalties for violation. The education and outreach measures discussed above will help this effort by continuing to raise awareness of the still relatively new regulations and the consequences for violating them. The local air quality program either is already implementing the following measures (indicated using **bold type**) or is planning to implement them under the PM Advance program. Existing measures will be maintained or expanded over the course of the program's commitment to PM Advance.

RM1. **Episodic Control Program**

Lewis & Clark County has restricted the use of wood burning stoves during periods of poor air quality for many years. In 2011, the Montana Board of Environmental Review approved revisions to the Lewis & Clark County air quality rules that changed the level at which air quality is designated as "poor." The intent of the revision was to maintain consistency with the 2006 revised $PM_{2.5}$ 24-hour National Ambient Air Quality Standard (NAAQS). The current episodic control program designates categories of air quality correlating with measured $PM_{2.5}$ concentrations. The levels are designated as follows: (1) Good means concentrations less than 60 percent of the 24-hour NAAQS (between 0-21 $\mu g/m^3$), (2) Watch means concentrations between 60 and 80 percent of the 24-hour NAAQS (21-28 $\mu g/m^3$), and (3) Poor means concentrations averaged over an 8-hour period that are at least 80 percent of the 24-hour NAAQS (28-35 $\mu g/m^3$).

The levels also take meteorological data into account to determine whether conditions are likely to change in the next 24 hours. Residents are asked to voluntarily stop or reduce burning at watch levels. During periods of poor air quality, the rules prohibit the use of wood burning devices that emit more than 7.5 grams per hour of fine particulate matter, unless certain exemptions or variances are granted. A poor air quality designation also triggers restrictions on idling diesel engines for more than two hours in a 12-hour period.

RM2. **Solid Fuel and Emissions Rules**

Existing air quality regulations also set out requirements for proper operation of solid fuel burning devices within the Air Pollution Control District, including limitations on the materials that may be used as fuel. Visible emissions may not exceed an opacity of 40% averaged over six consecutive minutes, except during the building of a new fire. The County does not currently have any regulations limiting the types or efficiencies of devices that may be installed in the area, although such regulations may be considered in the future.

RM3. Implement Periodic Review of Existing Air Regulations

As new sources are identified or air quality standards change, the existing regulations need to be updated to ensure consistency with state and federal requirements and with current understanding of public health impacts. The existing regulations require that the Board of Health review the

regulations periodically and make recommendations to the governing body for revisions. This measure takes the review a step further, implementing an annual (every fall) review by air quality program staff. Staff will present recommendations to the Board of Health.

APPENDIX A. Implementation Schedule

Lewis & Clark County PM Advance Control Measures

	Strategy	Implementation Milestones
EM1	Update and Implement a Long-Range Outreach/Education Campaign	· Continue distributing existing Burn Wise materials · Complete VM3 - consumer survey (ongoing, begin 2015) ·Work with air quality committee to prioritize outreach activities and messaging (2015) ·Update & publish the campaign document with new measures, implement prioritized measures (2016, ongoing) ·Periodically review progress and compare results with expectations and survey responses (ongoing)
EM2	**Set Up Electronic Air Quality Sign**	·Select new permanent location for AQ sign (summer 2015) ·Work with sign company to set up remote connection between monitor and sign (summer 2015) ·Resume regular updates with AQ status (2015-16 season) ·Assess effectiveness of messaging, location (ongoing)
EM3	**Prioritize Workforce Development**	·Identify future training opportunities for program staff (annual) ·Locate funding sources (ongoing) ·Set & meet goal for amount of annual training (ongoing) ·Assess effectiveness of trainings and prioritize in future years (ongoing) · Create training plans for new staff (ongoing)
EM4	Shared Air Quality Educational Trunk	·Coordinate with state to plan contents of trunk (2016) ·Develop schedule of opportunities to use trunk (annual) ·Work with other local programs for shared use & transport, of trunk (ongoing) ·Assess effectiveness of trunk contents, update activities as necessary (ongoing)
EM5	Host a Public Workshop on Clean, Safe Residential Wood Heating	·Review examples from EPA and Ontario for ideas & tips (2014-15) ·Work with AQ committee to develop draft schedule of events (2015) ·Assign project lead to take on event planning activities including contacting partners, scheduling venue, advertising, etc. (early 2015) ·Host workshop (October 2015) ·Measure success, follow up, consider an annual event (ongoing)
EM6	Update the Chemical Mass Balance Study	·Determine need, contact state to help coordinate (2015) ·Secure funding (2015, ongoing) ·Conduct study (2015-16 or 2016-17) ·Analyze results, compare with existing study, update activities as necessary (ongoing)

	Strategy	Implementation Milestones
EM7	Develop and Pilot an Elementar/Middle School Air Quality Program	·Research existing curricula & opportunities (mid-2015) ·Develop/Build on relationship with school district, coordinate closely with key staff (2015-16) ·Launch pilot program, for example may begin in one classroom or one school (2016)
EM8	Today's Air Mobile Phone Application	·State of Montana completes app (early 2015) ·Work with state on initial roll-out to public (2015 season) ·Assess function & local reach, communicate with state about potential areas for improvement (2015-16, ongoing)
VM1	**Provide Wood Moisture Meters to Forest Service Wood Harvest Permit Holders**	·Develop distribution plan (2014) ·Purchase 300 meters (2014) ·Distribute meters (fall 2014) ·Follow up with recipients (fall 2015) ·Consider purchasing/distributing additional meters (ongoing)
VM2	Implement a Bounty Program for Old Wood Stoves	·Research similar programs in other areas (2014-15) ·Research and begin to secure funding (ongoing) ·Working with AQ committee, develop 'shovel ready' implementation plan for first year (2015) ·Contingent on funding, kick-off targeted bounty for one year, carefully tracking successes and failures for future years (tbd)
VM3	Conduct a Periodic Consumer Survey of Residents with Wood Burning Devices	·Research similar successful measures in other areas (2014-15) ·Work with AQ committee to develop questions, distribution method, incentives, etc. (early 2015) ·Distribute survey (ongoing, begin late-2015) ·Measure results, compare with expectations and previous results, reassess control measures as necessary (ongoing) ·Re-survey every couple years to track success of education & outreach efforts (ongoing)
RM1-2	**Wood Burning Regulations**	·Continue to implement and enforce regulations (ongoing) ·Prioritize enforcement (ongoing)
RM3	Implement Periodic Review of Existing Air Regulations	·Review successful regulations in other areas (ongoing) ·Evaluate effectiveness of alert levels (ongoing) ·Evaluate effectiveness of penalties assessed for violation (ongoing) ·Review program needs to better implement/enforce (ongoing) ·Work with AQ committee, state, city/county officials, etc. (ongoing) ·Prioritize updates to regulations when necessary (ongoing)

APPENDIX B. Sign-Up Letter

Montana Department of
ENVIRONMENTAL QUALITY
Steve Bullock, Governor
Tracy Stone-Manning, Director
P. O. Box 200901 Helena, MT 59620-0901 (406) 444-2544 Website: www.deq.mt.gov

April 10, 2013

PM Advance
c/o Laura Bunte
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards, C304-01
Research Triangle Park, NC 27711

Dear Ms. Bunte:

The State of Montana in partnership with the Lewis & Clark County would like to participate in PM Advance with respect to Lewis & Clark County. We wish to join this partnership with EPA to preserve or improve the air quality in Lewis & Clark County, and we meet the program eligibility criteria, i.e.:

(1) Lewis & Clark County is not currently a nonattainment area for the 1997 and/or 2012 annual fine particulate matter ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS) and/or for the 2006 24-hour $PM_{2.5}$ NAAQS,

(2) Lewis & Clark County consists of the city of Helena and East Helena located within Lewis & Clark county Montana,

(3) The following air monitor(s) reflect the air quality in Lewis & Clark County: Helena-Rossiter Pump House Monitor (30-049-0026), and

(4) Montana has submitted data for inclusion in the National Emissions Inventory.

We understand that our efforts under PM Advance may benefit Lewis & Clark County by potentially:

- Reducing air pollution in terms of $PM_{2.5}$ as well as other air pollutants,
- Ensuring continued healthy $PM_{2.5}$ levels,
- Maintaining the $PM_{2.5}$ NAAQS,
- Helping avoid violations of the $PM_{2.5}$ NAAQS that could lead to a future nonattainment designation,
- Increasing public awareness about $PM_{2.5}$ as an air pollutant, and
- Targeting limited resources toward actions to address $PM_{2.5}$ problems quickly.

Our goal is to implement measures and programs to reduce $PM_{2.5}$ in Lewis & Clark County in the near term. We agree to that it is in our best interest to work together and in coordination with stakeholders and the public to proactively pursue this goal.

Please direct any questions to Eric Merchant at emerchant@mt.gov 406-444-1457 or Stephen Coe at scoe@mt.gov , 406-782-2689 ext 209.

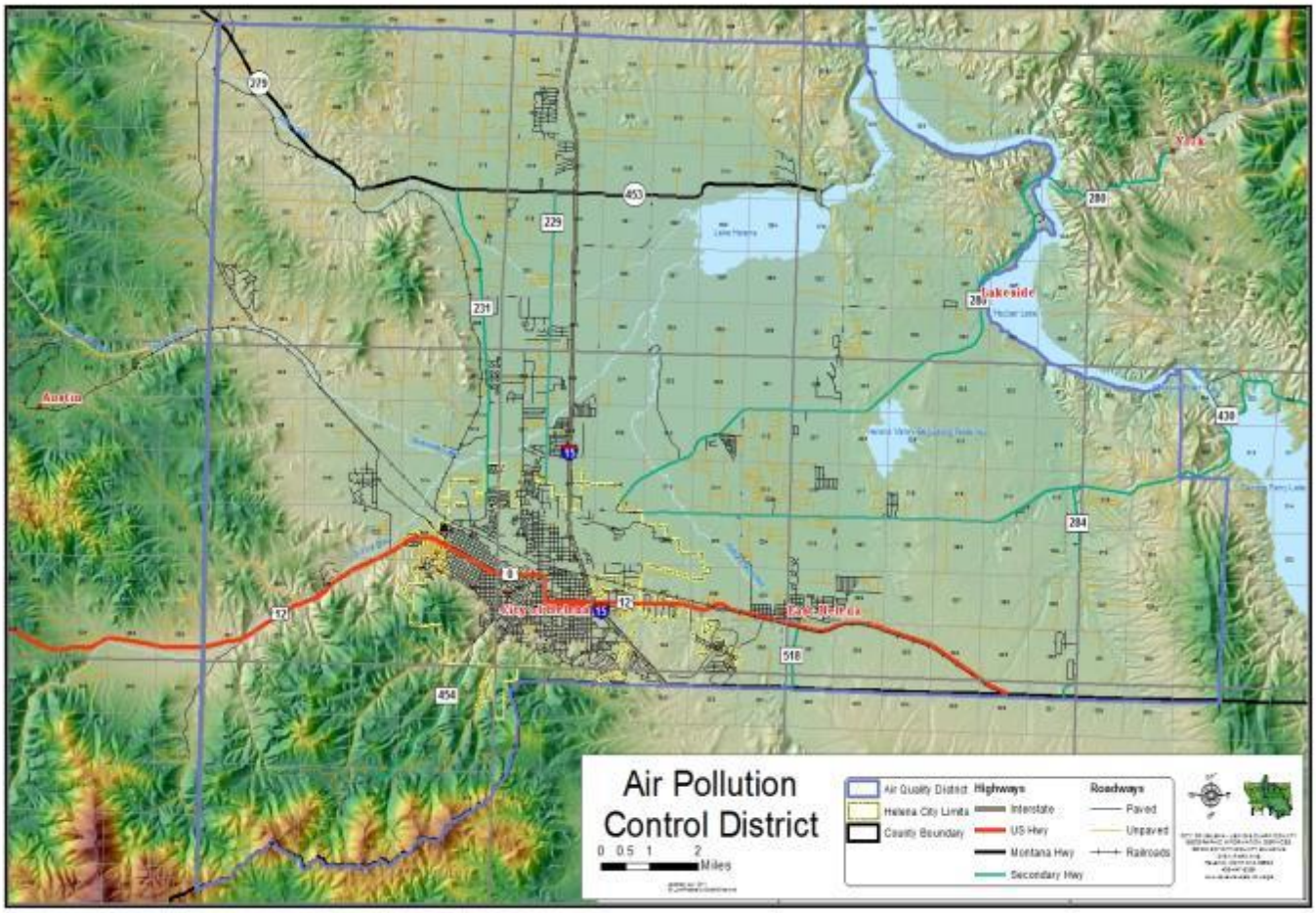
Sincerely,

Dave Klemp
Air Director
Air Resources Management Bureau
Montana Department of Environmental Quality

Melanie Reynolds M.P.H.
Health Officer
Lewis and Clark City-County Health Dep.

cc: EPA Region 8 Catherine Roberts (303) 312-6025

APPENDIX C. Local Air Quality Regulations



Lewis & Clark County Air Pollution Control District

LEWIS AND CLARK COUNTY
OUTDOOR AIR QUALITY REGULATIONS

TABLE OF CONTENTS

LEWIS AND CLARK COUNTY
OUTDOOR AIR QUALITY REGULATIONS

CHAPTER 1
PROGRAM AUTHORITY AND ADMINISTRATION

Rule 1.101 - Title

These regulations shall be known and cited as the Lewis and Clark County Outdoor Air Quality Regulations.

Rule 1.102 - Authorities for Program

The authorities to promulgate these regulations are provided in Article XI, Section 4(b) of the Constitution of the State of Montana and in §75-2-301, Montana Code Annotated (MCA).

Rule 1.103 - Intent and Purpose

(1) It is the purpose of these regulations to achieve and maintain such levels of outdoor air quality as will protect human health and safety in Lewis and Clark County.

(2) The intent of these regulations is to maintain the level of air pollutants at or below those standards set forth in §17.8.2 and 17.8.3, Administrative Rules of Montana (ARM).

Rule 1.104 - Scope

(1) The provisions of these regulations apply to all sources of air pollution within the area defined in the attached Air Pollution Control District Map and legal description with the exception of air pollution sources over which jurisdiction is retained by the Montana Board of Environmental Review pursuant to §75-2-301 (5), MCA.

(2) The provisions of these regulations do not supersede the provisions set forth in Chapter 9 of the State of Montana Air Quality Control Implementation Plan: Emergency Episode Avoidance Plan.

Rule 1.105 - Severability

In the event any section, subsection or other portion of these regulations is for any reason held invalid or unconstitutional by a court of competent jurisdiction, such section, subsection or portion will be considered a separate provision of these regulations and

such holding will not affect the validity of the remaining portions of these regulations which will remain in full force and effect.

CHAPTER 2
DEFINITIONS

(1) "Air Pollution Control District" means the area within which the Lewis and Clark County Outdoor Air Quality Regulations are enforced.

(2) "Air Quality Ratings" are "Good", "Watch" and "Poor".

(a) "Good" means

(i) ambient air particulate matter (PM) concentrations averaged over an eight hour period are less than 60% of any state or federal ambient 24-hour standard established for PM 2.5, and

(ii) scientific and meteorological data indicate the average PM 2.5 concentrations over any eight-hour period may be reasonably expected to remain below 60% of any state or federal ambient 24-hour standard for the next 24 hours.

b) "Watch" means

(i) ambient air PM concentrations averaged over an eight-hour period are between 60% and 80% of any state or federal ambient 24-hour standard established for PM 2.5, and

(ii) scientific and meteorological data indicate the average PM 2.5 concentrations over any eight-hour period may be reasonably expected to remain below 80% of any state or federal ambient 24-hour standard for the next 24 hours.

(c) "Poor" means

(i) ambient air PM concentrations averaged over an eight-hour period are 80% or more of any state or federal ambient 24-hour standard established for PM 2.5, and

(ii) scientific and meteorological data indicate the average PM 2.5 concentrations over any eight-hour period may be reasonably expected to exceed 80% of any state or federal ambient 24-hour standard for the next 24 hours.

(3) "Board" means the Lewis and Clark City - County Board of Health.

(4) "Bonfire" means a ceremonial fire or small recreational fire for the purpose of celebrating a particular organization related event, or for a social gathering, picnic, campout or other related event.

(5) "Health Department" means the Lewis and Clark City - County Health Department.

(6) "Incinerator" means any single- or multiple-chambered combustion device that burns combustible material, alone or with a supplemental fuel or with catalytic combustion assistance, primarily for the purpose of removal, destruction, disposal, or volume reduction of any portion of the input.

Incinerator does not include:

(a) Safety flares used to combust or dispose of hazardous or toxic gases at industrial facilities, such as refineries, gas sweetening plants, oil and gas wells, sulfur recovery plants, or elemental phosphorus plants;

(b) Space heaters that burn used oil;

(c) Wood-fired boilers; or

(d) Wood waste burners, such as tepee, wigwam, truncated cone, or silo burners.

(7) "Management burning" means any person conducting any outdoor burning for any purpose including but not limited to forestry/wildlife management, licensed landfill management, firefighter training exercises, commercial film productions or fuel hazard reduction that is designated as necessary by a fire protection agency.

(8) "Opacity" means the degree, expressed in percent, to which emissions reduce the transmission of light and obscure the view of an object in the background.

(9) "Open burning" means outdoor combustion of material with or without a receptacle, including but not limited to bonfires and small recreational fires.

(10) "Particulate matter" or "PM" means any material, except water in uncombined form, that is or has been airborne and exists as a liquid or a solid at standard conditions. For the purposes of this definition, standard conditions are defined in the applicable test method in CFR 40 Part 50, Appendix L and Appendix J; Part 51, Appendix M; and Part 53.

(11) "PM 2.5" means particulate matter with an aerodynamic diameter of less than or equal to a nominal 2.5 micrometers as measured by a reference method based on

40 CFR Part 50, Appendix L and designated in accordance with 40 CFR Part 53, or by an equivalent method designated in accordance with 40 CFR Part 53.

(12) "Pellet stove" means a commercially sold stove that burns only automatically fed biomass, pelletized fuels.

(13) "Person" means any individual, partnership, institution, joint-stock company, unincorporated association, or society or government agency, or other corporation of any character whatsoever.

(14) "Regulations" means the Lewis and Clark County Outdoor Air Quality Regulations.

(15) "Solid fuel burning device" means any fireplace, fireplace insert, wood stove, wood burning heater, wood-fired boiler or similar device burning any solid fuel used for aesthetic, cooking, or heating purposes.

CHAPTER 3
AIR QUALITY ACTION STAGES

Rule 3.101 - Prohibitions and Actions

(1) When the Health Department declares a Good stage no specific action is required.

(2) When the Health Department declares a Watch stage it shall request voluntary reductions in the use of solid fuel burning devices.

(3) When the Health Department declares a Poor stage:

(a) A person may not operate a solid fuel burning device unless it is exempt under Rule 5.101(4)or a variance or exemption has been granted under these regulations.

(b) A person owning, operating or in control of a solid fuel burning device may not cause, allow or discharge any emissions from such a device that are of an opacity greater than twenty percent. Emissions produced during the building of a new fire for a period or aggregated periods not exceeding 15 minutes in any 24-hour period are exempt from opacity requirements.

(c) A person may not idle diesel or locomotive engines for over two hours in any 12-hour period.

(d) A person may not conduct open burning.

(e) A person may not operate an incinerator.

(f) Operators of solid fuel burning devices have four (4) hours to discontinue their use before warnings and/or violation may be issued by the Health Department.

(g) If the Poor rating lasts for longer than 48 hours, and meteorological data indicate that air quality may reasonably be expected to continue to decline, the Health Department may identify additional suspected significant contributors of particulates and may order suspected contributing activities/operations to cease. Such activities may include, but are not limited to construction activities, restaurants of a type known for particulate emissions, and management burns. The Health Department may pursue suspension of activities beyond the Air Pollution Control District that are suspected of contributing to deterioration of air quality within the District.

CHAPTER 4
SOLID FUEL/VISIBLE EMISSIONS//INCINERATION

Rule 4.101 - Prohibited Burning

(1) Within the Air Pollution Control District, a person may not:

(a) Burn any material in a residential solid fuel burning device except regular black and white newsprint, untreated Kraft paper, untreated wood and lumber, and wood and paper products manufactured for the sole purpose of use as heating fuel;

(b) Burn coal as a solid fuel at any time.

(2) A person may not operate an incinerator in violation of the requirements of §17.8.316, ARM which are hereby adopted and incorporated by reference.

Rule 4.102 - Visible Emissions

(1) A person owning, operating, or in control of a residential solid fuel burning device may not cause, allow, or discharge emissions that exhibit an opacity of 40% or greater averaged over 6 consecutive minutes.

(a) Emissions produced during the building of a new fire for a period or aggregated periods not exceeding 15 minutes in any 24-hour period are exempt from opacity requirements.

(2) Only Health Department personnel or designees who have successfully completed the Visual Emissions Evaluation Course and hold current certification may determine opacity.

(3) An opacity determination must follow all requirements, procedures, specifications and guidelines set forth in 40 CFR Part 60, Appendix A, method 9 or by an in-stack transmissometer that complies with all requirements, procedures, specification and guidelines contained in 40 CFR Part 60, Appendix B, performance specification 1. Where the presence of uncombined water is the only reason for failure of an emission to meet an applicable opacity limitation contained in these regulations that limitation shall not apply.

CHAPTER 5
EXEMPTIONS AND VARIANCES

Rule 5.101 - Exemptions

(1) A person who has an economic need to burn solid fuel for residential space heating purposes may apply for a low-income exemption to burn during Poor air quality days. A person may demonstrate such a need by certifying his or her eligibility for energy assistance according to economic guidelines established by the U.S. Office of Management and Budget under the Low Income Energy Assistance Program as administered by the Montana Department of Public Health and Human Services.

(a) The applicant shall attach proof of participation in one of the following programs:

(i) Low Income Energy Assistance Program (LIEAP)

(ii) Families Achieving Independence in Montana (FAIM)

(iii) Supplemental Security Income (SSI)

(2) A person who has a heating system that is temporarily inoperable may apply for an exemption to burn on Poor air quality days.

(a) The applicant shall attach proof, from a licensed heating specialist, detailing why the heating system is inoperable and the estimated length of time that the system will be inoperable.

(3) The application for an exemption shall contain the following information:

(a) The name and complete address of the applicant;

(b) The reason for and estimated duration of the exemption; and

(c) The applicant's signature and date.

(4) Solid fuel burning devices with average pm 2.5 particulate emission rates of less than 7.5 grams per hour as certified by EPA are exempt from these regulations, except in no case shall emissions from such stoves exceed 20% opacity during a Poor air quality episode.

Rule 5.102 - Variances

(1) A person may operate a solid fuel burning device during a Poor air quality rating if the Health Board grants a variance from these regulations.

(2) The Health Board may grant a person a variance or partial variance if it determines:

(a) Compliance with the requirements from which the variance is sought would produce hardship without equal or greater benefits to the public; and

(b) The emissions proposed to occur under a variance do not constitute an unreasonable danger to public health or safety.

(3) Application for a variance shall be made on forms supplied by the Health Department.

(4) The application for variance shall be submitted to the Environmental Services Administrator at least 14 working days prior to a regularly scheduled Health Board meeting.

(5) After receiving a timely request under (4) above, the Environmental Services Division Administrator shall notify the Health Board Chair.

(6) The Health Board Chair in consultation with the Health Officer and the Environmental Services Division Administrator will determine whether the variance request will be heard by the Health Board or by a hearing officer.

(7) The Health Board Chair will instruct the Environmental Services Division Administrator to schedule the variance request for a public hearing.

(8) If the variance request will be heard by a hearing officer, the Health Board Chair will appoint a hearing officer.

(9) The hearing officer will conduct a public hearing and make a written recommendation to the Health Board

(10) The recommendation of a hearing officer is subject to approval by a quorum of the Health Board at the next regularly scheduled Health Board meeting.

(11) Any decision of the Health Board or a recommendation of a hearing officer must be supported by findings of fact.

(12) The Health Board may not grant a variance authorizing any source to emit air pollutants in excess of standards set forth at §17.8.2 and 17.8.3, ARM.

ENFORCEMENT AND PENALTIES

Rule 6.101 - General Provisions

(1) Action under this Rule is not a bar to enforcement of these regulations, or regulations or orders made pursuant thereto, by injunction or other appropriate remedy, as provided in §75-2-413, MCA. The Health Board or the Health Department may institute and maintain in the name of the county or the state any and all enforcement proceedings.

(2) All fines collected under this chapter are deposited in the Outdoor Air Quality Fund 186.

(3) It is the intention of the Health Board to impose absolute liability upon persons for conduct that violates any part, provision or order issued pursuant to these regulations. Unless otherwise specifically provided, a person may be guilty of an offense without having, with respect to each element of the offense, either knowledge, negligence, or specific intent.

(4) It is the specific intention of the Health Board that these regulations impose liability upon
persons for violations of a part, provision or order issued pursuant to these regulations.

(5) A person is responsible for conduct which is an element of an offense if the conduct is either that of the person himself or that of another and he is legally accountable.

(6) A person is legally accountable for the conduct of another under these regulations when he:

(a) causes another to perform the conduct, regardless of the legal capacity or mental state of the other person; or

(b) either before or during the commission of an offense with the purpose to promote or facilitate such commission, he solicits, aids, abets, agrees or attempts to aid such other person in the planning or commission of the offense.

Rule 6.102 - Criminal Penalties

Except as provided for in Rule 6.104, a person who violates a provision, regulation, or rule enforced under these regulations, or an order made pursuant to these regulations, is guilty of an offense and upon conviction subject to a fine not to exceed ten thousand dollars ($10,000.00). Each day of the violation constitutes a separate offense.

Rule 6.103 - Civil Penalties

(1) Except as provided in Rule 6.104, a person who violates a provision, rule or order under these regulations, after notice thereof has been given by the Health Department, is subject to a civil penalty not to exceed ten thousand dollars ($10,000) per violation. Each day a violation continues constitutes a separate violation.

(2) Upon request of the Health Department the county attorney may petition the district court to impose, assess and recover the civil penalty. The civil penalty is in lieu of the criminal penalty provided in Rule 6.102.

Rule 6.104 - Penalties

(1) Notwithstanding the provisions of Rule 6.102, a person who violates a provision of these regulations (Lewis and Clark Outdoor Air Quality Regulations) is guilty of a criminal offense and subject, upon conviction, to a fine not to exceed five hundred dollars ($500.00). Each day a violation continues constitutes a separate offense.

(2) Notwithstanding the provisions of Rule 6.103, any person who violates any of the provisions of these regulations is subject to a civil penalty not to exceed five hundred dollars ($500.00). Each day a violation continues constitutes a separate violation. The civil penalty is in lieu of the criminal penalty provided for in Rule 6.102, and may be pursued in any court of competent jurisdiction.

(3) The civil penalty or criminal fine for a violation of these regulations during the calendar year :

First violation - Warning
Second Violation – One Hundred Dollars ($100)
Third Violation – Two Hundred Dollars ($200)
Fourth Violation – Five Hundred Dollars ($500)

Chapter 7
ADMINISTRATIVE PROCEDURES AND HEALTH BOARD HEARINGS

Rule 7.101 - Notice of Violation

(1) Whenever the Health Department determines that there are reasonable grounds to believe that a violation of any provision of these regulations has occurred, the Health Department may issue a written notice to be served personally or by registered or certified mail on the alleged violator or his agent.

(2) This notice must specify the provision of these regulations alleged to have been violated and the facts alleged to constitute the violation.

(3) If the Health Department issues a Notice of Violation to a person for a first violation of any provision of these regulations, the Health Department shall provide such person with a summary of the regulations that affect solid fuel burning devices.

Rule 7.102 – Appearance Before the Health Board

The Health Department or Health Board may require alleged violators of these regulations to appear before the Health Board for a hearing at a time and place specified in the Notice of Violation.

Rule 7.103 – Other Remedies

Injunction under this Rule 8.101 does not bar enforcement of these regulations by injunction, seeking penalties or other appropriate remedy.

Rule 7.104 - Credible Evidence

For the purpose of establishing compliance with these regulations or establishing whether a person has violated or is in violation of any standard or limitation adopted pursuant to these regulations or Title 17, Chapter 8 of the Montana Code Annotated, nothing in these regulations precludes the use, including the exclusive use, of any relevant evidence.

Rule 7.105 - Administrative Review

(1) A person subject to a Notice of Violation issued under the authority of these regulations may request an administrative review by the Health Officer or his or her designee (Hearing Officer).

(2) A request for an administrative review must be received with fifteen (15) days of the issuance of a Notice of Violation.

(3) A request for an administrative review does not suspend or delay the department's notice, order or action, except as otherwise provided for in these regulations.

(4) The Hearing Officer shall schedule a review within ten (10) days after receipt of the request. The review may be scheduled beyond ten days after receipt of the request by mutual consent of the department and the party requesting the review.

(5) The Hearing Officer shall provide written or verbal notice to the person requesting the review of the date, time and location of the scheduled hearing.

(6) The Hearing Officer may continue the administrative review for a reasonable period following the hearing to obtain information necessary to make a decision.

(7) The Hearing Officer shall affirm, modify, or revoke the Notice of Violation, Order to Take Corrective Action, or other action, in writing, following the completion of the administrative review. A copy of this decision must be sent by certified mail or hand delivered to the person who requested the review.

Rule 7.106 – Health Board Hearings

(1) Any person subject to an Order to Take Corrective Action or an action taken by the department under the authority of these regulations may request a hearing before the Health Board following the conclusion of an administrative review.

(2) The Health Board shall schedule a hearing within sixty (60) days after receipt of a written request and shall notify the applicant of that hearing.

(3) The Health Board may and on application by a party shall compel the attendance of witnesses and the production of evidence on behalf of the parties.

(4) Public hearings must proceed in the following order:

(a) first, the department shall present a staff report, if any.

(b) second, the person who requested the hearing shall present relevant evidence to the Health Board; and

(c) third, the Health Board shall hear any person in support of or in opposition to the issue being heard and shall accept any related letters, documents or materials.

(5) After a hearing regarding an Order to Take Corrective Action, the Health Board shall issue a final decision that affirms, modifies or rescinds the department's Order to Take Corrective Action. In addition, the Health Board may issue an

appropriate order for the prevention, abatement or control of the emissions involved.

(6) A person aggrieved by an order of the Health Board may apply for rehearing upon one or more of the following grounds and upon no other grounds:

(a) the Health Board acted without or in excess of its powers;

(b) the order was procured by fraud;

(c) the order is contrary to the evidence;

(d) the applicant has discovered new evidence, material to him which he could not with reasonable diligence have discovered and produced at the hearing; or

(e) competent evidence was excluded to the prejudice of the applicant.

(7) The petition for a rehearing must be filed with the Health Board within thirty (30) days of the date of the Health Board's order.

Rule 7.107 - Judicial Review

(1) Within thirty (30) days after the application for rehearing is denied, or if the application is granted, within thirty (30) days after the decision on the rehearing, a party aggrieved thereby may appeal to the District Court.

(2) The appeal shall be taken by serving a written notice of appeal upon the chair of the Health Board, which service shall be made by the delivery of a copy of the notice to the chair and by filing the original with the Clerk of Court. Immediately after service upon the Health Board, the Health Board shall certify to the District Court the entire record and proceedings, including all testimony and evidence taken by the Health Board. Immediately upon receiving the certified record, the District Court shall fix a day for filing of briefs and hearing arguments on the cause and shall cause a notice of the same to be served upon the Health Board and the appellant.

(3) The District Court shall hear and decide the cause upon the record of the Health Board. The District Court shall determine whether the Health Board regularly pursued its authority, whether the findings of the Health Board were supported by substantial competent evidence, and whether the Health Board made errors of law prejudicial to the appellant.

(4) Either the Health Board or the person aggrieved may appeal from the decision of the District Court to the Supreme Court. The proceedings before the Supreme

Court are limited to a review of the record of the hearing before the Health Board and of the district court's review of the record

CHAPTER 8
REVIEW AND REVISIONS TO REGULATIONS

Rule 8.101 - Review

The Health Department shall periodically review the effectiveness of these regulations and shall make appropriate recommendations to the Lewis and Clark County Board of County Commissioners for revisions of these regulations. Such review shall include the levels of particulate matter measured as micrograms per cubic meter (μg/m3) contained in the ambient air within the Air Pollution Control District. Such review shall also take into account other air quality pollutants regulated by the EPA and DEQ, including but not limited to lead, carbon monoxide, sulfur dioxide and nitrous oxides.

Rule 8.102 - Amendments and Revisions

(1) The Board of County Commissioners may enact any amendments or revisions to these regulations that have been approved by the Montana Board of Environmental Review.

(2) The Board of County Commissioners grants to the Health Board the authority to establish the policies and procedures that provide for the implementation of the Lewis and Clark County Outdoor Air Regulations.

Rule 8.103 – Repealer and Effective Date

(1) All previous rules, regulations, resolutions and ordinances as adopted by the Board of County Commissioners governing outdoor air quality in the Air Pollution Control District are hereby repealed.

(2) These regulations will be in full force and effect upon final approval by the Montana Board of Environmental Review.

Reviewed and approved by the Montana Board of Environmental Review, by memorandum and order dated November ____, 2011.

APPENDIX D. Communication Plan

Lewis & Clark Public Health

Outdoor Air Quality Communication Plan

Prepared by Gayle Shirley, Communications Manager

PURPOSE

The purpose of this plan is to outline and standardize efforts by the Health Department to communicate air quality status to residents of the Lewis and Clark County Air Pollution Control District, which includes the cities of Helena and East Helena and the Helena Valley.

The authority and responsibilities of the Health Department with regard to air quality status are defined in the Lewis and Clark County Outdoor Air Quality Regulations, adopted in November 2011 (text available on department website). Among the responsibilities is to "declare" that air quality is either "good," "watch," or "poor."

This plan addresses the manner in which the Health Department will issue such declarations.

AIR QUALITY MONITORING PERIOD

In general, the Health Department will notify the public of air-quality status twice a day (9 AM and 4 PM) during a monitoring season to run from Nov. 1 through the end of February. At other times of year when air quality is threatened (during wildfire season, for example), the department may resume daily monitoring and notification on a temporary basis.

AIR QUALITY DEFINITIONS

As outlined in the Outdoor Air Quality Regulations, the department will advise the public whether the air quality is "good," "watch," or "poor." Technical descriptions of each of these may be found in the regulations.

For the purpose of notifying the general public, the following "plain language" descriptions will be used:

When Air Quality Is Good

> Air quality is **GOOD** within the Helena Air Pollution Control District as of 4 PM today.

For more information about air quality, call 447-1644 or visit HelenaAir.org

Air-quality status will be updated daily at 9 AM and 4 PM.

When Air Quality Is Watch

Air quality is at a **WATCH** stage within the Helena Air Pollution Control District as of 4 PM today. The amount of particle pollution in the air has become a potential health hazard.

Burning Restrictions

To protect health and improve air quality:

- Consider voluntarily cutting back on or stop using solid-fuel burning devices, like wood stoves and fireplaces. If you must burn, please use a small, hot fire.
- Consider voluntarily reducing car idling.

Health Considerations

Particle pollution (also called particulate matter or PM) is a mixture of solid particles and liquid droplets found in the air, including dust, dirt, soot, and smoke. Exposure to these microscopic particles has been linked to:

- premature death in people with heart or lung disease,
- nonfatal heart attacks,
- irregular heartbeat,
- aggravated asthma,
- decreased lung function, and
- increased respiratory symptoms, such as irritation of the airways, coughing, and difficulty breathing.

Health Recommendation

- Sensitive individuals (including children, the elderly, and people with heart or lung disease) should limit their activity outdoors to protect their health until air quality has improved.

For more information about air quality and its effects on health, call 447-1644 or visit HelenaAir.org

Air-quality status will be updated daily at 9 AM and 4 PM.

When Air Quality Is Poor

Air quality is **POOR** within the Helena Air Pollution Control District as of 4 PM today. The amount of particle pollution in the air has become a potential health hazard.

Burning Restrictions

According to local regulations, when air quality is POOR you must:

- Stop using solid-fuel burning devices (like wood stoves or fireplaces) unless you have received a variance or exemption from the health department. (Visit HelenaAir.org to learn more about variances and exemptions.)
- Idle diesel or locomotive engines for no more than 2 hours in any 12-hour period.
- Stop open burning of slash or debris.
- Avoid using an incinerator.

Health Considerations

Particle pollution (also called particulate matter or PM) is a mixture of solid particles and liquid droplets found in the air, including dust, dirt, soot, and smoke. Exposure to these microscopic particles has been linked to:

- premature death in people with heart or lung disease,
- nonfatal heart attacks,
- irregular heartbeat,
- aggravated asthma,
- decreased lung function, and
- increased respiratory symptoms, such as irritation of the airways, coughing, and difficulty breathing.

Health Recommendations

- Sensitive individuals (including children, the elderly, and people with heart or lung disease) may have an increase in respiratory symptoms. They should limit outdoor activity.
- Active children and adults and people with respiratory disease such as asthma should limit outdoor activity.
- Everyone else, especially children, should limit outdoor activity.

For more information about air quality, its effects on health, and variances and exemptions, call 447-1644 or visit HelenaAir.org

Air-quality status will be updated daily at about 9 AM and 4 PM.

NOTIFICATION METHODS

E-Mail

At the outset of each air-quality monitoring period, staff of the Environmental Services Division will develop a single e-mail distribution list of any and all individuals and entities who ask to receive daily air-quality updates.

Solicitation of those wanting to be on the list will occur through news releases and the Health Department website and Facebook page, as well as any other appropriate means.

Staff of the Environmental Division will send daily air-quality updates, using the message templates above, to this distribution list as close to 9 AM and 4 PM as possible, seven days a week.

Mass Media

Local print and broadcast media will be included on the e-mail distribution list to encourage them to disseminate air-quality status updates through all means at their disposal.

At the outset of each air-quality monitoring season, the Communications Coordinator, working with staff of the Environmental Services Division, will issue a news release explaining the requirements of the Outdoor Air Quality Regulations.

Website

During the air-quality monitoring season, daily status updates will be posted prominently on the home page and Air Quality pages of the Health Department website. This will be the responsibility of the Communications Coordinator or, if he or she is unavailable, the Senior Executive Assistant.

Electronic Reader Board

During the air-quality monitoring season, the daily status updates will be posted prominently on the electronic reader board. This will be the responsibility of the Communications Coordinator or, if he or she is unavailable, the Senior Executive Assistant.

The Communications Coordinator, in consultation with Environmental Services Division staff, will develop standard messages for each of the status possibilities: Good, Poor, Watch.

Facebook

During the air-quality monitoring season, air quality alerts will be posted to the Health Department's Facebook wall when air quality is WATCH or POOR. This will be the responsibility of the Communications Coordinator or, if he or she is unavailable, the Senior Executive Assistant.

APPENDIX E. Outreach/Education Campaign

Lewis & Clark Public Health

Air Quality Program Outreach/Education Campaign

Key Contacts

Gayle Shirley, Communications Manager, 457-8908, gshirley@lccountymt.gov
Kathy Moore, Environmental Services Division Administrator, 457-8926, kmoore@lccountymt.gov

Campaign Dates

Dec. 1, 2013, through Feb. 28, 2014; materials developed for this campaign may be reused in successive heating/burning seasons (November through February)

Goal(s)

According to the U.S. Environmental Protection Agency (EPA), "Engaging the public and giving them the tools to make informed decisions about what they burn and how they burn it is the first step in an overall wood smoke reduction plan."[1]

This campaign specifically seeks to:

1. Persuade users of wood stoves and other solid-fuel burning devices (fireplaces, fireplace inserts, masonry furnaces, wood furnaces and boilers, and pellet stoves) within the Lewis and Clark County Air Pollution Control District (see p. 7) to change how and when they burn in order to reduce emissions.
2. Raise public awareness of the health impacts of wood smoke.
3. Ultimately reduce quantity of air pollution caused by particulate matter from wood smoke within the Air Pollution Control District during the heating season (November through February).

Budget

Currently available: $12,450.00 – a combination of county mill money ($7,000) and funding from Montana Department of Environmental Quality ($5,450)

"Air quality educators and communicators in Washington and surrounding areas have formed a network called the Northwest Air Quality Communicators (NWAQC).[7] The NWAQC shares information as well as resources to develop and conduct region-wide education and awareness programs. Based on a recent program developed and implemented by the NWAQC, it would cost

about $500,000 to $750,000 to develop and about $350,000 to $500,000 per year to run an effective campaign."[4]

Key Message(s)

"Be cautious in developing any strategies based on health issues... since even people with health problems... do not strongly believe wood smoke is a health threat.... Factors that will have a direct and material impact on the person – such as cost, the inconvenience and work required to obtain and burn wood – are likely to be most powerful."[2]

The EPA has developed an education program called "Burn Wise" that has been proven effective. Use of this program in Lewis and Clark County will help to reinforce messaging being done on a state and national level. EPA allows local agencies to make free use of Burn Wise campaign materials.[3]

- Overall campaign message: Burn the right wood, the right way, in the right wood-burning appliance to protect your home, health, and the air we breathe.
    1. Proper burning techniques and well-seasoned wood can significantly reduce the cost of burning and the amount of smoke produced.
    2. New EPA-approved burning appliances heat cleaner and more efficiently than older models.
    3. Forgo burning on days when air-quality is "poor" to comply with local regulations.

Target Audiences:

"Develop messaging specifically for people who burn wood as a primary source of heat. This strategy will deliver 'the biggest bang for your buck.'"[2]

1. Owners of wood stoves and other solid-fuel burning devices
2. Prospective purchasers of wood stoves and other solid-fuel burning devices, including those who purchase second-hand devices that are less likely to meet current EPA standards

41% of Lewis and Clark County households (approximately 10,900 households) have at least one wood-burning appliance. In general, the sample of Lewis and Clark County residents who have wood burning appliances in their homes can be described as:

- Between the ages of 55 and 74
- Having less than a completed college education
- Caucasian
- A couple without any young children in the home
- Having an annual income between $25,000 and $75,000 [2]

Potential Strategies

Paid

Strategy	Source	Cost	Distribution/Reach
Trifold brochure	EPA "Dirty Little Secret"[3] LCPH "Burn Clean, Breathe Easy" New design emphasizing key messages?	No production charges; would need to customize EPA brochure with LCCCHD logo and name Printing cost: 250: $200 500: $350 750: $270	City-County Building Hospital, clinics, specific physician offices Large employers Appliance sales outlets (Smitty's Fireplace Shop, Stan the Stove Man, Home Depot, Lowes, Power Townsend) Stove installers/chimney sweeps (Kurt Lee, Steve Mitchell) Forest Service offices (where firewood permits are available) Community bulletin boards Through utility bills (too late for this year)
Radio ads and PSAs	Montana Radio Company (KMTX, Mighty Mo, ESPN) Cherry Creek Radio (KBLL, KCAP, KZMT, KHKR, KHLN)	Production is free 6 ads per day (3 paid, 3 free) Mighty Mo 107.3: $882/mo KMTX-FM 105.3: $693/mo KMTX-AM 950: $567/mo Production is free (2 free ads for every 4 paid) KBLL-FM: 245 ads over 3 months: $3,300 KXMT-FM: 216 ads over 3 months: $2,592	Station profiles (see Gayle) See sample schedule (Gayle)

Newspaper ads	Independent Record	In-house production 1/4-page B&W ad (approx 3.5 x 4.5 in): $322 first run, discounts for every frequency of same ad run in a week (ex. Ad runs twice a week; second ad is $258) Leaderboard ad on HelenaIR.com	79% of Helena area adults (according to IR)
Billboard(s)	Lamar Advertising	Production cost: $185 $575 per billboard per flight (4 weeks)	Along Montana Avenue, highway to E. Helena
Poster	EPA "Burn Wise"	Already produced or in-house production 11 x 17 full color printing cost (Action Print): 250: $190 500: $340 750: $450	Same as brochure
Paid Facebook posts	LCPH Facebook page	$100 boosted post	7,300 people (based on reach of HIV FB ad)
TV ads	KTVH (Beartooth NBC) KXLH (CBS)	Production free 75 spots/mo for $750 (discounted rate available till 12-29-13) 42 spots/mo for $500 (discounted rate till 12-29-13)	See Gayle for Nielsen ratings
Burn Wise Magnet	Design based on Burn Wise messaging	500 for $250 (Signs Now)	Same as brochure

Unpaid

Tool	Source	Distribution
IR public health column	Gayle, Melanie	Independent Record, print & online
News release to print, broadcast	Gayle	
Website posts	Gayle	Feature on Health home page
Facebook posts	Gayle	LCCCHD Facebook page
City-County Lobby TV	Gayle	
Public presentations	Kathy, Jay, Beth, Frank	Schools, civic organizations
One-on-one meetings with stove sales people, installation and cleaning people	Kathy, Jay, Beth, Frank	Provide with brochures to distribute to patrons
HCTV talk shows	Kathy, Jay, Beth, Frank	
Radio talk shows	Kathy, Jay, Beth, Frank	

Recommended Strategies

Strategy	Quantity	Cost
Trifold brochure	500	$350.00
Acrylic poster/brochure holders	30	$750
Radio ads Mighty Mo, KMTX-AM, KMTX-FM KBLL-FM, KZMT-FM	6 ads/day for 3 months (on each station) 461 ads over 3 months (on both stations)	$6,500 $5,792
3 paid Facebook boosts (different key message in each)	1/month for 3 months	$300
All unpaid strategies		$0
		Total cost: $13,692

Resources

1 "Strategies for Reducing Residential Wood Smoke," US Environmental Protection Agency, http://epa.gov/burnwise/pdfs/strategies.pdf

2 "Lewis and Clark County Residential Woodburning Survey of Households," Lewis and Clark City-County Health Department, August 2012, http://www.lccountymt.gov/fileadmin/user_upload/Health/Environmental/Air_Quality/Documents/wood-stove-survey-2-13.pdf

3 EPA Burn Wise Campaign Materials, http://www.epa.gov/burnwise/burnwisekit.html

4 "Reducing the Impacts of Wood Smoke from Home Wood Burning Devices," Washington State Department of Ecology, 2007,

http://www.ecy.wa.gov/programs/air/outdoor_woodsmoke/Woodsmokeworkgroup/woodsmokeworkgroup.htm

5 "Wood Smoke Emission Reductions Through Public Education," by John Gulland, Post Carbon Institute, 2010, http://dev.energybulletin.net/51677

6 Interview with Shawn Smith, manager of Smitty's Fireplace Shop, Nov. 14, 2013.

7 Airwatch Northwest, www.airwatchnw.org

Media Contacts

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