

4.0 Analyses of Individual Nonattainment Areas

4.8 Region 8 Nonattainment Areas

4.8.1 Montana

Attachment 1

Montana Area Designations For the 24-Hour Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in Montana that EPA has designated as not attaining the 2006 24-hour fine particle (PM_{2.5}) standard.¹ A county (or part thereof) is designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	State-Recommended Nonattainment Counties	EPA's Intended nonattainment County
Lincoln County (partial)	No state recommendation	Lincoln County (partial includes Libby only)

For the Libby area, located in Lincoln County, EPA established nonattainment area boundaries for the 1997 PM_{2.5} NAAQS that was a partial county. This boundary is described in 40 CFR 81.327 under "Montana – PM_{2.5}" and reads as follows:

"Libby MT: Lincoln County (part) The area bounded by lines from Universal Transverse Mercator Zone 11(North American Datum 1983) coordinates beginning at 600,000mE, 5,370,000mN east to 620,000mE, 5,370,000mN south to 620,000mE, 5,340,000mN west to 600,000mE, 5,340,000mN north to 600,000mE, 5,370,000mN". For the reasons described below EPA is again designating the same area nonattainment for the 2006 standard as described above for the 1997 annual standard for Libby, Montana.

EPA has designated the remaining counties in the state as "attainment/unclassifiable" for the 2006 24-hour standard.

¹ EPA designated nonattainment areas for the 1997 fine particle standards in 2005. In 2006, the 24-hour PM_{2.5} standard was revised from 65 micrograms per cubic meter (average of 98th percentile values for 3 consecutive years) to 35 micrograms per cubic meter; the level of the annual standard for PM_{2.5} remained unchanged at 15 micrograms per cubic meter (average of annual averages for 3 consecutive years).

EPA Technical Analysis for Libby, Lincoln County

Introduction

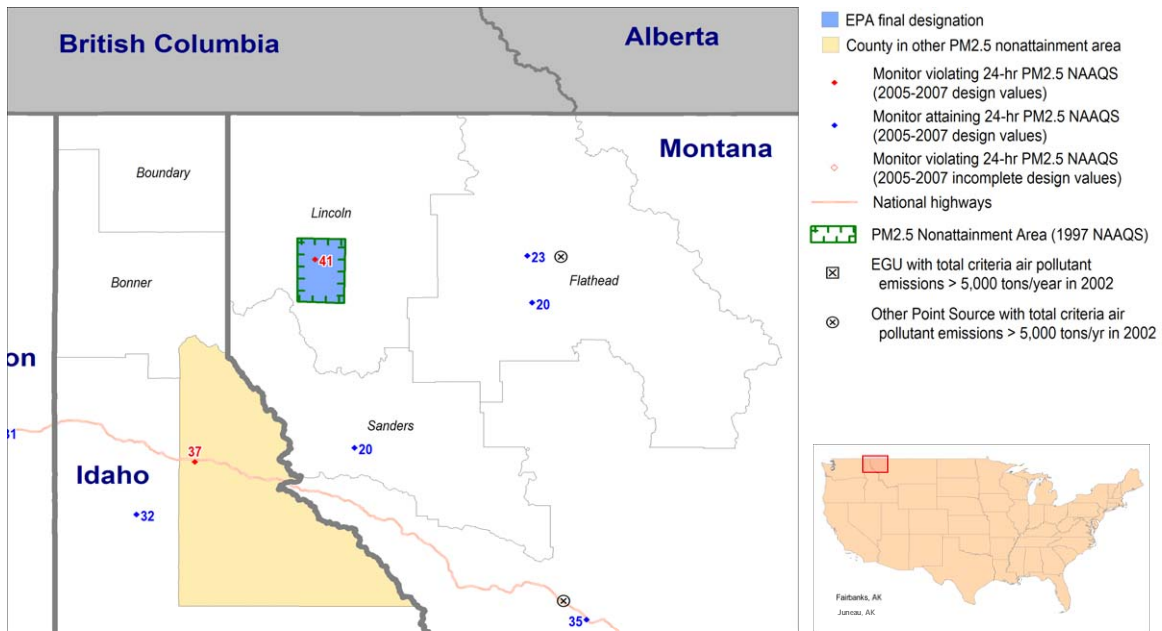
Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for Lincoln County identifies the area with monitors that violate the 24-hour PM_{2.5} standard and evaluates nearby counties for contributions to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under factor 1 below.)

Figure 1 below is a map of the counties in the nonattainment area and other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 5.29 Libby, MT 24-hr PM_{2.5} Nonattainment Area



5-29

Figure 1

For this area, EPA previously established PM_{2.5} nonattainment boundaries for the 1997 PM_{2.5} National Ambient Air Quality Standard (NAAQS) that included the partial county of Lincoln located in Montana.

In December 2007, Montana recommended that Missoula and Ravalli counties be designated as “nonattainment” and all remaining counties be designated as “attainment” for the 2006 24-hour PM_{2.5} standard based on air quality data from 2004-2006. These data are from Federal reference method (FRM) monitors located in the state. (Letter to Robbie Roberts, Regional Administrator, December 18, 2007)

In August 2008, EPA notified Montana of its intended designations. In this letter, EPA also requested that if the State wished to provide comments on EPA’s intended designations, it should do so by October 20, 2008. EPA stated that it would consider any additional information provided by the State in making final decisions on the designations.

Based on EPA’s technical analysis described below, EPA has designated the same partial area in Lincoln County, Montana as previously designated nonattainment for the 1997 PM_{2.5} standard as nonattainment for the 24-hour PM_{2.5} air-quality standard based upon currently available information. The county is listed in the table below.

Libby/Lincoln County	State-Recommended Nonattainment Counties	EPA-Recommended Nonattainment Counties
Montana	None	Lincoln (partial)

The Libby area of Lincoln County is a unique topographically isolated area surrounded by the Kootenai National Forest within an extremely remote and rural area of Montana. The factors that are most relevant for designating this area as nonattainment are Factors 2, 6, and 7 which are monitoring, meteorology and topography, respectively. The source of emissions in Libby is predominately from the use of residential wood- burning stoves during the wintertime when frequent and persistent temperature inversions trap the PM_{2.5} emissions causing violations of the standard. The location of the town of Libby, with a total land area of 1.3 square miles, is within Lincoln County with a total land area of 3,675 square miles. Libby is in a narrow valley surrounded by mountains 4,000 feet higher than the town. As described here and in Factor 6 and 7 below, this area is a unique topographical and meteorological situation.

In the Libby nonattainment designation for the annual PM_{2.5} standard the Counties of Bonner, Sanders, Flathead and Boundary were given consideration and were not included because the nine factor analysis concluded there is no contribution to Libby and they do not have violating monitors. Thus, after a review of recent information for the 24-hour standard regarding these surrounding rural counties, we again concluded there were no factors that indicated they should be given any further consideration as candidates for a nonattainment status.

The following is a technical analysis for EPA Region 8 portion of the Montana area.

Factor 1: Emissions data

For this factor, EPA evaluated County level emission data of the following PM_{2.5} components and precursor pollutants: “PM_{2.5} emissions total,” “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other,” “SO₂,” “NO_x,” “VOCs,” and “NH₃.” “PM_{2.5} emissions total” represents direct emissions of PM_{2.5} and includes: “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other”, primary sulfate (SO₄), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO₂ and NO_x, are part of “PM_{2.5} emissions total,” they are not shown in Table 1 as separate items). “PM_{2.5} emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM_{2.5} emissions other” represents other inorganic particles (crustal). Emissions of SO₂ and NO_x, which are precursors of the secondary PM_{2.5} components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH₃ (ammonia) are also potential PM_{2.5} precursors and are included for consideration. Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that

this metric is not the exclusive manner for considering data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at [http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C. \]](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.)

Table 1 below shows emissions of PM_{2.5} and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Lincoln County area. Counties that are part of the Lincoln County nonattainment area for the 1997 PM_{2.5} NAAQS are shown in boldface. Counties are listed in descending order by CES.

Table 1. PM_{2.5} Related Emissions and Contributing Emission Scores

County	State Recommended Non-attainment?	CES	PM _{2.5} emissions total (tpy)	PM _{2.5} emissions carbon (tpy)	PM _{2.5} emissions other (tpy)	SO ₂ (tpy)	NOx (tpy)	VOCs (tpy)	NH ₃ (tpy)
Lincoln, MT	No	100	2738	1708	1029	535	3395	7681	506
Sanders, MT	No	68	3620	2278	1341	391	968	9852	874
Bonner, ID	No	28	1234	608	626	357	4478	6831	328
Flathead, MT	No	16	2789	1527	1262	1291	5880	9083	877
Boundary, ID	No	7	996	507	488	113	1117	3179	376

CES score as provided by EPA Office of Air Quality Planning and Standards (hereafter, OAQPS).

Note: Emission data are from EPA's 2005 National Emission Inventory (NEI) and are provided by EPA-OAQPS.

Based on emissions levels and CES values and in light of the unique aspects of this area as explained above, a portion of Lincoln County only is a candidate for a 24-hour PM_{2.5} nonattainment designation.

Factor 2: Air quality data

This factor considers the 24-hour PM_{2.5} design values (in µg/m³) for air-quality monitors in Lincoln, Sanders and Flathead counties based on data for 2005-2007 period. We gave further consideration to monitoring for Sanders County and Flathead County in comparison to Lincoln County. However, as no violations are occurring in these areas and in light of the unique isolating aspects of this area indicating no contribution from these counties as explained above no further consideration is given to these two Counties or any others as part of this nonattainment area. A monitor's design value indicates whether that monitor attains a specified air-quality standard. The 24-hour PM_{2.5} standard is met when the 3-year average of a monitor's 98th percentile values are 35µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values in the Lincoln County area are shown in Table 2.

Table 2. Air Quality Data

County	State Recommended Nonattainment?	24-hour PM _{2.5} Design Values, 2004-2006 (µg/m ³)	24-hour PM _{2.5} Design Values, 2005-2007 (µg/m ³)
Lincoln, MT	No	43	41
Sanders, MT	No	20	20
Flathead, MT	No	24	23

Under this factor, we also consider fine particle composition monitoring data. Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations occur predominantly in the winter. On high days, carbonaceous PM_{2.5} makes up 92% of the total PM_{2.5} mass.

Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 24-hr PM_{2.5} NAAQS for designation purposes. Based on the air quality data in this factor a portion of Lincoln County only is a candidate for a nonattainment designation. However, the absence of a violating monitor alone is not a sufficient reason to eliminate counties as candidates for nonattainment status.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 shows the 2005 population for Lincoln County as well as the population density. Population data give an indication of whether it is likely that population-based emissions might contribute to violations of the 24-hour PM_{2.5} standards.

Table 3. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Lincoln	No	19,182	5

As shown in Table 3 above, Lincoln County is a sparsely populated rural area. Based on the 2000 U.S. Census the population for Libby itself 2,626 persons located in a 1.3 square mile area with a population density of 1,751 persons per square mile. Based on the population density of

this factor a portion of Lincoln County only is a candidate for the 24-hour nonattainment designation.

Factor 4: Traffic and commuting patterns

This factor considers the number of commuters in Lincoln County who drive within the County and the percent of total commuters as well as the total Vehicle Miles Traveled (VMT) in millions of miles.

Table 4. Traffic and Commuting Patterns

County	State Recommended Non-attainment?	2005 VMT (millions annually)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into and within statistical area	Percent Commuting into and within statistical area
Lincoln	No	216	6,180	94	NA	NA

The listing of Counties in Table 4 reflects the number of people commuting *within* Lincoln County only. NA is abbreviation for “not applicable”.

The 2005 VMT data used for table 4 and table 5 of the 9-factor analysis have been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at: ftp://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf

As shown in Table 4 above 94% of the commuters are within Lincoln County. Based on the traffic and commuting in this factor a portion of Lincoln County only is a candidate for the 24-hour nonattainment designation.

Factor 5: Growth rates and patterns

This factor considers population growth for 2000-2005 and growth in vehicle miles travelled (VMT) for 2000-2005 for Lincoln County as well as patterns of population and VMT growth. A County with rapid population or VMT growth is generally an integral part of an urban area. However, Lincoln County is a remote, topographically isolated rural area and has minimal changes in growth rates and patterns.

Table 5 below shows population, population growth, VMT for Lincoln County.

Table 5. Population and VMT Growth and Percent Change

Location	Population (2005)	Population % change (2000 to 2005)	2005 VMT (millions mi)	VMT Growth (1000s)	VMT % change (2000 to 2005)

				mi from 2000 to 2005)	
Lincoln	19,182	2	216	4	NA

Based on the growth rate in this factor a portion of Lincoln County only is a candidate for the 24-hour nonattainment designation.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on “high PM_{2.5} days” for each of two seasons (an October-April “cold” season and a May-September “warm” season). These high days are defined as days where any FRM air-quality monitors had 24-hour PM_{2.5} concentrations above 95% on a frequency distribution curve of PM_{2.5} 24-hour values.

For each air quality monitoring site, EPA developed a “pollution rose” to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Figure 2 below identifies 24-hour PM_{2.5} values by color; days exceeding 35 ug/m³ are denoted with a red or black icon. A dot indicates the day occurred in the warm season; a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

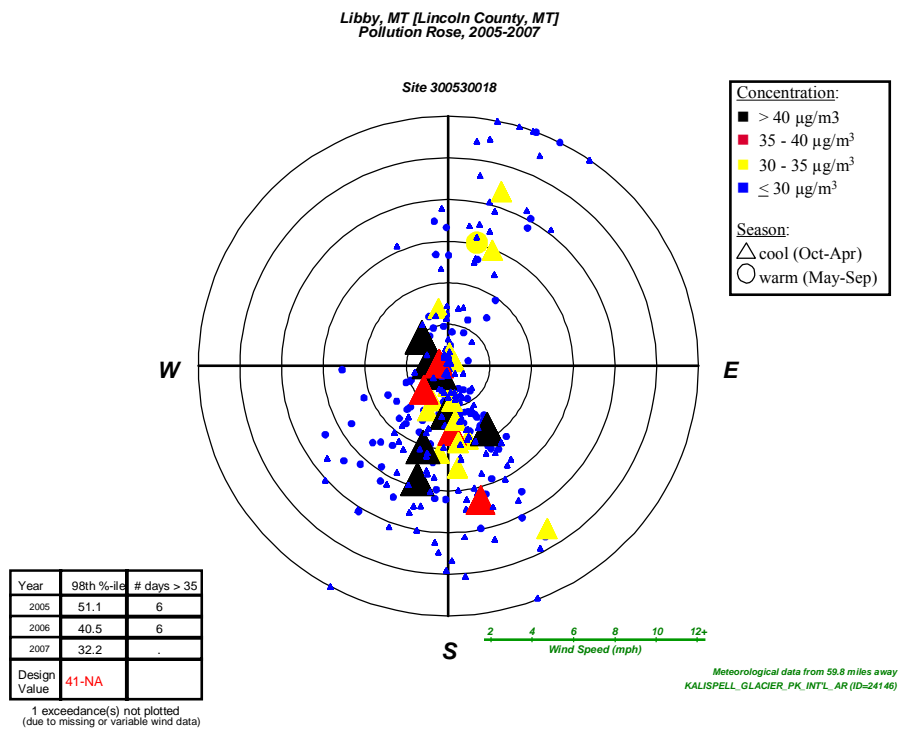


Figure 2

The wind rose information as reflected in Figure 2 was created in a national analysis to provide a consistent approach and data set for use in all areas. These wind roses were only one factor EPA considered in making designations, and were more significant in analyses where they were located close to the violating monitor. The wind rose for Libby is based on information from the Kalispell Airport which is 67 miles away. The meteorology factor is also considered in each county's Contributing Emissions Score (CES) because the method for deriving this metric included an analysis of trajectories of air masses for high PM_{2.5} days.

Libby, Montana is located in the northwestern part of the state in a narrow, north-south oriented valley. The ridgetops surrounding Libby are approximately 4,000 feet higher than the town. There are no other towns or large emissions sources nearby thus transport of high background concentrations into Libby is unlikely. The highest PM_{2.5} concentrations in Libby generally occur during the months of November through February. During the summer months concentrations typically average less than the 24-hour PM_{2.5} standard while winter concentrations are well above the standard. The much higher concentrations in winter are typically caused by stagnant weather conditions, strong temperature inversions, light winds and high emissions of direct PM_{2.5} from woodstoves used for residential heating. Based on the meteorology in this factor a portion of Lincoln County only is a candidate for a 24-hour nonattainment designation.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography / topography factor analysis evaluates the physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM_{2.5} over the Lincoln County area. Lincoln County has a land area of 3,675 square miles. The area of concern showing high PM_{2.5} concentrations is located within and around the Libby vicinity. Figures 3 and 4 below show that Lincoln County has numerous geographical and topographical boundaries that limit the air shed containing the Libby area to a very narrow valley surrounded by high mountain ranges. The town of Libby has a total land area of 1.3 square miles. The elevation of the Libby area is 2,601 feet (MSL) and the surrounding ridgetops are 4,000 feet higher. The town sits in a narrow valley that runs in a north-south direction (located at 48°23'17" north, 115°33'13" west.) The Kootenai River runs adjacent to the town in an east-west direction. The Kootenai Basin is dominated by three major mountain ranges. The Rocky Mountain Range and the Flathead Range are the eastern boundary and the Purcell Range roughly bisects it from north to south. The Selkirk and Cabinet Ranges mark the western boundary. Elevations reach a maximum of about 12,000 feet with most summit elevations between 6,000 and 7,000 feet. The entire watershed is heavily forested and the majority of Lincoln County is National Forest land with no other large metropolitan areas. The nearest large cities are Kalispell which is 90 miles due east and Missoula which is 192 miles south.

The geographical and topographical barriers in Libby significantly limit air pollution from being transported into the Libby air shed from elsewhere. Therefore, this factor combined with factor 6 Meteorology demonstrate how the PM_{2.5} in the area remains confined to the Libby area. The combination of a low lying valley, surrounded by high elevation mountains and the single river valley restrict, trap, and concentrate air pollution in the Libby area thus providing the conditions for violations of the PM_{2.5} standard to occur. Based on topography in this factor a portion of Lincoln County only is a candidate for a 24-hour nonattainment designation.

Figure 3: Libby, MT area from Google Earth™



Figure 4: Libby, MT area with topography from National Atlas.Gov



Factor 8: Jurisdictional boundaries (e.g., existing PM 2.5 areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in these areas indicates that the same components that make up most of the PM_{2.5} mass in the area on an annual average basis (such as sulfate and direct PM_{2.5} carbon in many eastern areas) also are key contributors to the PM_{2.5} mass on days exceeding the 24-hour PM_{2.5} standard. These data indicate that in many cities, the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 24-hour standard.

Most areas that were originally designated nonattainment for the PM_{2.5} standards still have not attained the standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards (all areas violated the annual standard, two also violated the previous 24-hour standard) also contribute to fine particle concentrations on the highest days. For this reason,

EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment represent important boundaries for state air quality planning.

The analysis of jurisdictional boundaries considered the planning and organizational structure of Lincoln County to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner. Air quality planning for the area of Libby is under the Lincoln County Health Department who adopts rules and regulations that are reviewed and approved by the Montana Department of Environmental Quality. There are no other jurisdictions to consider. The State of Montana's program for air quality protection can be carried out in a cohesive manner for addressing the nonattainment issues in Lincoln County.

In addition, the area is nonattainment for the PM_{10} standard and the $PM_{2.5}$ annual standard. The State of Montana has recently submitted an attainment plan for the annual standard. The jurisdictional boundary proposed for the 24-hour $PM_{2.5}$ standard is the same boundary described for the annual $PM_{2.5}$ standard. Based on the jurisdiction in this factor a portion of Lincoln County only is a candidate for a 24-hour nonattainment designation.

Factor 9: Level of control of emission sources

This factor considers emission controls currently implemented in the Lincoln County area. The emission estimates in Table 1 (under Factor 1 above) include any control strategies implemented by the States before 2005 that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2 , NO_x , and crustal $PM_{2.5}$). The Montana Department of Environmental Quality has recently submitted a plan for attaining the annual $PM_{2.5}$ standard that includes specific rules adopted by Lincoln County for regulating woodstoves and other wood burning ordinances. For the 2005-2007 time period, Libby is showing attainment of the annual standard. In addition, the Libby area has completed a changeout of more than 1,000 existing non-EPA certified woodstoves for low-emitting EPA certified stoves. When fully implemented, this program should reduce direct $PM_{2.5}$ emissions in the cold weather months and help lower fine particle concentrations. However, at the current time Libby is still violating the 24 hour standard. Based on the level of control in this factor a portion of Lincoln County only is a candidate for the 24-hour nonattainment designation.

Conclusion

Libby in Lincoln County has monitors that, based on both 2004-2006 and 2005-2007 FRM data in the EPA Air Quality System (AQS), violate the 2006 24-hour $PM_{2.5}$ NAAQS. Therefore, this area is being designated nonattainment. EPA's analysis of the nine factors and other analytical tools supports the conclusion that the boundaries established for implementing the 1997 $PM_{2.5}$ NAAQS are also appropriate for implementing the 2006 24-hour $PM_{2.5}$ NAAQS.

Both Factors 6 Meteorology and Factor 7 Topography provide further support for the effect of mountainous terrain combined with frequent and persistent temperature inversions result in violations of the standard. Furthermore, air quality monitoring data on the composition of fine particle mass indicates that the days with the highest fine particle concentrations occur predominantly in the winter. On high days, carbonaceous PM_{2.5} makes up 92% of the total PM_{2.5} mass, indicating that residential wood burning emissions located in Libby are a key source. Based on all of this data EPA concludes that only the town of Libby located in Lincoln County is being designated nonattainment of 24-hour standard.

The State of Montana did not recommend that the Libby area in Lincoln County be designated as nonattainment for the 2006 24-hour PM_{2.5} standard based on the most recent three years of air quality data that was available in December 2007. The Governor's letter of December 18, 2007 requested that EPA delay the designation until December of 2009 based on insufficient information. However, in previous designations insufficient information was considered to be missing or incomplete monitoring data. For the Libby area, EPA has concluded there is sufficient information based on data from the Federal reference method (FRM) monitors within the State to determine that the area is violating the standard. Thus, EPA is unable to grant the Governor's request for a one year delay. Since the State did not provide a 9-factor analysis for the Libby area, EPA does not have any specific technical information to evaluate from the State. The State did not provide a response to EPA's August 18, 2008 to Governor Brian Schweitzer transmitting our nine factor analysis and intended designations.

Additional information regarding responses to specific State comments can be found in EPA's Response to Comments document at <http://www.epa.gov/pmdesignations/2006standards/tech.htm>.]

