STATE OF MONTANA

AIR QUALITY MONITORING NETWORK PLAN

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Montana Department of Environmental Quality
Air Resources Management Bureau

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Contents

Introduction

The Air Quality Monitoring Network Plan (Plan) is produced by the Montana Department of Environmental Quality (DEQ) on an annual basis in order to meet three objectives. First, the Plan development process establishes the structure for the DEQ to evaluate its existing ambient air monitoring network and to tailor the network based on modified data needs, changing regulatory requirements, and available resources. Second, the Plan provides opportunity for the DEQ to solicit, evaluate, and respond to comments and input from County Agencies, the general public, and other DEQ interests regarding the network. Third, the Plan is developed and submitted to the Regional Office of the Federal Environmental Protection Agency (EPA Region 8) in fulfillment of the requirements contained in Title 40 of the Code of Federal Regulations Part 58.10 (40 CFR 58.10).

The Plan is intended to accurately describe the monitoring sites in the DEQ's network, identify their monitoring purpose, describe how the sites fulfill Network Design criteria, and describe any deviations in physical characteristics or operation from regulatory requirements. The Plan also describes changes the DEQ anticipates making to the network in the next year.

The DEQ monitors air quality principally by measuring concentrations of criteria air pollutants pursuant to the federal Clean Air Act in an endeavor to meet three basic monitoring objectives:

1. Provide air pollution data to the general public in a timely manner.
2. Support compliance with ambient air quality standards and emissions strategy development.
3. Support air pollution research studies.

Criteria air pollutants are the most common air pollutants with known harmful human health effects. The six criteria pollutants are:

- carbon monoxide (CO);
- sulfur dioxide (SO_2);
- lead (Pb);
- nitrogen dioxide (NO_2);
- ozone (O_3); and
- particulate matter (PM). PM includes airborne materials in two size fractions, those with an aerodynamic diameter of 10 microns and less (PM_{10}), and those with an aerodynamic diameter of 2.5 microns and less ($PM_{2.5}$).

For each criteria air pollutant, National Ambient Air Quality Standards (NAAQS) are established to protect public health and welfare. Montana has adopted similar air quality standards known as the Montana Ambient Air Quality Standards (MAAQS).

The Plan is provided in three broad sections. The first section describes the various pollutant-specific ambient air monitoring design requirements and explains how the DEQ has implemented each as applicable. The second section describes changes to the monitoring network that the DEQ is proposing. The final section includes nine appendices. Descriptions of the location information for each of the individual monitoring sites can be found in Appendix A. Appendix B describes the Core Based Statistical Areas (CBSAs) or larger communities within Montana that may require ambient air monitoring. Appendix C provides a detailed description of the existing monitors within the DEQ's network and an indication of the monitors that the DEQ desires to change. Appendix D provides a one-page summary of the proposed network changes. Appendix E provides a summary of network-wide monitoring results for calendar year 2012. Appendix F lists the fine particulate matter chemical components for which analysis is performed. Appendix G summarizes the DEQ's efforts to keep its fine particulate monitors comparable to national reference method standards. Appendix H summarizes the current NAAQS and MAAQS. Finally, Appendix I includes the comments on the Plan received during the 30-day public inspection period prescribed by 40 CFR 58.10(a)(1), as well as a copy of the DEQ response to each.

I. Ambient Air Monitoring Requirements

The term 'ambient air' is defined in 40 CFR 50.1 as "that portion of the atmosphere, external to buildings, to which the general public has access. " Federal rules implemented by the Environmental Protection Agency (EPA) require each state to establish a network of monitors to measure concentrations of the criteria pollutants in the ambient air based upon population, regional air quality, and regulatory concerns. The following sections summarize the ambient air monitoring requirements for each of the criteria air pollutants, and explain the DEQ's implementation of them.

A. Ozone (O_3) Monitoring Criteria

The minimum number of ozone monitors required by 40 CFR Appendix D is summarized in Table 1.

Table 1 - Minimum O_3 Monitoring Requirements.[1]

Metropolitan Statistical Area (MSA) population[2,3]	Number of Monitors per MSA	
	Most recent 3-year design value concentrations ≥ 85% of any O_3 NAAQS[4]	Most recent 3-year design value concentrations < 85% of any O_3 NAAQS[4,5]
>10 million	4	2
4 – 10 million	3	1
350,000 – <4 million	2	1
50,000 – <350,000[6]	1	0

[1] From Table D-2 of Appendix D to 40 CFR Part 58
[2] Minimum monitoring requirements apply to the metropolitan statistical area (MSA)
[3] Population based on latest available census figures.
[4] O_3 NAAQS levels and forms are defined in 40 CFR Part 50.
[5] These minimum monitoring requirements apply in the absence of a design value.
[6] An MSA must contain an urbanized area of 50,000 or more population.

As described in Appendix B, there are three Metropolitan Statistical Areas (MSAs) in Montana, and all three fall within the 50,000 to 350,000 person population category. The three MSAs are Billings (Yellowstone, Carbon, and Golden Valley Counties), Missoula (Missoula County), and Great Falls (Cascade County). At present, O_3 monitoring is being conducted in Missoula as representative of these three areas. The DEQ previously conducted O_3 monitoring in the Billings area from 2005 to 2007 (station number 30-111-0086). In Great Falls, historical monitoring data, meteorological patterns, and professional judgment suggest that monitoring in this MSA is not warranted given the low O_3 levels monitored in the two larger MSAs and the consistently windy conditions that exist in Great Falls.

Beyond the monitoring efforts related to the three MSAs the DEQ has endeavored, sometimes via collaborative funding from the Bureau of Land Management (BLM), to define background levels of O_3 across Montana, particularly in light of increased petroleum exploration across the eastern portion of the state. The DEQ is conducting O_3 monitoring in Broadus (30-075-0001), Birney (30-087-0001), Sidney (30-083-0001), and at the National Core Monitoring Site (NCore, 30-049-0004). In 2012 two additional monitoring stations were added to this network in Malta (30-071-0010) and Lewistown (30-027-0006. See Appendix A for a map displaying the location of all these sites). Table 2 summarizes the 8-hour O_3 values measured at monitoring sites operated by the DEQ during the designated ozone season (June through September) of 2012. Table 3 summarizes the 8-hour O_3 values measured at monitoring sites operated by the DEQ during all of calendar year 2012.

Table 2 – 8-Hour Rolling Monitored O_3 Values for Ozone Season 2012. Values in ppm.

Station	Minimum	Maximum	Average	NAAQS Design Values[2, 3]	
				2012	2010 - 2012
Birney	0.003	0.064	0.035	0.059	0.056
Broadus	0.005	0.061	0.034	0.056	0.055
Lewistown[1]	0.012	0.037	0.025	--	--
Malta[1]	0.014	0.057	0.034	--	--
Missoula	0.002	0.060	0.028	0.057	0.054
NCore	0.003	0.052	0.032	0.053	--
Sidney	0.014	0.065	0.040	0.061	0.056

[1] Monitoring at these sites did not begin until August, 2012.
[2] Design Values are not displayed for stations that did not operate for the entire described period.
[3] Design Values calculated by the AQS database.

Table 3 – 8-Hour Rolling Monitored O_3 Values, for All of 2012. Values in ppm.

Station	Minimum	Maximum	Average
Birney	0.003	0.064	0.029
Broadus	0.005	0.061	0.031
Lewistown[1]	0.007	0.037	0.024
Malta[1]	0.005	0.057	0.027
Missoula	0.002	0.061	0.024
NCore	0.002	0.053	0.030
Sidney	0.005	0.065	0.032

[1] Monitoring at these sites did not begin until August, 2012.

As demonstrated in Tables 2 and 3, very little variability has been seen in the monitored ambient O_3 concentrations across the state of Montana. The 8-hour O_3 design value of 0.059 ppm collected in the Billings area during 2005-2007 further illustrates this phenomenon. The dynamic becomes particularly interesting given the spatial breadth and population diversity of these sites. Two of the seven monitoring sites (including the 2005–2007 Billings site) are located in the two largest-population communities in Montana, two are in small towns, one is in a rural oilfield, two are in very rural settings with minimal population and no industry, and one is in a pristine background location adjacent to a federal wilderness area. It appears, then, that the O_3 monitored in the ambient air across Montana is indicative of general background concentrations produced principally by natural sources or transported in from sources outside the state.

The monitoring directives in 40 CFR Appendix D Section 5 contain specific requirements for the operation of Photochemical Assessment Monitoring Stations (PAMS) in areas classified as serious, severe, or extreme nonattainment for O_3. Montana does not contain any O_3 nonattainment areas, and no PAMS monitoring is required of the DEQ.

B. Carbon Monoxide (CO) Monitoring Criteria

Per 40 CFR 58 Appendix D Section 4.2, the requirements for CO monitoring sites are closely related to the requirements for near-road NO_2 monitoring sites (see Section I.C.). Table 4 summarizes the number of required CO monitoring sites.

Table 4 – Minimum CO Monitoring Requirements

Criteria	Number of Near-Road CO Monitors Required[1]
CBSA Population ≥ 1,000,000	One, collocated with an NO_2 monitor or in an alternative location approved by the EPA Regional Administrator

[1] From Appendix D to 40 CFR Part 58, Sec 4.2.1

As communicated in Appendix B, no Montana CBSAs meet the listed criteria, and no CO monitors are required in Montana on this basis.

Historically, the DEQ and local county air programs have conducted CO monitoring in various larger communities in the state where motor vehicle emissions had caused ambient air concerns. However, because of the improvement of traffic patterns and the gradual renewal of the general vehicle fleet to newer, cleaner-burning engines, monitored CO concentrations in the ambient air became extremely low. As a result, the DEQ discontinued its traffic-related CO monitoring with EPA approval, and no community CO monitoring is currently being conducted.

The DEQ continues to operate one CO monitor at the NCore station north of Helena to track trace-level background concentrations of this pollutant over time. Section I.H describes NCore monitoring. In a separate effort, the DEQ continues to monitor CO at a location just inside the west entrance to Yellowstone National Park. The instrument is operated in support of, and is funded by the National Park Service. It is principally present to monitor traffic impacts to this significant Class 1 area, particularly in the wintertime. Table 5 summarizes the 1-hour CO values measured at these two monitoring sites during 2012.

Table 5 – 1-Hour Monitored CO Values for 2012. Values in ppm.

Station	Min	Max	Average
West Yellowstone	0	4.8	0
NCore	0.084	0.607	0.153

C. Nitrogen Dioxide (NO_2) Monitoring Criteria

The minimum number of NO_2 monitoring sites required by 40 CFR 58 Appendix D Section 4.3 is summarized in Table 6.

Table 6 – Minimum NO_2 Monitoring Requirements.

Requirement Type	Criteria	Minimum Number of NO_2 Monitors Required
Near Road	CBSA Population ≥ 500,000	1
	CBSA Population ≥ 2.5 million	2
	CBSA Population ≥ 500,000 and Road Segments with annual average daily traffic counts ≥250,000	2
Area-Wide	CBSA Population ≥ 1 million	1
Protection of Susceptible and Vulnerable Populations	Any area inside or outside CBSAs	As Required by EPA Regional Administrator and Appendix D Section 4.3.4 (b).

As described in Appendix B, no Montana communities meet any of the criteria listed in Table 6, and no additional NO_2 monitoring has been required of the DEQ by the Regional EPA Administrator; therefore no ambient NO_2 monitors are currently required in Montana. However, the DEQ currently operates five NO_2 monitoring sites in an effort to determine NO_2 background concentrations and potential impacts associated with the oil and gas industry in the eastern part of the state. NO_2 is monitored at Sidney (30-083-0001), Broadus (30-075-0001), and Birney (30-087-0001). In 2012 two additional monitoring stations were added to this network in Malta (30-071-0010) and Lewistown (30-027-0006) in partnership with the BLM for a similar purpose.

In a separate effort, the DEQ also monitors NO_2 at a location just inside the west entrance to Yellowstone National Park. The instrument is operated in support of, and is funded by, the National Park Service. It is principally present to monitor traffic impacts to this significant Class 1 area, particularly in the wintertime.

Table 7 summarizes the 1-hour NO_2 values measured at monitoring sites operated by the DEQ during 2012.

Table 7 – 1-Hour Monitored NO_2 Values for 2012. Values in ppb.

Site	Min	Max	Average	NAAQS Design Values[2] 2012	NAAQS Design Values[2] 2010 - 2012
Birney	0	16	0.57	8	8
Broadus	0	32	1.01	10	16
Lewistown[1]	0	18	0.70	--	--
Malta[1]	0	16	0.88	--	--
Sidney	0	17	0.86	9	9
West Yellowstone	0	28	2.0	26	23

[1] Monitoring at these sites did not begin until August, 2012.
[2] Values are not displayed for stations that did not operate for the entire described period

D. Sulfur Dioxide (SO_2) Monitoring Criteria

The minimum number of SO_2 monitoring sites required by 40 CFR 58 Appendix D Section 4.4 is shown in Table 8.

Table 8 – Minimum $PM_{2.5}$ Monitoring Requirements.[1]

CBSA PWEI[2]	Minimum Number of SO_2 Monitors Required
≥1,000,000	3
<1,000,000 - ≥100,000	2
<100,000 - ≥5,000	1

[1] From Appendix D to 40 CFR Part 58, Sec 4.4.2
[2] Core Based Statistical Area Population Weighted Emissions Index

This EPA criteria used to determine the numbers of required SO_2 monitors was published on June 22, 2010, and is based on two metrics: the Core Based Statistical Area (CBSA-- a county or counties with at least one urbanized area of at least 10,000 people population), and the Population Weighted Emissions Index (PWEI—the quantity of population in the CBSA multiplied by the annual tons of SO_2 emitted, divided by 1,000,000). The Billings CBSA as described in Appendix B is the only CBSA in Montana that has the potential to require SO_2 monitoring based on these metrics. The Billings CBSA PWEI was calculated as follows:

Billings CBSA 2012 Census Estimate:	162,848
Reported 2012 SO_2 Emissions (tons per year):	6286.5
PWEI = (162,848 X 6,286.5) / 1,000,000:	1,024

Based on the listed criteria, neither Billings nor any of the other Montana CBSAs present an SO_2 PWEI that approaches or exceeds 5,000. Consequently, no DEQ SO_2 monitoring is required based on the PWEI criteria. However, 40 CFR 58 Appendix D Section 4.4.3 also specifies that the EPA Regional Administrator may require additional SO_2 monitoring where the PWEI criteria are not thought to adequately meet monitoring objectives. In particular, the Administrator may require additional monitoring in areas that have "the potential to have concentrations that may violate or may contribute to the violation of the NAAQS…." While not required by the Administrator, the DEQ continues to operate one long-term SO_2 monitor at the Coburn Road site in Billings (30-111-0066) because this site is essential to the ongoing management of SO_2-related air quality issues in the Billings area. The Coburn Road site has been in continuous operation since 1981 as a State or Local Air Monitoring Station (SLAMS) site for NAAQS comparison purposes.

The DEQ also operates one background SO_2 monitor at the Sidney site (30-083-0001), and one trace level background monitor at the NCore station (30-049-0004. Section I.H describes NCore monitoring). Table 9 summarizes the 1-hour values measured at the SO_2 monitoring sites operated by the DEQ during 2012.

Table 9 – 1-Hour Monitored SO_2 Values for 2012. Values in ppb.

Site	Min	Max	Average	NAAQS Design Values[1] 2012	NAAQS Design Values[1] 2010 - 2012
Billings - Coburn Road	0	129.0	2.91	70	78
NCore - Sieben's Flat	0	3.6	0.34	--	--
Sidney - Oil Field	0	8.0	0.03	4	5

[1] The NCore site is not currently designated as a SLAMS site, therefore no design value is calculated for this site..

Beyond the DEQ-operated monitors, ambient SO_2 is monitored by industrial sources in the communities of Great Falls and Billings. In the Great Falls area, one SO_2 monitoring site in the community of Black Eagle is operated by the Montana Refining Company (Black Eagle, 30-013-2001) as required by their air quality permit. Data from this site is not entered into the AQS database but is used by the DEQ's air quality compliance program. In the Billings/Laurel area there are currently three industry-operated SO_2 sites. One is operated by the Yellowstone Electric Limited Partnership (YELP) as a condition of their air quality permit (Johnson Lane, 30-111-2006), and two are operated by a consortium of local SO_2-emitting industries (the Billings Laurel Air Quality Technical Committee or BLAQTC: Brickyard 30-111-2005, and Laurel 30-111-0016. A third site, Lockwood 30-111-1065, failed in 2011 and was not replaced). The DEQ has historically performed periodic quality assurance audits of these sites and has entered their data into AQS, but suspended these efforts in 2011 due to resource constraints. Both BLAQTC and YELP operate under their own approved Quality Assurance Project Plans (QAPPs) as individual Primary Quality Assurance Organizations (PQAOs) independent of the DEQ. The DEQ believes that the data obtained from the YELP and BLAQTC monitors meet the commitments of the individual QAPPs and are therefore of regulatory quality. Currently, the DEQ looks principally to the Coburn Road SLAMS monitor for NAAQS compliance determination in the Billings area, but continues to examine the YELP and BLAQTC data for contrast and comparison purposes.

E. Lead (Pb) Monitoring Criteria

The lead monitoring design rule in 40 CFR 58 Appendix D Section 4.5 requires monitoring agencies to establish air quality monitoring near industrial facilities that emit more than 0.5 tons per year (tpy) of lead into the atmosphere, and at specified airports. None of the listed airports are located in Montana, but one facility in the state has reported annual lead emissions in excess of the 0.5 tpy lead emissions threshold.

Each calendar year the DEQ requires facilities with active Montana Air Quality Permits to report quantities of emissions of air pollutants by the end of March of the following year. For calendar year 2012, one facility within the state of Montana reported total lead emissions in excess of the 0.5 tpy threshold. The Colstrip Steam Electric Generating Facility located in Rosebud County reported total lead emissions of 1.63 tons for calendar 2012. This value is reduced slightly from the total of 1.73 tons reported in 2011, but both values exceed the 0.5 tpy monitoring threshold.

The DEQ has assessed the need to monitor lead near the Colstrip facility based on the CFR criteria. While 40 CFR 58 Appendix D Section 4.5 requires monitoring, it establishes no funding mechanism to accomplish the requirement. In addition, other pollutants (e.g. $PM_{2.5}$, SO_2) currently pose a more significant risk to the citizens of Montana and thereby require the application of available ambient air monitoring resources. Consequently, the DEQ is deferring lead monitoring in Colstrip until sufficient funding and heightened pollutant priority provide for the accomplishment of this endeavor.

F. Particulate Matter (PM_{10}) Monitoring Criteria

The minimum number of PM_{10} monitoring sites required by 40 CFR 58 Appendix D Section 4.6 is shown in Table 10.

Table 10 - Minimum PM_{10} Monitoring Requirements.[1]

Population category	Number of Monitors per MSA[1]		
	High concentration[2]	Medium concentration[3]	Low concentration[4,5]
>1,000,000	6–10	4–8	2–4
500,000–1,000,000	4–8	2–4	1–2
250,000–500,000	3–4	1–2	0–1
100,000–250,000	1–2	0–1	0

[1] From Table D-4 of Appendix D to 40 CFR Part 58. Selection of urban areas and actual numbers of stations per MSA within the ranges shown in this table will be jointly determined by EPA and the DEQ.
[2] High concentration areas are those for which data exceeds the PM_{10} NAAQS by 20 percent or more.
[3] Medium concentration areas are those for which data exceeds 80 percent of the PM_{10} NAAQS.
[4] Low concentration areas are those for which data is less than 80 percent of the PM_{10} NAAQS.
[5] The low concentration requirements are the minimum which apply in the absence of a design value.

As described in Appendix B and in Table 11 below none of the Montana MSAs currently meet the combination of population and PM_{10} concentration listed in Table 9 so as to mandate PM_{10} monitoring. However, the DEQ continues to operate PM_{10} monitors in seven areas previously designated as nonattainment for the 24-hour PM_{10} NAAQS as required by EPA and to demonstrate the adequacy of PM_{10} control plans. Those areas include Butte, Columbia Falls, Kalispell, Libby, Missoula, Thompson Falls, and Whitefish.

The DEQ is currently also operating PM_{10} monitors in several areas in order to define background levels of this pollutant. These areas include Broadus, Birney and Sidney. In 2012 two additional monitoring stations were added to this network in Malta (30-071-0010) and Lewistown (30-027-0006) in partnership with the BLM in an attempt to further define background concentrations and spatial distribution of this pollutant within the state of

Montana. Table 11 summarizes the 24-hour values measured at the PM_{10} monitoring sites operated by the DEQ during 2012.

Table 11 – 24-Hour Monitored PM_{10} Values for 2012

Site	Concentration in µg/m³			NAAQS Design Values[2,3]		
	Min	Max	Average	Wtd Mean	2012	2010 - 2012
Birney[4]	0	102	20	19.6	0	0
Broadus[4]	2	118	34	31.5	0	0
Butte	0	162	27	22.6	0	0
Flathead Valley	1	46	13	12.6	0	0
Kalispell	6	63	21	21.4	0	0
Lewistown[1]	1	41	10	5.3	--	--
Libby	3	80	21	21.0	0	0
Malta[1]	1	31	7	4.4	--	--
Missoula	2	139	20	15.9	0	0
Sidney[4]	1	125	25	23.8	0	0
Whitefish	3	138	19	19.2	0	0
Thompson Falls	3	42	14	13.7	0	0

[1] Monitoring at these sites did not begin until August, 2012.
[2] Values are not displayed for stations that did not operate for the entire described period.
[3] PM_{10} Design Values are in the form of numbers of estimated exceedances as calculated by the procedure in 40 CFR 50 Appendix K. The Weighted Mean is in the form of µg/m³.
[4] The Broadus, Birney, and Sidney PM_{10} monitors are designated as Special Purpose Monitors (SPM) and not SLAMS monitors because they do not meet appropriate sighting criteria—they are each too close to gravel Roads to correctly assess regional PM_{10} impacts. See Section I.

PM_{10} monitoring is discussed further in Section II.

G. Fine Particulate Matter ($PM_{2.5}$) Monitoring Criteria

The minimum number of $PM_{2.5}$ monitoring sites required by 40 CFR 58 Appendix D Section 4.7 is shown in Table 12.

Table 12 – Minimum $PM_{2.5}$ Monitoring Requirements.[1]

MSA population[1,2]	Number of Monitors per MSA	
	Most recent 3-year design value ≥85% of any $PM_{2.5}$ NAAQS[3]	Most recent 3-year design value <85% of any $PM_{2.5}$ NAAQS[3,4]
>1,000,000	3	2
500,000–1,000,000	2	1
50,000–<500,000[5]	1	0

[1] From Table D-5 of Appendix D to 40 CFR Part 58. Minimum monitoring requirements apply to MSAs.
[2] Population based on latest available census figures.
[3] $PM_{2.5}$ NAAQS levels and forms are defined in 40 CFR part 50.
[4] Minimum monitoring requirements apply in the absence of a design value.
[5] A MSA is an urbanized area with a population of 50,000 or more.

As described in Appendix B, Montana possesses only three MSAs (Billings, Missoula, and Great Falls), and all three fall into the smallest population category listed in Table 12. Missoula is the only Montana MSA that has at any time demonstrated a $PM_{2.5}$ design value greater than 85 percent of the NAAQS, though it has not done so for at least the last seven years. Consequently, no $PM_{2.5}$ monitors or near-road $PM_{2.5}$ monitors are required within Missoula or any community in Montana based on the current criteria.

Because $PM_{2.5}$ is a pollutant of concern within Montana, the DEQ's $PM_{2.5}$ monitoring network goes well beyond the minimum requirements described in Table 12. The DEQ and several county air quality programs operate $PM_{2.5}$ monitors in various communities to demonstrate continuing NAAQS compliance, to provide information to Health Departments implementing $PM_{2.5}$ control strategies, and to inform the public of potential health impacts during both winter inversions and summer wildfire events. In addition, the DEQ is currently operating $PM_{2.5}$ monitors in Broadus, Birney and Sidney to define background levels of this pollutant. In 2012 two additional monitoring stations were added to this network in Malta (30-071-0010) and Lewistown (30-027-0006) in partnership with the BLM in an attempt to further define background concentrations and spatial distribution of this pollutant within the state of Montana. These sites, along with the NCore site located north of Helena, meet the requirements of 40 CFR Appendix D Section 4.7.3 to install and operate at least one regional background and at least one regional transport $PM_{2.5}$ monitoring site within the state.

In a separate effort, the DEQ also monitors $PM_{2.5}$ at a location just inside the west entrance to Yellowstone National Park. The instrument is operated in support of, and is funded by the National Park Service. It is principally present to monitor traffic impacts to this significant Class 1 area, particularly in the wintertime. Table 13 summarizes the 24-hour values measured at the $PM_{2.5}$ monitoring sites operated by the DEQ during 2012.

Table 13 – 24-Hour Monitored $PM_{2.5}$ Values for 2012

Site	Concentration in μg/m³			NAAQS Design Values[2]		
				2012	2010 - 2012	
	Min	Max	Average	98th Pctl.	24 hour	Annual
Billings	0	32.5	5.2	--[3]	--[3]	--[3]
Birney	0	41.3	7.7	13.6	12	4.9
Bozeman	0	50.7	8.3	--[3]	--[3]	--[3]
Broadus	0	32.2	8.7	18.1	16	6.2
Butte	0.7	100.6	11.1	24.5	34	8.9
Flathead Valley	1	32.5	7.7	20.8	24	8.1
Frenchtown	2.8	100	12.3	19.7	23	9.7
Great Falls	1.5	48	9	--[3]	--[3]	--[3]
Hamilton	0	236.2	16.8	19.8	27	7.3
Helena	0.2	97	9.2	24	33	8.2
Lewistown[1]	0	44.3	5	--[1]	--[1]	--[1]
Libby	0.7	33.1	11.1	27	33	8.2
Malta[1]	0	26.3	4.9	--[1]	--[1]	--[1]
Missoula	0.6	105	10.8	17.3	23	7.4
NCore	0	37.2	5.4	10.2	10	4.0
Seeley	4.2	68.7	19	--[3]	--[3]	--[3]
Sidney	2.5	30.1	8.3	15.2	15	6.6
West Yellowstone	0	41.3	5	--[3]	--[3]	--[3]

[1] Monitoring at these sites did not begin until October, 2012.
[2] NAAQS Design Values are in μg/m³
[3] These monitors are non-Federal Equivalent Method (non-FEM) monitors operated for public information only. They are not certified to produce NAAQS-comparison data.

The $PM_{2.5}$ monitoring criteria in 40 CFR 58 Appendix D Section 4.7 contains two additional significant requirements. First, Section 4.7.4 requires that each state continue to conduct $PM_{2.5}$ Chemical Speciation monitoring at locations designated to be part of the national Speciation Trends Network (STN). Two sites in Montana are currently part of this network: Butte (30-093-0005), and NCore (30-049-0004). Appendix F contains a list of the chemical components for which analysis is performed on filters collected at these stations.

Second, Section 4.7.2 requires that states operate continuous analyzers in at least one-half of the *required* $PM_{2.5}$ monitoring sites (per Table 12, above). The continuous monitors must be designated as Federal Equivalent Method (FEM) analyzers, and at least one analyzer per MSA must be collocated with an episodic Federal Reference Method (FRM) analyzer. As previously discussed, no $PM_{2.5}$ monitors are required by federal rule to be operated in any Montana community, so the CFR Section 4.7.2. criteria does not currently have direct application in the state. However, $PM_{2.5}$ is a significant pollutant in Montana, and impacts from summer wildfires and wintertime inversions have established a strong demand for continuous, near-real time $PM_{2.5}$ data for assessing public health impacts as well as determining NAAQS compliance. To meet this need the DEQ's $PM_{2.5}$ network is now comprised solely of continuous monitors; with FRM monitors used only for collocation, validation, and quality assurance (QA) purposes. As a result, the national discussion regarding the accuracy and representativeness of continuous monitors is of great significance to the DEQ and to the citizens of Montana.

The DEQ has been very deliberate in its operation and QA of continuous particulate monitors. As a result, Montana's comparisons between FRM and FEM instruments and between collocated FEM instruments have been quite good. Data analysis tools recently made available by EPA demonstrate this reality as shown by the statistical summaries contained in Appendix G. The DEQ intends to continue to make strong use of continuous FEM instruments in its $PM_{2.5}$ monitoring network.

H. National Core Monitoring Site (NCore) Monitoring Criteria

Section 3 of Appendix D to 40 CFR 58 requires that each state operate at least one NCore multipollutant monitoring site. 40 CFR 58.13(a) details that each NCore site must be established and operating no later than January 1, 2011. By definition, each NCore site must include monitoring equipment to measure $PM_{2.5}$, $PM_{10-2.5}$, speciated $PM_{2.5}$, O_3, SO_2, CO, NO_Y, lead, and basic meteorology. The majority of NCore sites across the nation are established in urban areas. In Montana, the NCore site was established as a long-term-trend background site in an area believed to be relatively pristine and un-impacted by human activities.

The Montana NCore site (Sieben's Flat, 30-049-0004) was installed in late 2010. All parameters were functional and acquiring data within the first week of January 2011 and have been operated continuously through the date of this report.

Quality assurance concerns were initially a challenge in the operation of the trace-level gas analyzers at the NCore site, particularly regarding the consistency in the way these analyzers respond to zero concentrations of test gases and the appropriateness of EPA-published guidelines for the limits of acceptability on these very low-level instruments. The DEQ has established operating and QA practices that have addressed these concerns, although issues with over-supplying volumes of calibration and test gases to the NO_Y analyzer continued to result in a significant loss of data from this instrument for calendar year 2012.

The monitoring directives in 40 CFR Appendix D Section 4.8 contain specific requirements for the operation of monitors for $PM_{10-2.5}$. These requirements are currently limited in application to NCore monitoring sites and are fully met in Montana's NCore site at Sieben's Flat.

I. <u>Other Monitoring Requirement Issues</u>

Monitors Not Meeting Siting Criteria

The DEQ designs its network and operates the air monitoring sites in compliance with EPA's requirements for ambient air monitoring sites (40 CFR Part 58, Appendices A, C, D and E). Within the DEQ's network there are four sites that do not meet all of the Appendix E siting requirements. The Hamilton (30-081-0007) $PM_{2.5}$ site is located within 15 meters of paved city streets, but is operated as a neighborhood-scale site and not intended as a "traffic corridor" monitor as discussed 40 CFR 58 Appendix E Section 6.3. The roads receive extremely low traffic counts, and EPA has approved (granted a waiver) of the continued operation of this site as a neighborhood scale site in response to previous Annual Network Report documents submitted by the DEQ.

Three PM_{10} monitors located in eastern Montana, Sidney (30-083-0001), Broadus (30-075-0001), and Birney (3-087-0001), were established to describe background concentrations of this pollutant on a neighborhood or broader scale. Each of the three sites is located in a remote region, and of logistic necessity, near unpaved gravel roads traveled by ranching and oilfield equipment. As a result, the monitors are unduly influenced by that traffic and are not appropriately representing background PM_{10} concentrations in their intended scaled scope. However, the DEQ desires to continue to operate these monitors as part of a suite of instruments located at these sites. Consequently, in its 2012 Network Plan the DEQ proposed to redesignate the PM_{10} monitors at Broadus and Birney as special purpose monitors (SPM) producing non-regulatory (NR) quality data. The Sidney PM_{10} monitor is already designated as producing NR data. EPA approved the redesignation on April 8, 2013.

Processes for Moving $PM_{2.5}$ Monitors

If circumstances were to make it necessary or desirable to relocate a $PM_{2.5}$ monitor with data exceeding a NAAQS, the change would be discussed between the local county program (if one exists), and the Permitting, Planning, Compliance, Registration and Monitoring sections of the DEQ's Air Resources Management Bureau. The Air Monitoring Section would solicit public feedback through the public comment period of the annual Monitoring Network Plan. Simultaneously, the DEQ would solicit comments from the EPA Region 8 office for the proposed change. No change would be made without demonstrating that a replacement site produced comparably high values unless circumstances precluded such a comparison.

$PM_{2.5}$ Spatial Scales and Monitoring Methods

The data from $PM_{2.5}$ monitoring sites with spatial scales designated as smaller than "neighborhood" is generally not used for $PM_{2.5}$ NAAQS compliance review purposes in the DEQ's network. The only $PM_{2.5}$ sites in the Montana network of this nature are the monitor at the west entrance to Yellowstone National Park (30-031-0017) and the monitor at the St. Luke's station in Billings (30-111-0085). Both of these monitors are non-FEM instruments and are not used for NAAQS compliance determinations. All $PM_{2.5}$ monitors designated as Federal Reference Method or equivalent (FRM/FEM) generate data suitable for determining compliance with the $PM_{2.5}$ NAAQS. The DEQ has historically operated non-FEM $PM_{2.5}$ monitoring equipment for general information purposes, and will continue to do so. The tables in Appendix C discriminate between FRM, FEM and non-FEM $PM_{2.5}$ instrumentation operated within the DEQ's network.

Quality Assurance Project Plan (QAPP)

Federal rules and associated guidance establish a significant grid of quality assurance requirements, and the DEQ operates its monitoring network within these requirements. Of note is the requirement in 40 CFR 58 Appendix A, Section 2 for each monitoring organization to develop and describe its quality system within a written QAPP. The DEQ's QAPP has undergone a significant edit and update which was approved on May 3, 2013.

II. Proposed Changes to the Monitoring Network

Introduction

The DEQ's Air Monitoring Section regards the requirement to develop and submit an Annual Network Plan to EPA as an opportunity to review the existing air monitoring network and to plan for future needs. In the process of producing this document the DEQ reviews air pollutant trends, known and projected emission changes, and revisions to the NAAQS and monitoring rules; then attempts to balance those realities against available resources. The changes proposed in this document reflect the results of that process.

Diminishing monitoring resources are precipitating a redirection of monitoring efforts toward those pollutants and geographic areas that have the greatest potential human health impacts or are of the greatest national concern. As a result, some historical monitoring that has served its purpose must be discontinued so that the resources associated with those efforts can be redirected to areas and pollutants of a higher priority. The DEQ has identified five historic PM_{10} monitoring stations that require ongoing resources to operate but that no longer provide corresponding air quality benefits. Consequently, the DEQ is proposing to discontinue monitoring at those five stations, and to close them down. The following paragraphs discuss the proposed closures.

Discontinue PM_{10} Monitoring at Five Western Montana Sites

Historically, some areas of western Montana experienced elevated ambient concentrations of PM_{10} resulting in nonattainment designations and respective long-term ambient monitoring. Fortunately, PM_{10} control efforts have been very effective, and monitored concentrations have fallen well below the PM_{10} NAAQS. Particularly, in five of the PM_{10} nonattainment areas in Montana, monitoring has continued for well over a decade, demonstrating consistently low concentrations. Those five areas are Thompson Falls, Missoula, Kalispell, Whitefish, and Libby. Tables 14 through 18 display summaries of the 24-hour average monitored concentrations at these stations over the past ten year period. Section 2.1(a) of 40 CFR 50 Appendix K states that the PM_{10} NAAQS is achieved "when the expected number of exceedances per year at each monitoring site is less than or equal to one." The tables demonstrate the consistent lack of NAAQS exceedances and the low and stable average concentrations monitored at these five sites.

Table 14, Thompson Falls (30-089-0007) 24-hour Average PM_{10} Values

Year	Percent Observations	Maximum Measured Values (µg/m3) 1st Max	2nd Max	3rd Max	4th Max	Days Max > Std	Est Days > Std[1]	Weighted Arith. Mean
2003	90	48	44	44	43	0	0	15.1
2004	93	32	31	26	26	0	0	13.2
2005	89	23	21	20	20	0	0	10.8
2006	88	38	37	31	30	0	0	13.5
2007	95	72	27	23	20	0	0	11.6
2008	80	57	34	26	24	0	0	13.2
2009	95	19	19	18	18	0	0	10.3
2010	97	24	20	19	19	0	0	10.4
2011	87	57	28	25	24	0	0	13.1
2012	87	42	37	33	32	0	0	13.6
Avgs.	90	41	30	27	26	0	0	12.5

Table 15, Missoula-Boyd Park (30-063-0024) 24-hour Average PM_{10} Values

Year	Percent Observations	Maximum Measured Values (µg/m3) 1st Max	2nd Max	3rd Max	4th Max	Days Max > Std	Est Days > Std[1]	Weighted Arith. Mean
2003	93	54	51	41	41	0	0	20.0
2004	90	86	54	52	51	0	0	21.8
2005	97	85	58	51	47	0	0	21.2
2006	97	85	80	74	70	0	0	23.1
2007	100	56	53	52	50	0	0	20.9
2008	81	79	75	69	66	0	0	20.1
2009	97	65	63	55	49	0	0	17.2
2010	95	56	50	50	49	0	0	16.5
2011	96	58	54	45	44	0	0	16.5
2012	95	62	46	45	42	0	0	15.9
Avgs.	94	69	58	53	51	0	0	19.3

Table 16, Kalispell (30-029-0047) 24-hour Average PM_{10} Values

Year	Percent Observations	Maximum Measured Values (µg/m3) 1st Max	2nd Max	3rd Max	4th Max	Days Max > Std	Est Days > Std[1]	Weighted Arith. Mean
2003	96	47	44	43	43	0	0	18.9
2004	99	71	64	61	61	0	0	23.8
2005	97	83	78	76	74	0	0	24.6
2006	99	74	70	59	58	0	0	23.0
2007	97	79	75	69	59	0	0	23.3
2008	55	61	56	51	50	0	0	23.2
2009	93	58	55	45	37	0	0	21.0
2010	97	59	37	34	31	0	0	18.5
2011	40	43	42	42	39	0	0	19.8
2012	94	63	59	56	56	0	0	21.4
Avgs.	87	64	58	54	51	0	0	21.7

Table 17, Whitefish (30-029-0009) 24-hour Average PM_{10} Values

Year	Percent Observations	Maximum Measured Values (µg/m3) 1st Max	2nd Max	3rd Max	4th Max	Days Max > Std	Est Days > Std[1]	Weighted Arith. Mean
2003	95	69	69	66	66	0	0	21.5
2004	97	90	85	75	75	0	0	24.6
2005	98	105	104	97	95	0	0	26.1
2006	96	163	117	114	114	1	1	28.4
2007	98	90	87	84	81	0	0	26.9
2008	54	106	97	97	95	0	0	26.5
2009	98	69	52	44	40	0	0	21.8
2010	90	96	94	53	52	0	0	21.8
2011	43	57	54	52	48	0	0	21.8
2012	95	138	136	103	61	0	0	19.2
Avgs.	86	98	90	79	73	0	0	23.9

Table 18, Libby (30-053-0018) 24-hour Average PM_{10} Values

Year	Percent Observations	Maximum Measured Values (µg/m3) 1st Max	2nd Max	3rd Max	4th Max	Days Max > Std	Est Days > Std[1]	Weighted Arith. Mean
2003	96	74	74	72	67	0	0	22.9
2004	98	81	78	78	73	0	0	28.0
2005	96	126	99	92	92	0	0	29.3
2006	96	100	99	89	86	0	0	27.1
2007	95	104	69	56	55	0	0	23.9
2008	99	86	84	79	68	0	0	23.2
2009	98	62	47	47	46	0	0	21.0
2010	99	89	87	83	68	0	0	21.8
2011	98	83	61	51	50	0	0	23.2
2012	92	80	66	61	58	0	0	21.0
Avgs.	97	89	76	71	66	0	0	24.1

[1] Estimated days in exceedance of the NAAQS per 40 CFR 50 Appendix K.

The analysis of monitored data and data trends from the five stations reveals a more than ample demonstration that the five areas have met, and consistently continue to meet clean air goals. The ongoing expenditure of limited monitoring resources to operate these sites will not add any substance to that body of knowledge. Consequently, the DEQ is proposing to discontinue operation of these five sites at the end of calendar 2013.

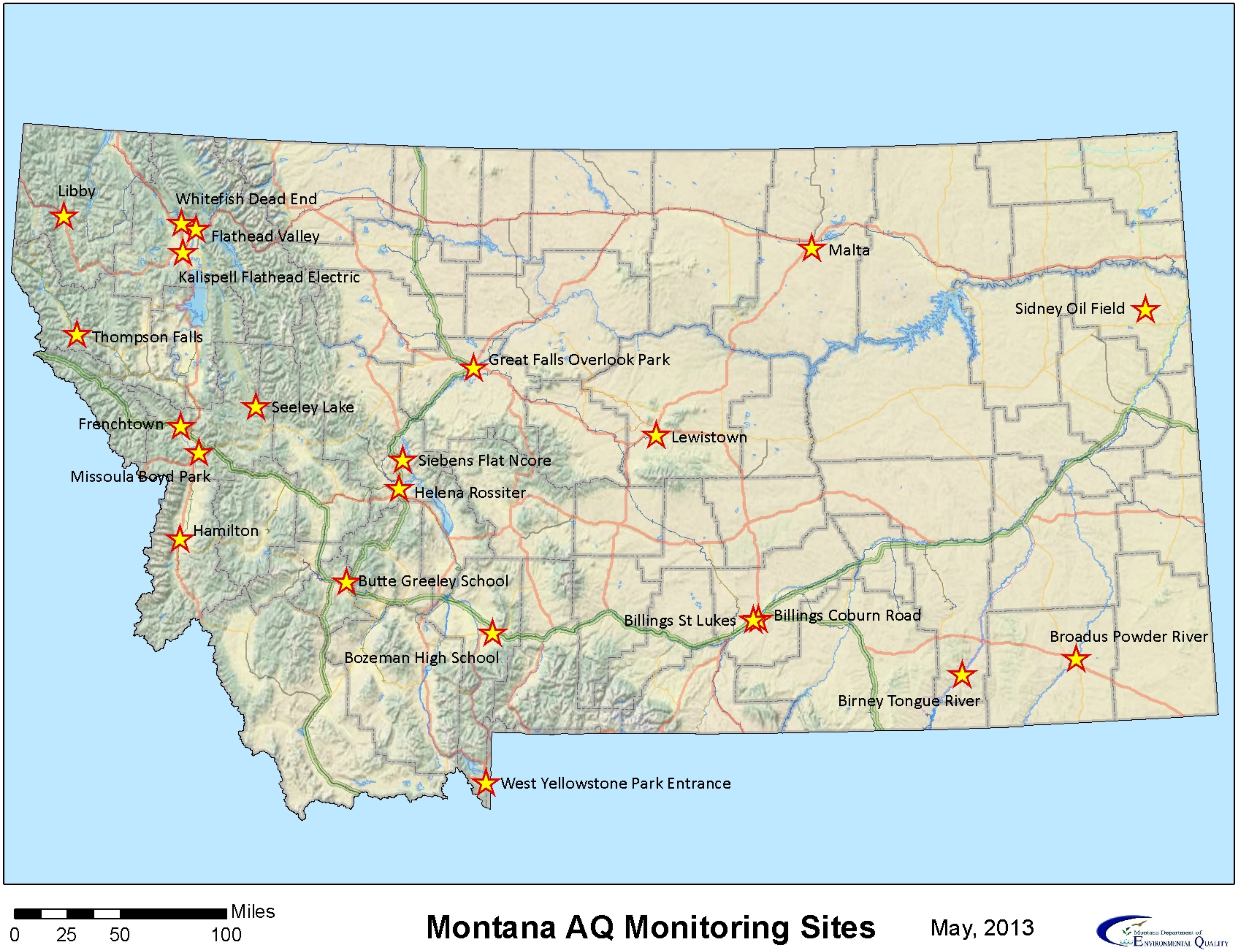
III. Appendices

Appendix A, Monitoring Site Location Information

Montana Department of Environmental Quality

Ambient Air Monitoring Site Location Summary

AQS No.	City - Site Name	Montana Address	Longitude	Latitude	CBSA	
30-111-0066	Billings Coburn Road	Coburn Hill Rd.	-108.458780	45.786579	Metro	Billings, 13740
30-111-0085	Billings St Luke's	2nd Ave. N. and N. 32nd St.	-108.511542	45.780400	Metro	Billings, 13740
30-087-0001	Birney Tongue River	SR 566, 3 Miles N of Birney	-106.489820	45.366151	--	--
30-031-0019	Bozeman High School	N 15th Avenue, H.S. Parking Lot	-111.056282	45.683765	Micro	Bozeman, Gallatin County, 14580
30-075-0001	Broadus Powder River	Big Powder River Road East	-105.370283	45.440295	--	--
30-093-0005	Butte Greeley School	Alley Btwn N. Park Pl. and S. Park Pl.	-112.501247	46.002602	Micro	Butte, Silver Bow County, 15580
30-029-0049	Flathead Valley	610 13th St West	-114.189272	48.363694	Micro	Flathead County, 28060
30-063-0037	Frenchtown Beckwith	16134 Beckwith Street	-114.224273	47.012907	Metro	Missoula, Missoula County, 33540
30-013-0001	Great Falls Overlook Park	10th Ave. S. and 2nd St. E.	-111.303317	47.494318	Metro	Great Falls, Cascade County, 24500
30-081-0007	Hamilton PS#46	Madison and 3rd St. S.	-114.158889	46.243621	--	--
30-049-0026	Helena Rossiter Pump House	1497 Sierra Rd. East	-112.013089	46.658762	Micro	Helena, 25740
30-029-0047	Kalispell Flathead Electric	E Center St. and Woodland Ave.	-114.305334	48.200540	Micro	Kalispell Area, Flathead County, 28060
30-027-0006	Lewistown	303 East Aztec Drive	-109.455315	47.048537	--	--
30-053-0018	Libby Courthouse Annex	418 Mineral Ave.	-115.552280	48.391672	--	--
30-071-0010	Malta	2309 Short Oil Road	-107.862471	48.317507	--	--
30-063-0024	Missoula Boyd Park	3100 Washburn Rd.	-114.020549	46.842297	Metro	Missoula, Missoula County, 33540
30-063-0038	Seeley Lake Elem. School	School Lane	-113.476182	47.175630	Metro	Missoula, Missoula County, 33540
30-083-0001	Sidney Oil Field	Corner Cnty Roads 335 and 131	-104.485552	47.803392	--	--
30-049-0004	Sieben's Flat NCore	I-15 Exit 209, then Sperry Dr.	-111.987164	46.850500	Micro	Helena, 25740
30-089-0007	Thompson Falls High School	Golf and Haley	-115.323746	47.594395	--	--
30-031-0017	West Yellowstone Park Entrance	NE of West Park Entrance Gate	-111.089618	44.657014	--	--
30-029-0009	Whitefish Dead End	End of 10th St.	-114.335973	48.400523	Micro	Flathead County, 28060



Montana AQ Monitoring Sites

May, 2013

Montana Department of Environmental Quality

Appendix B, Montana Core Based Statistical Areas (CBSAs)

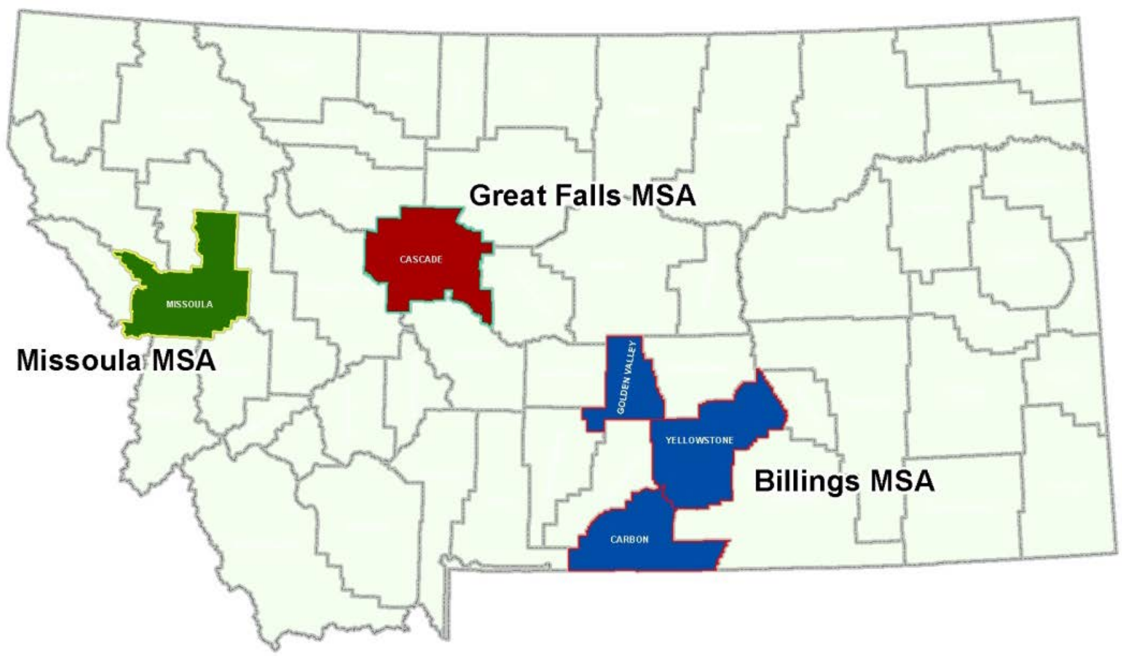
CBSA definition per 40 CFR 58.1: "*Core-based statistical area (CBSA)* is defined by the U.S. Office of Management and Budget, as a statistical geographic entity consisting of the county or counties associated with at least one urbanized area/urban cluster of at least 10,000 population, plus adjacent counties having a high degree of social and economic integration. Metropolitan Statistical Areas (MSAs) and micropolitan statistical areas are the two categories of CBSA (metropolitan areas have populations greater than 50,000; and micropolitan areas have populations between 10,000 and 50,000). In the case of very large cities where two or more CBSAs are combined, these larger areas are referred to as combined statistical areas (CSAs) (*http://www.census.gov/population/estimates/metro-city/List1.txt*)."

Montana Core Based Statistical Areas as of February, 2013

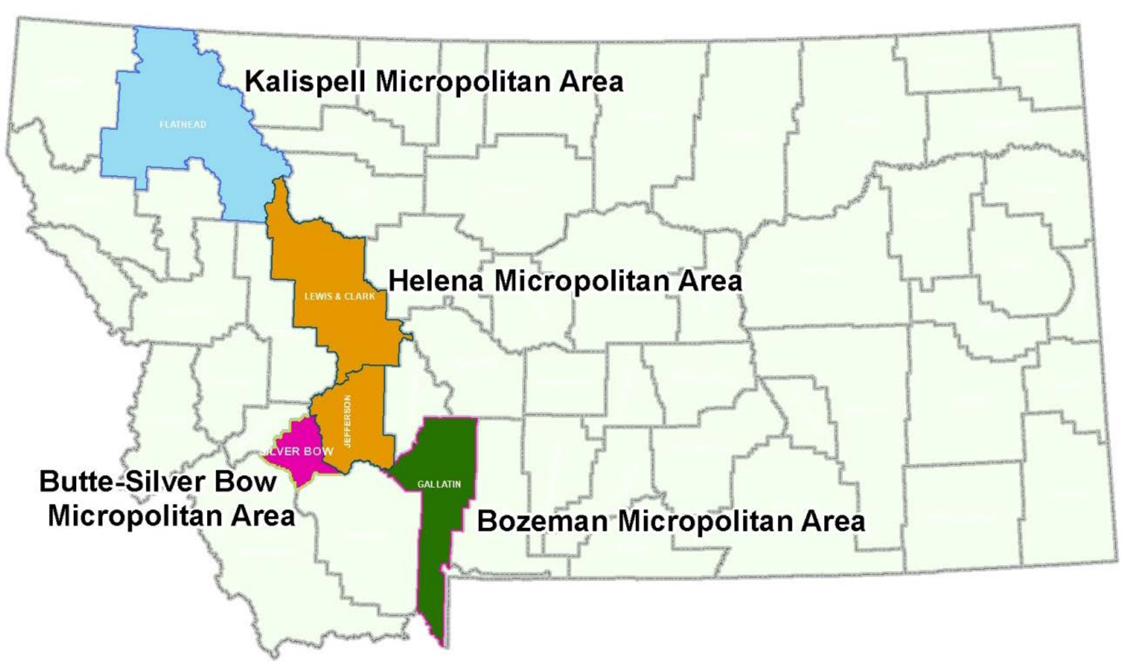
CBSA Code	CBSA Title	Metropolitan or Micropolitan Statistical Area	2012 Estimated Total Population	County/County Equivalent	2012 Estimated County Population	FIPS State Code	FIPS County Code	Central or Outlying County
13740	Billings, MT	Metro	162,848	Golden Valley County	839	30	37	Outlying
				Carbon County	10,127	30	9	Outlying
				Yellowstone County	151,882	30	111	Central
33540	Missoula, MT	Metro	110,977	Missoula County	110,977	30	63	Central
24500	Great Falls, MT	Metro	81,723	Cascade County	81,723	30	13	Central
14580	Bozeman, MT	Micro	92,614	Gallatin County	92,614	30	31	Central
28060	Kalispell, MT	Micro	91,633	Flathead County	91,633	30	29	Central
25740	Helena, MT	Micro	76,277	Jefferson County	11,401	30	43	Outlying
				Lewis and Clark County	64,876	30	49	Central
15580	Butte-Silver Bow, MT	Micro	34,403	Silver Bow County	34,403	30	93	Central

Source: U.S. Census Bureau, Population Division; Office of Management and Budget, February 2013 delineations
Internet Release Date: March 2013

Montana Metropolitan Statistical Areas (MSAs)



Montana Micropolitan Statistical Areas



Appendix C, Existing and Proposed Air Monitoring Network

Existing Ambient Air Quality Monitoring Network By Location With Proposed Changes

AQS Number	Site Name	Pollutant	Param-POC	Method			Frequency	Type[6]	Spatial Scale	Monitoring Objective[1]	2014 Change
				Code	Note[5]	PM					
30-111-0066	**Billings-Coburn**	SO_2	42401-1	100	7		Continuous	SLAMS	Neigh.	H,S	
		SO_2 - 5 min	42406-1	100	7		Continuous	SLAMS	Neigh.	H,S	
30-111-0085	**Billings-St. Luke's**	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM	Micro.	P	
30-087-0001	**Birney**	NO	42601-1	074	11		Continuous	SLAMS	Neigh.	B	
		NO_2	42602-1	074	11		Continuous	SLAMS	Neigh.	B	
		NO_X	42603-1	074	11		Continuous	SLAMS	Neigh.	B	
		O_3	44201-1	047	9		Continuous	SLAMS	Neigh.	B	
		PM_{10}	81102-1	122	4	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	B	
30-031-0019	**Bozeman**	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM	Neigh.	P	
30-075-0001	**Broadus**	NO	42601-1	074	11		Continuous	SLAMS	Neigh.	B	
		NO_2	42602-1	074	11		Continuous	SLAMS	Neigh.	B	
		NO_X	42603-1	074	11		Continuous	SLAMS	Neigh.	B	
		O_3	44201-1	047	9		Continuous	SLAMS	Neigh.	B	
		PM_{10}	81102-1	122	4	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	B	
30-093-0005	**Butte-Greeley**	PM_{10}	81102-4	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	H,P	
		$PM_{2.5}$	88101-2	116	2	FRM	1 in 6 coll[2]	QA Col	Neigh.	H,P	
		$PM_{2.5}$ Spc'n	Various		6	FRM	1 in 6	CSN	Neigh.	H,P	
30-029-0049	**Flathead Valley**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh	P	
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh	P	
30-063-0037	**Frenchtown**	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	P	
30-013-0001	**Great Falls-OP**	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM	Middle	H,P	
30-081-0007	**Hamilton**	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	H,P	
30-049-0026	**Helena-Rossiter**	$PM_{2.5}$	88101-3	183	21	FEM	Continuous	SLAMS	Neigh.	H,P	
		$PM_{2.5}$	88101-2	116	2	FRM	1 in 6 coll[2]	QA Col		H,P	
30-029-0047	**Kalispell-FEC**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	✓
30-053-0018	**Libby**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	✓
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	H,P	
30-027-0006	**Lewistown**	NO	42601-1	099	10		Continuous	SPM NR	Neigh.	B	
		NO_2	42602-1	099	10		Continuous	SPM NR	Neigh.	B	
		NO_X	42603-1	099	10		Continuous	SPM NR	Neigh.	B	
		O_3	44201-1	047	9		Continuous	SPM NR	Neigh.	B	
		PM_{10}	81102-1	150	21	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	183	21	FEM	Continuous	SPM NR	Neigh.	B	
30-071-0010	**Malta**	NO	42601-1	099	10		Continuous	SPM NR	Neigh.	B	
		NO_2	42602-1	099	10		Continuous	SPM NR	Neigh.	B	
		NO_X	42603-1	099	10		Continuous	SPM NR	Neigh.	B	
		O_3	44201-1	047	9		Continuous	SPM NR	Neigh.	B	
		PM_{10}	81102-1	150	21	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	183	21	FEM	Continuous	SPM NR	Neigh.	B	
30-063-0024	**Missoula-Boyd**	O_3	44201-1	047	9		Continuous	SLAMS	Neigh.	P	
		PM_{10}	81102-6	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	✓
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	H,P	
		$PM_{2.5}$	88101-4	170	8	FEM	Continuous - coll[3]	QA Col		H,P	
30-063-0038	**Seeley Lake**	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM NR	Neigh.	H,P	
30-083-0001	**Sidney**	NO	42601-1	099	10		Continuous	SLAMS	Neigh.	S	
		NO_2	42602-1	099	10		Continuous	SLAMS	Neigh.	S	
		NO_X	42603-1	099	10		Continuous	SLAMS	Neigh.	S	
		O_3	44201-1	047	9		Continuous	SLAMS	Neigh.	S	
		SO_2	42401-1	100	7		Continuous	SLAMS	Neigh.	S	
		SO_2 - 5 min	42406-1	100	7		Continuous	SLAMS	Neigh.	S	
		PM_{10}	81102-1	122	4	FEM	Continuous	SPM NR	Neigh.	S	
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	Neigh.	S	

(Continued…)

Existing Ambient Air Quality Monitoring Network By Location With Proposed Changes, Continued

AQS Number	Site Name	Pollutant	Param-POC	Method Code	Method Note[5]	Method PM	Frequency	Type[6]	Spatial Scale	Monitoring Objective[1]	2014 Change
30-049-0004	**NCore**	CO	42101-1	554	13		Continuous	NCore	Region	B	
		NO	42601-1	574	15		Continuous	NCore	Region	B	
		NOy	42600-1	574	15		Continuous	NCore	Region	B	
		O_3	44201-1	047	9		Continuous	NCore	Region	B	
		SO_2	42401-1	600	14		Continuous	NCore	Region	B	
		$PM_{2.5}$	88101-3	170	8	FEM	Continuous	NCore	Region	B	
		$PM_{2.5}$	88101-1	116	2	FRM	1 in 3	NCore	Region	B	
		$PM_{2.5}$ Spc'n	Various		6	FRM	1 in 3	NCore	Region	B	
		PM_{coarse}	86101-1	185	12	FEM	Continuous	NCore	Region	B	
30-089-0007	**Thompson Falls**	PM_{10}	81102-1	125	3	FRM	1 in 6	SLAMS	Neigh.	H, P	✓
30-031-0017	**West Yellowstone**	CO	42101-1	093	1		Continuous	SPM NR	Micro	S	
		NO	42601-1	099	10		Continuous	SPM NR	Micro	S	
		NO_2	42602-1	099	10		Continuous	SPM NR	Micro	S	
		NO_X	42603-1	099	10		Continuous	SPM NR	Micro	S	
		$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM NR	Micro	S	
30-029-0009	**Whitefish**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	P	✓

Footnotes

[1] **Monitoring Objective Descriptions:** B = Background, H = Highest Concentration, P = Population Exposure, S = Source Impact

[2] **"Coll"** = collocated sampler

[3] **"Continuous Coll"** = collocated continuous (BAM) sampler

[4] **"Contin 1st/4th Qtr"** = Analyzer operates continuously, but only during the first and fourth calendar quarters of each year.

[5] **Method Notes :**

1 Teledyne-API Model 300. Nondispersive infrared-equivalent method.
2 BGI-PQ200 with very sharp cut cyclone. Federal Reference Method.
3 BGI-PQ200 with WINS eliminator. Federal Reference Method.
4 MetOne BAM 1020. Beta attenuation monitor-equivalent method PM10.
5 MetOne BAM 1020 with PM2.5 sharp cut cyclone. Beta attenuation monitor.
6 MetOne / URG Speciation Air Sampling System.
7 Teledyne-API Model 100A. Ultraviolet fluorescence-equivalent method.
8 MetOne FEM-BAM 1020 with PM2.5 very sharp cut cyclone. Beta attenuation monitor-equivalent method PM2.5.
9 Thermo Model 49i. UV absorption-equivalent method.
10 Teledyne-API Model 200E or 200EU. Chemiluminescence-Federal Reference Method.
11 Thermo Model 42i TL. Chemiluminescence-Federal Reference Method.
12 MetOne BAM1020 PM10-2.5 Measurement System. Paired beta attenuation monitors.
13 Thermo Model 48i-TLE. Enhanced Trace Level CO Analyzer
14 Teledyne-API Model 100E. Trace Level UV Fluorescence SO2 Analyzer
15 Thermo Model 42i-TLE. NO-DIF-NOy chemiluminescent specialty trace level gas analyzer
21 Thermo Scientific FH62C14-DHS Continuous, 5014i

[6] **Type :**

SLAMS : State or Local Air Monitoring Station
SPM : Special Purpose Monitor
QA Col: Quality Assurance, Co-located Monitor
ID : Industrial Monitor
NR : Non-Regulatory Data
CSN : Chemical Speciation Network

Appendix D, Summary of Proposed Network Changes

Proposed Changes to the Existing Ambient Air Quality Monitoring Network

AQS Number	Site Name	Pollutant	Param-POC	Method			Frequency	Type[6]	Spatial Scale	Monitoring Objective[1]	2014 Change
				Code	Note[5]	PM					
30-089-0007	**Thompson Falls**	PM_{10}	81102-1	125	3	FRM	1 in 6	SLAMS	Neigh.	H, P	✓
30-029-0047	**Kalispell**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	✓
30-063-0024	**Missoula-Boyd**	PM_{10}	81102-6	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	✓
30-029-0009	**Whitefish**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	P	✓
30-053-0018	**Libby**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	H,P	✓

Footnotes

[1] **Monitoring Objective Descriptions:** B = Background, H = Highest Concentration, P = Population Exposure, S = Source Impact

[2] **"Coll"** = collocated sampler

[3] **"Continuous Coll"** = collocated continuous (BAM) sampler

[5] **Method Notes :**

3 BGI-PQ200 with WINS eliminator. Federal Reference Method.

4 MetOne BAM 1020. Beta attenuation monitor-equivalent method PM10.

[6] **Type :**

SLAMS : State or Local Air Monitoring Station

Appendix E, Ambient Air Quality Summary, Calendar Year 2012

Ambient Air Monitoring Network Summary for Calendar 2012

Site	Parameter	Units	Min	Max	Average	Data Capt. %	# > NAAQS	# > 80% NAAQS	NAAQS
Billings - Coburn Road	SO2	ppb	0	129	2	88	3	6	75
Billings - St. Lukes	PM25	ug/m3	0	32.5	5.2	99	0	3	35
Birney - Tongue River	NO2	ppb	0	16	0	97	0	0	100
Birney - Tongue River	OZONE	ppm	0	0.076	0.029	98	0	0	0.12
Birney - Tongue River	PM10 STD	ug/m3	0	102	20	89	0	0	150
Birney - Tongue River	PM25	ug/m3	0	41.3	7.7	96	2	8	35
Bozeman High School	PM25	ug/m3	0	50.7	8.3	81	7	14	35
Broadus - Powder River	NO2	ppb	0	32	0	78	0	0	100
Broadus - Powder River	OZONE	ppm	0	0.063	0.031	97	0	0	0.12
Broadus - Powder River	PM10 STD	ug/m3	2	118	34	94	0	0	150
Broadus - Powder River	PM25	ug/m3	0	32.2	8.7	78	0	3	35
Butte - Greeley School	PM10 STD	ug/m3	0	162	27	98	1	2	150
Butte - Greeley School	PM25	ug/m3	0.7	100.6	11.1	98	13	28	35
Flathead Valley	PM10 STD	ug/m3	1	46	13	96	0	0	150
Flathead Valley	PM25	ug/m3	1	32.5	7.7	95	0	5	35
Frenchtown - Beckwith	PM25	ug/m3	2.8	100	12.3	98	12	18	35
Great Falls - OP	PM25	ug/m3	1.5	48	9	99	3	4	35
Hamilton - PS #46	PM25	ug/m3	0	236.2	16.8	96	42	52	35
Helena - Rossiter	PM25	ug/m3	0.2	97	9.2	97	8	12	35
Kalispell - FEC	PM10 STD	ug/m3	6	63	21	94	0	0	150
Lewistown	NO2	ppb	0	27	0	86	0	0	100
Lewistown	OZONE	ppm	0.003	0.057	0.025	98	0	0	0.12
Lewistown	PM10 STD	ug/m3	1	41	10	36	0	0	150
Lewistown	PM25	ug/m3	0	44.3	5	49	1	2	35
Libby - Courthouse	PM10 STD	ug/m3	3	80	21	92	0	0	150
Libby - Courthouse	PM25	ug/m3	0.7	33.1	11.1	98	0	5	35
Malta	NO2	ppb	0	16	0	94	0	0	100
Malta	OZONE	ppm	0.004	0.078	0.028	99	0	0	0.12
Malta	PM10 STD	ug/m3	1	31	7	37	0	0	150
Malta	PM25	ug/m3	0	26.3	4.9	43	0	0	35
Missoula - Boyd Park	OZONE	ppm	0	0.073	0.024	99	0	0	0.12
Missoula - Boyd Park	PM10 STD	ug/m3	2	139	20	95	0	2	150
Missoula - Boyd Park	PM25	ug/m3	0.6	105	10.8	96	15	21	35
Missoula - Boyd Park	PM25 COL	ug/m3	0	107.6	10.4	90	15	21	35
NCore - Sieben's Flat	CO TRACE	ppb	84	607	153	89	0	0	35000
NCore - Sieben's Flat	NOY	ppb	0.2	14.8	1.5	43			
NCore - Sieben's Flat	OZONE	ppm	0	0.058	0.03	98	0	0	0.12
NCore - Sieben's Flat	PM10 STD	ug/m3	2	53	10	96	0	0	150
NCore - Sieben's Flat	PM25	ug/m3	0	37.2	5.4	98	1	3	35
NCore - Sieben's Flat	PMCOARSE	ug/m3	0	19	4	96			
NCore - Sieben's Flat	SO2	ppb	0	5.2	0.3	94	0	0	75
Seeley - Elementary	PM25	ug/m3	4.2	68.7	19	99	36	70	35
Sidney - Oil Field	NO2	ppb	0	17	0	87	0	0	100
Sidney - Oil Field	OZONE	ppm	0	0.069	0.032	85	0	0	0.12
Sidney - Oil Field	PM10 STD	ug/m3	1	125	25	98	0	2	150
Sidney - Oil Field	PM25	ug/m3	2.5	30.1	8.3	98	0	3	35
Sidney - Oil Field	SO2	ppb	0	8	0	87	0	0	75
West Yellowstone	CO	ppm	0	4.8	0	82	0	0	35
West Yellowstone	NO2	ppb	0	28	2	87	0	0	100
West Yellowstone	PM25	ug/m3	0	41.3	5	84	2	4	35
Whitefish - Dead End	PM10 STD	ug/m3	3	138	19	95	0	2	150

Appendix F, $PM_{2.5}$ Speciation Analytes

PM2.5 Speciation Analytes

	Parameter	Method
Mass - PM2.5		
PM 2.5u Gravimetric	88502	810
Trace elements (33)		
Aluminum	88104	811
Antimony	88102	811
Arsenic	88103	811
Barium	88107	811
Bromine	88109	811
Cadmium	88110	811
Calcium	88111	811
Cerium	88117	811
Cesium	88118	811
Chlorine	88115	811
Chromium	88112	811
Cobalt	88113	811
Copper	88114	811
Indium	88131	811
Iron	88126	811
Lead	88128	811
Magnesium	88140	811
Manganese	88132	811
Nickel	88136	811
Phosphorus	88152	811
Potassium	88180	811
Rubidium	88176	811
Selenium	88154	811
Silicon	88165	811
Silver	88166	811
Sodium	88154	811
Strontium	88168	811
Sulfur	88169	811
Tin	88160	811
Titanium	88161	811
Vanadium	88164	811
Zinc	88167	811
Zirconium	88185	811
Cations - PM2.5 (NH4, Na, K)		
Ammonium	88301	812
Potassium	88303	812
Sodium	88302	812
Nitrate - PM2.5		
Nitrate (Total)	88306	812
Sulfate - PM2.5		
Sulfate	88403	812
Organic and elemental carbon IMPROVE_A		
E1 IMPROVE	88383	841
E2 IMPROVE	88384	841
E3 IMPROVE	88385	841
EC IMPROVE TOR	88380	831
EC IMPROVE TOT	88357	840
O1 IMPROVE	88374	841
O2 IMPROVE	88375	841
O3 IMPROVE	88376	841
O4 IMPROVE	88377	841
OC IMPROVE TOR	88370	838
OC IMPROVE TOT	88355	839
OP IMPROVE TOR	88378	842
OP IMPROVE TOT	88388	826

Appendix G, PM2.5 FRM / FEM Comparisons

$PM_{2.5}$ FRM / FEM Comparison, Helena Rossiter School Site

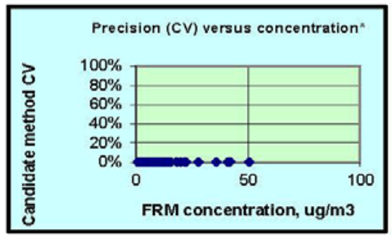
Summary - Candidate ARM Comparability

Applicant:	
Candidate method:	
Test site:	Helena Rossiter Pumphouse - (Site location 30-049-0026)

Data sets	Number
Valid data sets available:	122
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	OK
Additional data sets needed:	--

(Including 1 data sets excluded because FRM conc. < 3.)

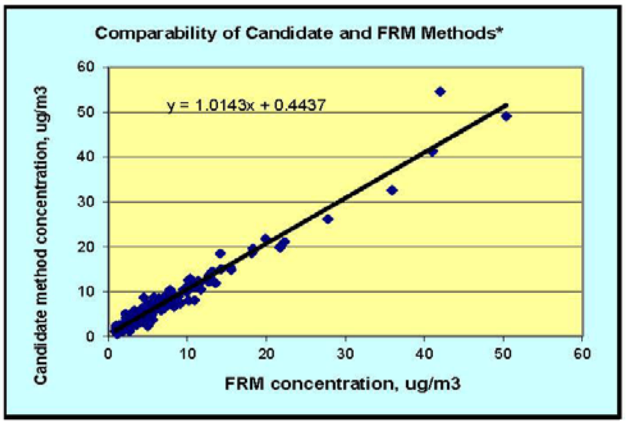
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	8.0	8.5				
Maximum:	50.4	54.6				
Minimum:	0.9	0.6				
Candidate / FRM Ratio:		107.0%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						



Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		1.014	0.444	0.97863
Limits for Class III	Upper:	1.100	1.661	
	Lower:	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

[1]Multiplicative bias [2]Additive bias

Note: Precision statistics can be calculated only for data sets containing multiple FRM or multiple candidate ARM measurements.



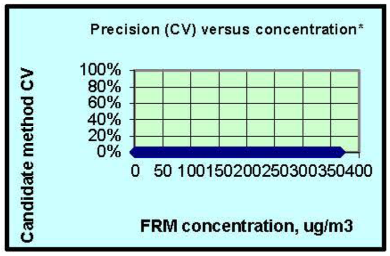
$PM_{2.5}$ FRM / FEM Comparison, NCore Site

Summary - Candidate ARM Comparability

Applicant:	
Candidate method:	
Test site:	NCORE - (Site location 30-049-0004)

Data sets	Number
Valid data sets available:	230
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	OK
Additional data sets needed:	--

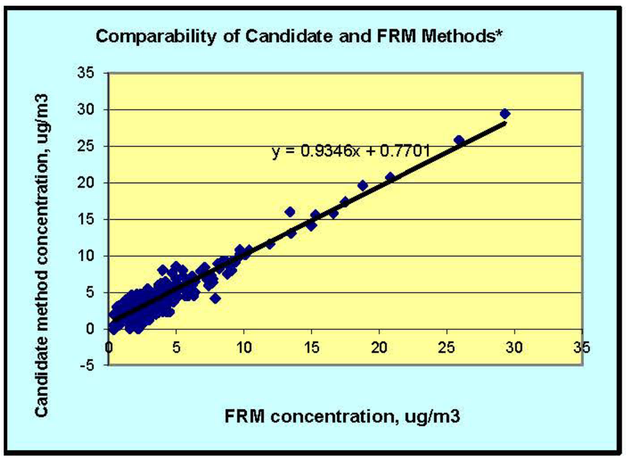
Precision (if data are available)	Data set mean, μg/m³		Data set precision, μg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	**FRM**	**Candidate**
Mean:	**2.7**	**4.6**				
Maximum:	13.4	29.4				
Minimum:	0.4	-0.1				
Candidate / FRM Ratio:	171.4%					
	RMS Relative Precision for this site:					
	Test requirements - Class III:				10.0%	15.0%
	Precision Test Results for site:					

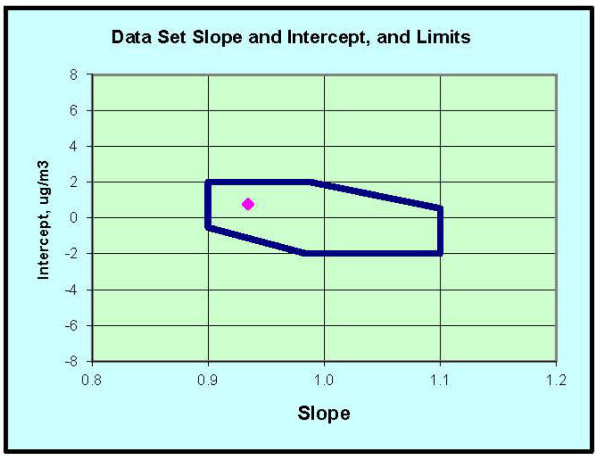


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.935	0.770	0.95534
Limits for Class III	Upper:	1.100	2.000	
	Lower:	0.900	-1.137	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

[1]Multiplicative bias [2]Additive bias

Note: Precision statistics can be calculated only for data sets containing multiple FRM or multiple candidate ARM measurements.





$PM_{2.5}$ FRM / FEM Comparison, Butte Site

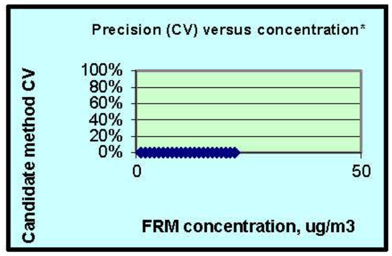
Summary - Candidate ARM Comparability

Applicant:	
Candidate method:	
Test site:	Butte Greeley School (30-093-0005)

Data sets	Number
Valid data sets available:	22
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	Insufficient
Additional data sets needed:	68

Comparison just beginning at this site.

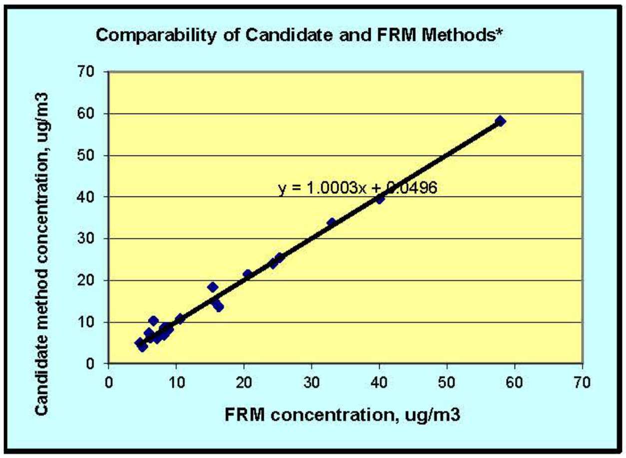
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	15.7	15.7				
Maximum:	57.9	58.2				
Minimum:	4.6	4.1				
Candidate / FRM Ratio:		100.3%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						

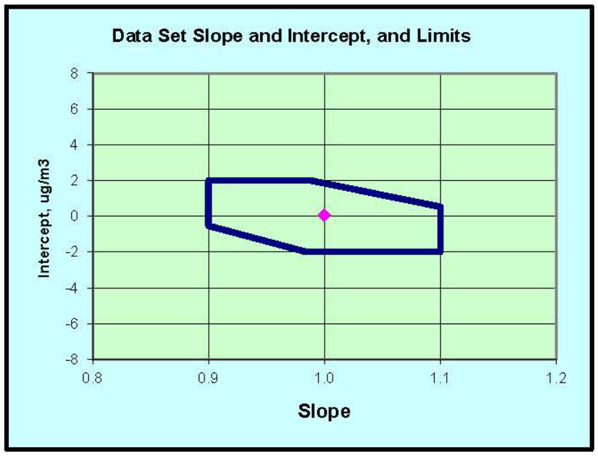


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		1.000	0.050	0.99481
Limits for Class III	Upper:	1.100	1.846	
	Lower:	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

[1]Multiplicative bias [2]Additive bias

Note: Precision statistics can be calculated only for data sets containing multiple FRM or multiple candidate ARM measurements.





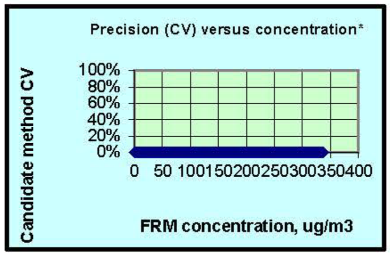
$PM_{2.5}$ FEM / FEM Comparison, Missoula - Boyd Park Site

Summary - Candidate ARM Comparability

Applicant:	
Candidate method:	
Test site:	Missoula Boyd Park - (Site location 30-063-0024)

Data sets	Number
Valid data sets available:	336
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	**OK**
Additional data sets needed:	--

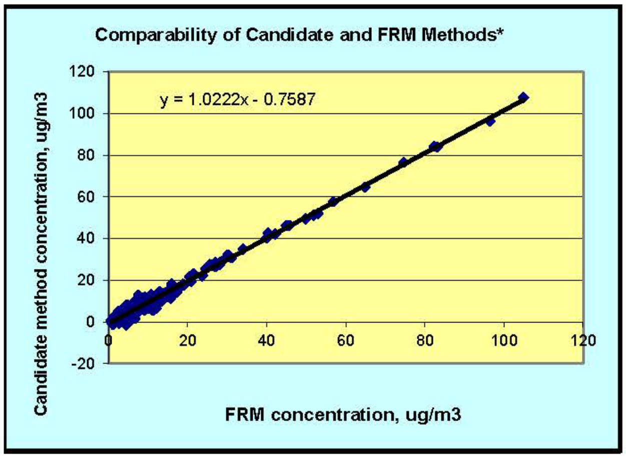
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	**FRM**	**Candidate**
Mean:	**10.9**	**10.4**				
Maximum:	105.0	107.6				
Minimum:	0.6	-1.5				
Candidate / FRM Ratio:		95.3%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						

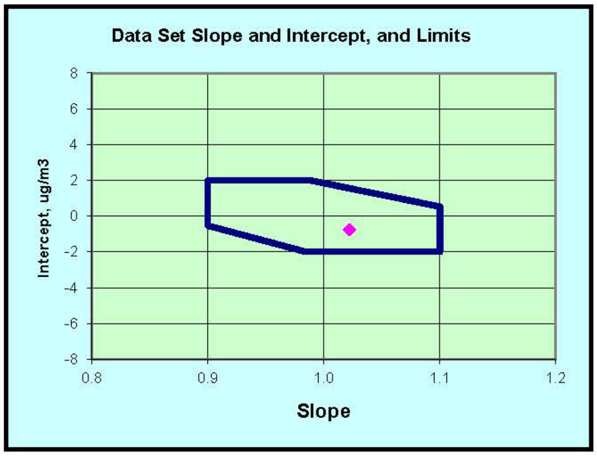


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		1.022	-0.759	0.99201
Limits for Class III	Upper:	1.100	1.557	
	Lower:	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

[1]Multiplicative bias [2]Additive bias

Note: Precision statistics can be calculated only for data sets containing multiple FRM or multiple candidate ARM measurements.





Appendix H, National and Montana Ambient Air Quality Standards

FEDERAL & STATE AIR QUALITY STANDARDS				
Pollutant	Averaging Period	Federal (NAAQS)	State (MAAQS)	NAAQS Standard Type
Carbon Monoxide (CO)	1-Hour	35 ppm [a]	23 ppm [b]	Primary
	8-Hour	9 ppm [a]	9 ppm [b]	Primary
Fluoride in Forage	Monthly	NA	50 µg/g [c]	NA
	Grazing Season	NA	35 µg/g [c]	NA
Hydrogen Sulfide (H_2S)	1-Hour	NA	0.05 ppm [b]	NA
Lead (Pb)	Quarterly	1.5 µg/m^3 [c, o]	1.5 µg/m^3 [c]	NA
	Rolling 3-Month	0.15 µg/m^3 [c]	NA	Primary & Secondary
Nitrogen Dioxide (NO_2)	1-Hour	100 ppb [d]	0.30 ppm [b]	Primary
	Annual	53 ppb [e]	0.05 ppm [f]	Primary & Secondary
Ozone (O_3)	1-Hour	NA [g]	0.10 ppm [b]	Primary & Secondary
	8-Hour	0.075 ppm [h] (2008 std)	NA	Primary & Secondary
Particulate Matter ≤ 10 µm (PM_{10})	24-Hour	150 µg/m^3 [j]	150 µg/m^3 [j]	Primary & Secondary
	Annual	NA	50 µg/m^3 [k]	Primary & Secondary
Particulate Matter ≤ 2.5 µm ($PM_{2.5}$)	24-Hour	35 µg/m^3 [l]	NA	Primary & Secondary
	Annual	12.0 µg/m^3 [m]	NA	Primary
	Annual	15.0 µg/m^3 [m]	NA	Secondary
Settleable PM	30-Day	NA	10 g/m^2 [c]	NA
Sulfur Dioxide (SO_2)	1-Hour	75 ppb [n]	0.50 ppm [p]	Primary
	3-Hour	0.5 ppm [a]	NA	Secondary
	24-Hour	0.14 ppm [a, q]	0.10 ppm [b]	Primary
	Annual	0.030 ppm [e,q]	0.02 ppm [f]	Primary
Visibility	Annual	NA	3×10^{-5}/m [f]	NA

[a] Federal violation when exceeded more than once per calendar year.
[b] State violation when exceeded more than once over any 12-consecutive months.
[c] Not to be exceeded (ever) for the averaging time period as described in either state or federal regulation. Pb is a 3-year assessment period for attainment.
[d] Federal violation when 3-year average of the 98th percentile of the daily maximum 1-hr average at each monitoring site exceeds the standard.
[e] Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard.
[f] State violation when the arithmetic average over any four consecutive quarters exceeds the standard.

[g] Applies only to NA areas designated before the 8-hour standard was approved in July, 1997. MT has none.
[h] Federal violation when 3-year average of the annual 4th-highest daily max. 8-hour concentration exceeds standard. (effective May 27, 2008)
i To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. EPA is in the process of reconsidering these standards (set in March 2008).
[j] State and federal violation when more than one expected exceedance per calendar year, averaged over 3-years.
[k] State violation when the 3-year average of the arithmetic means over a calendar year at each monitoring site exceed the standard.
[l] Federal violation when 3-year average of the 98th percentile 24-hour concentrations at each monitoring site exceed the standard.
[m] Federal violation when 3-year average of the annual mean at each monitoring site exceeds the standard.
[n] Federal violation when 3-year average of the 99th percentile of the daily maximum 1-hr average at each monitoring site exceeds the standard. Promulgated June 2, 2010. Expected effective date mid-August, 2010.
[o] The 1978 Pb NAAQS will remain effective until one year after designations are effective for the October 15, 2008, revised Pb NAAQS (0.15 $\mu g/m^3$), except in existing Pb nonattainment areas (East Helena, MT). In East Helena, EPA will retain the 1978 Pb NAAQS until EPA approves attainment and/or maintenance demonstrations for the revised Pb NAAQS.
[p] State violation when exceeded more than eighteen times in any 12 consecutive months.
[q] The 1971 SO_2 NAAQS will remain effective until one year after designations are effective for the June 2, 2010, revised SO_2 NAAQS (75 ppb), except in existing SO_2 nonattainment areas (Laurel and East Helena, MT). In Laurel and East Helena, EPA will retain the 1971 SO_2 NAAQS until EPA approves attainment and/or maintenance demonstrations for the revised SO_2 NAAQS.

Appendix I, Comments Received

The DEQ Air Quality Monitoring Network Plan was made available for public inspection as required by 40 CFR 58.10(a)(1) on May 30, 2013. One set of comments was received by DEQ. Those comments are attached in their entirety in the following pages, followed by DEQ's letter of response.

June 28, 2013

Hoby Rash
Air Resources Management Bureau
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620
hrash@mt.gov

Via Electronic Mail

RE: Comments on DEQ's 2013 Monitoring Network Plan

Mr. Rash:

On behalf of Montana Environmental Information Center ("MEIC"), we submit these comments on the Montana Department of Environmental Quality ("DEQ") draft 2013 Monitoring Network Plan ("the Draft Plan"). These comments are specific to the ambient air monitoring requirements with respect to the monitoring criteria for sulfur dioxide (SO_2) and fine particulate matter ($PM_{2.5}$).

I. AN UPGRADE OF THE SEELEY LAKE $PM_{2.5}$ MONITORING SITE IS NECESSARY

MEIC urges DEQ to ensure that Seeley Lake complies with the National Ambient Air Quality Standard ("NAAQS") for $PM_{2.5}$. DEQ currently monitors $PM_{2.5}$ at Seeley Lake "for public information only." Draft Plan at 14. However, due to the high concentration of $PM_{2.5}$ at that station, particularly in the winter months, this monitoring must be upgraded to a Federal Equivalent Method monitor that is certified to produce NAAQS-comparison data, to ensure compliance with the NAAQS and to enable DEQ to determine whether it must take steps to reduce ambient particulate levels to protect the public in the Seeley area from the health impacts of this harmful pollutant.

II. MONITORING FOR SO_2 SHOULD BE REQUIRED IN ROSEBUD COUNTY, WHICH HAS MODELED VIOLATIONS OF THE SO_2 NAAQS

DEQ also must install and operate a regulatory monitor to ensure compliance with the one-hour SO_2 NAAQS in Rosebud County. Under 40 C.F.R. 58, Appendix D, Section 4.4.3, the EPA Regional Administrator may require additional monitoring for SO_2 in areas that have "the potential to have concentrations that may violate or contribute to the violation of NAAQS… which are not monitored under the minimum monitoring provisions…" There is a demonstrated need for additional monitoring in Rosebud County, because air quality modeling for the County has established potential violations of the 2010 one-hour SO_2 NAAQS. Rosebud County contains the single largest source of SO_2 emissions in the state of Montana: the Colstrip coal-fired power plant. The Colstrip plant includes four coal-fired boiler units, which have a net capacity of approximately 2,094 MW and which emit many pollutants, including SO_2. While no SO_2 monitoring data for the area around the Colstrip plant exists, modeling of SO_2 emissions from the plant demonstrates violations of the one-hour SO_2 NAAQS. EPA guidance confirms that modeling results may be used to determine whether there is a violation of the one-hour SO_2 NAAQS that warrants designation of a nonattainment area. See Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards at 4 (Mar. 24, 2011) ("Area Designation Guidance"), available at http://www.epa.gov/air/sulfurdioxide/pdfs /20110411so2designationsguidance.pdf.

In June of 2012, MEIC contracted with an independent expert to conduct an air dispersion modeling analysis to evaluate compliance in the area of the Colstrip plant with the 2010 one-hour SO_2 NAAQS. That modeling analysis is attached to this comment letter as Exhibit 1. The modeling was performed using the most recent version of AERMOD in accordance with EPA's modeling guidance for the one-hour SO_2 NAAQS promulgated in Appendix W to 40 C.F.R. Part 51 and described in Attachment 3 to EPA's Area Designation Guidance. The modeling includes an analysis of emissions from only the Colstrip plant and did not consider background concentrations of SO_2 or emissions from other nearby sources. Exhibit 1 at 14. Thus, the modeling almost certainly underestimates the actual total air concentrations of SO_2, and violations may be more widespread than presented in the modeling.

Based on both Colstrip's allowable SO_2 emissions and on actual measured maximum SO_2 emissions from 2011, the air dispersion modeling establishes that Colstrip's emissions violate the 2010 one-hour SO_2 NAAQS. Id. at 4 ("Based on either permitted (allowable) SO_2 emissions, or measured 2011 maximum SO_2 emissions, air dispersion modeling shows that the Colstrip facility violates the one-hour SO_2 NAAQS in Montana"), 15-16 Figs. 2 & 3. Further, violations of the SO_2 NAAQS are likely even assuming Colstrip's future anticipated SO_2 emissions under EPA's Montana Regional Haze Plan, 77 Fed. Reg. 57,864 (Sept. 18, 2012). Modeling based on the 30-day average SO_2 limit in the regional haze plan did not demonstrate violations; however, peak hourly emissions of two to three times Colstrip's 30-day average SO_2 limit—the appropriate measure of compliance with a one-hour standard—would almost certainly cause areas of Rosebud County to exceed the NAAQS. Exhibit 1 at 16.

Furthermore, unlike other industrial sources in Great Falls and Billings that monitor ambient SO_2 levels, see the Draft Plan at 10, DEQ has no ambient SO_2 monitoring data related to the Colstrip plant. In the original air quality permit, the Colstrip plant was required to monitor SO_2 emissions. This monitoring requirement was eliminated during a subsequent amendment of the plant's operating permit, specifically because the Colstrip plant operator demonstrated that there was little potential for the plant to cause a violation of the prior SO_2 NAAQS. *See* Air Quality Permit #0513-05 (Feb. 23, 2005). However, updated modeling shows violations of the more stringent 2010 one-hour SO_2 NAAQS, and it is clear that further monitoring is required.

Because modeling has established current and likely future violations of the 2010 one-hour SO_2 NAAQS in Rosebud County, and because the Colstrip plant does not currently monitor for compliance with the SO_2 NAAQS, DEQ must develop a State or Local Air Monitoring

Station ("SLAMS") site at an appropriate site in Rosebud County, in order to monitor compliance with SO_2 NAAQS.

III. CONCLUSION

For the reasons discussed above, MEIC requests that DEQ upgrade its $PM_{2.5}$ monitor in Seeley Lake to a Federal Equivalent Method monitor certified to produce NAAQS-comparison data. Additionally, because modeling has established violations of SO_2 NAAQS in Rosebud County, DEQ should conduct additional monitoring at an appropriate site in Rosebud County. Please contact us by phone at (406) 586-9699 or by email at jharbine@earthjustice.org or amaxwell@earthjustice.org if you have any questions.

Sincerely,

Jenny Harbine
Adrienne Maxwell

Encl.

Exhibit 1

Air Dispersion Modeling Analysis For Verifying Compliance with the One-Hour SO_2 and NO_2 NAAQS: PPL Montana – Colstrip Power Plant

Prepared by:

Camille Marie Sears

June 11, 2012

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FIGURES

ATTACHMENTS

1. Introduction

PPL Montana operates the Colstrip Power Plant, which is a major source of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emissions located in Rosebud County, Montana. This facility, which is permitted by the Montana Department of Environmental Quality (MDEQ), includes four coal-fired boiler units (Units 1 and 2 at 307 net MW each; Units 3 and 4 at 740 net MW each).[1] Emissions from each unit vent to a dedicated stack.[2] An aerial view of the Colstrip Station is shown in Figure 1.

I was asked to verify whether Colstrip's SO_2 and NO_x emissions cause air impacts that exceed the recently promulgated one-hour National Ambient Air Quality Standard (NAAQS) for these pollutants, or would prevent maintenance of the standards. In response, I prepared air dispersion modeling analyses for calculating ambient SO_2 and Tier 1 NO_2 air concentrations from the Colstrip facility. These modeled impacts are then compared with the one-hour SO_2 and NO_2 NAAQS, respectively. This report presents my modeling results and discusses the technical methodology I used for performing these analyses. Lindsey Sears assisted me in preparing model inputs and the maps showing the model results.

The one-hour SO_2 NAAQS takes the form of a three-year average of the 99th-percentile of the annual distribution of daily maximum one-hour concentrations, which cannot exceed 75 ppb.[3] This standard is to be verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of $\mu g/m^3$. The one-hour SO_2 NAAQS of 75 ppb equals 196.2 $\mu g/m^3$, and this is the value I used for determining whether modeled Colstrip impacts exceed the NAAQS.[4] The 99th-percentile of the annual distribution of daily maximum one-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

The one-hour NO_2 NAAQS takes the form of a three-year average of the 98th-percentile of the annual distribution of daily maximum one-hour concentrations, which cannot exceed 100 ppb.[5] The one-hour NO_2 NAAQS of 100 ppb equals 188 $\mu g/m^3$.[6] The 98th-percentile of the annual distribution of daily maximum one-hour concentrations corresponds to the eighth-highest value at each receptor for a given year.

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[1] PPL Montana, Public Meeting Handout, November 2011.
[2] USEPA, Clean Air Markets – Data and Maps, which can be accessed at: http://ampd.epa.gov/ampd.
[3] USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO_2 National Ambient Air Quality Standard, August 23, 2010.
[4] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 12060, subroutine Modules. The conversion calculation is 75/0.3823 = 196.2 $\mu g/m^3$.
[5] USEPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, March 1, 2011.
[6] The ppb to $\mu g/m^3$ conversion is found in the source code to AERMOD v. 12060, subroutine Modules. The conversion calculation is 100/0.5319 = 188.0 $\mu g/m^3$.

I modeled three scenarios for both SO_2 and NO_x emissions: allowable (or permitted emissions), 2011 reported maximum actual emissions, and Federal Implementation Plan (FIP) best available retrofit technology (BART) emission limits on units 1 and 2. Existing Colstrip SO_2 emissions cause modeled one-hour SO_2 NAAQS violations. Based on either permitted (allowable) SO_2 emissions, or measured 2011 maximum SO_2 emissions, air dispersion modeling shows that the Colstrip facility violates the one-hour SO_2 NAAQS in Montana. FIP BART SO_2 emissions did not show a modeled violation of the one-hour SO_2 NAAQS.

Also, existing Colstrip NO_x emissions and FIP BART NO_x emissions cause modeled Tier 1 one-hour NO_2 NAAQS violations. Tier 1 is a method for modeling NO_2 air impacts that assumes full conversion of stack NO emissions to NO_2.[7] Colstrip 2011 maximum actual NO_x emissions do not show a modeled violation of the one-hour NO_2 NAAQS.

It should be noted that the FIP BART SO_2 and NO_x emission limits are proposed values. It should also be noted that these limits are based on 30-day averages. Since the SO_2 and NO_2 NAAQS are one-hour average concentrations, the 30-day average emission limits will not ensure that the standards are protected. Modeling results are described in more detail in Section 5 of this report.

I specialize in atmospheric dispersion modeling, which uses regulatory-approved computer programs to estimate chemical concentrations in the air and deposition fluxes to the ground. In the past 30 years I have prepared over 1,000 air dispersion modeling analyses. I hold B.S. (1978) and M.S. (1980) degrees in Atmospheric Science from the University of California at Davis. A copy of my curriculum vitae is included in Attachment 1.

2. Modeling Methodology

This section describes the dispersion model, control options, and output options I used for verifying Colstrip's compliance with the one-hour SO_2 and NO_2 NAAQS.

2.1 Air Dispersion Model

I performed one-hour SO_2 and NO_2 NAAQS modeling with USEPA's AERMOD program, version 12060, obtained from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website. AERMOD is the USEPA preferred air dispersion model for determining air impacts within 50

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[7] USEPA, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, March 1, 2011, p. 5.

kilometers of air pollution emission sources.[8] Version 12060 is the latest version of the AERMOD model, which was completed on February 29, 2012 (Julian day 60 of 2012).

2.2 AERMOD Input Control Options

I ran AERMOD model with the following control options:

- One-hour average air concentrations
- Regulatory defaults
- Flagpole receptors
- Rural dispersion coefficients

To correspond to a representative inhalation level, I used a flagpole height of 1.5 meters for all modeled receptors. I added this parameter to the receptor file when running AERMAP, as described in Section 3.4.

I determined that Colstrip should be modeled with the default AERMOD rural dispersion control option. I reached this finding using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.[9]

2.3 Output Options

My AERMOD modeling analyses of the Colstrip facility includes five years of meteorological data – years 2007 through 2011. Consistent with USEPA's Modeling Guidance for SO_2 NAAQS Designations, I used the MXDYBYYR (maximum day by year) output options to create a table of fourth-high one-hour SO_2 impacts for each year of meteorological data modeled.[10] I used the same approach for modeling NO_2 impacts, while creating a table of eighth-high one-hour NO_2 impacts for each year of meteorological data modeled. This provides five separate files of one-hour concentrations for each pollutant. I then averaged the one-hour SO_2 and NO_2 values for each receptor across the five years of modeled data to calculate concentrations in the form of the one-hour SO_2 and NO_2 NAAQS. These output files also provide the data necessary for preparing air concentration isopleths.

[8] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[9] Id., Section 7.2.3.
[10] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

3. Model inputs

The AERMOD air dispersion model requires a lengthy list of input values. Key inputs to this dispersion model include local geography, air emission rates of the released pollutant, source parameters (how and where the material is released to the air), receptors (locations where the offsite concentrations and deposition are calculated), and meteorological data (determines how and where the material is dispersed in the air). Each of these inputs is discussed below.

3.1 Geographical Inputs

The "ground floor" of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

I used the Universal Transverse Mercator (UTM) NAD83 zone 13 coordinate system for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. I obtained the source locations from FIP CALPUFF modeling files developed by USEPA.[11] I verified the source coordinates using Google Earth Pro orthoimagery, which ensures consistency with the UTM NAD83 coordinate system.

As mentioned above, I determined that Colstrip's emission sources should be modeled with rural dispersion coefficients. I studied the geographical setting in a three-kilometer radius circle surrounding the Colstrip facility location, examining both land use and population density characteristics. If less than 50% of the surrounding area is urban and developed, then a rural classification is supported. Also, the default rural option may apply if the population density in the three-kilometer radius surrounding each facility is less than 750 people per square kilometer. Since both of these conditions apply to the Colstrip facility, I modeled the stack emissions with AERMOD's default rural dispersion coefficients.[12]

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[11] USEPA, Modeling Report: Montana Regional Haze Federal Implementation Plan (FIP) Support, March 12, 2012.
[12] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

3.2 Emission Rates and Source Parameters

My modeling analyses are limited to SO_2 and NO_x emissions from the coal-fired boiler stacks at the Colstrip facility, as described in the Introduction.[13] I modeled three emission scenarios for the Colstrip facility. I first modeled permitted, also called allowable, SO_2 and NO_x emissions from Colstrip's coal-fired boiler. Allowable emissions based on permitted heat inputs and emission factors in lb per MMBTU are one basis for verifying compliance with the one-hour NAAQS. [14]

The allowable emissions I modeled are as follows:

Units 1 & 2:
SO_2: 3419.5 MMBTU/hr * 1.2 lb/MMBTU = 4103.4 lb/hr each
NO_x: 3419.5 MMBTU/hr * 0.7 lb/MMBTU = 2393.7 lb/hr each[15]

Units 3 & 4:
SO_2: 2070 lb/hr each
NO_x: 5301 lb/hr each[16]

I also modeled actual maximum hourly SO_2 and NO_x emissions obtained from USEPA's Clean Air Markets Data and Maps database (CAMD).[17] We downloaded 2011 CAMD hourly data for all facilities in the State of Montana, and then extracted the necessary information for Colstrip's emission units that are the subject of this report. The CAMD includes hour-by-hour reported SO_2 and NO_x emissions from Colstrip's coal-fired combustion units 1-4.

Using the 2011 CAMD data, I extracted maximum hourly simultaneous emissions from all four of the coal-fired boiler units at the Colstrip facility. In essence, I summed the reported emissions for units 1 through 4 for each hour and then used the highest hourly combined emissions from all units. Other hours reported higher emissions for each separate unit (the maximum for a given unit does not occur at the same time as the other facility units), but the emission values I used represent the maximum simultaneous hourly emissions at this facility for calendar year 2011. The 2011 CAMD emissions I modeled are as follows:

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[13] There are other SO_2 and NO_x emission sources near Colstrip's facility that would tend to add to model impacts.
[14] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 9-11.
[15] MDEQ, Draft Title V Operating Permit #OP0513-07, May 17, 2011, Conditions C.8 and C.11.
[16] MDEQ, Letter to PPL Montana, November 17, 2006; MDEQ, Draft Title V Operating Permit #OP0513-07, May 17, 2011, Condition B.3.
[17] USEPA, Clean Air Markets – Data and Maps, which can be accessed at: http://camddataandmaps.epa.gov/gdm.

Unit 1: 2361.9 lb/hr SO_2 and 1585.2 lb/hr NO_x
Unit 2: 1482.9 lb/hr SO_2 and 2146.5 lb/hr NO_x
Unit 3: 1423.6 lb/hr SO_2 and 1384.2 lb/hr NO_x
Unit 4: 1718.6 lb/hr SO_2 and 1414.3 lb/hr NO_x

I also modeled BART SO_2 and NO_x emissions for units 1 and 2, based on USEPA's FIP modeling of Colstrip. The FIP emissions I modeled are as follows:

Units 1 & 2:
SO_2: 3419.5 MMBTU/hr * 0.08 lb/MMBTU = 273.6 lb/hr each
NO_x: 3419.5 MMBTU/hr * 0.15 lb/MMBTU = 512.9 lb/hr each[18]

Units 3 & 4:
SO_2: 2070 lb/hr each
NO_x: 5301 lb/hr each[19]

Coal-fired boiler stacks are treated as point sources in AERMOD. Point sources are modeled with the following stack parameters:

- Source Location X (Easting) coordinate (UTM NAD83);
- Source Location Y (Northing) coordinate (UTM NAD83);
- Source base elevation (meters above sea level);
- Stack emission rate (g/s);
- Stack height (meters);
- Stack gas exit temperature (Kelvin);
- Stack gas exit velocity (meters/second);
- Stack diameter (meters).[20]

I obtained stack release parameters from USEPA's FIP modeling files. I modeled the following allowable emissions and stack parameters for Colstrip's coal-fired boiler stacks:

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[18] USEPA, Modeling Report: Montana Regional Haze Federal Implementation Plan (FIP) Support, March 12, 2012, Appendix D.
[19] MDEQ, Letter to PPL Montana, November 17, 2006; MDEQ, Draft Title V Operating Permit #OP0513-07, May 17, 2011, Condition B.3.
[20] USEPA, User's Guide for the AMS/EPA Regulatory Model – AERMOD, EPA-454/B-03-101, September 2004 (with revisions), pp. 3-16 – 3-18.

Unit	XUTM (meters)	YUTM (meters)	Base Elevation (meters)	SO_2 Emission Rate (g/s)	NO_x Emission Rate (g/s)	Release Ht. (meters)	Stack Temp. (K)	Stack Exit Vel. (m/s)	Stack Diam. (m)
1	374717.0	5082325.0	989.0	517.0	301.6	152.4	366.3	29.7	5.0
2	374779.0	5082322.0	989.0	517.0	301.6	152.4	367.3	28.4	5.0
3	374877.0	5082224.0	992.0	260.8	667.9	210.9	361.3	26.9	7.3
4	374974.0	5082214.0	994.0	260.8	667.9	210.9	362.7	27.6	7.3

For the reported 2011 maximum CAMD emissions scenario, I modeled the following source inputs:

Unit	XUTM (meters)	YUTM (meters)	Base Elevation (meters)	SO_2 Emission Rate (g/s)	NO_x Emission Rate (g/s)	Release Ht. (meters)	Stack Temp. (K)	Stack Exit Vel. (m/s)	Stack Diam. (m)
1	374717.0	5082325.0	989.0	297.6	199.7	152.4	366.3	29.7	5.0
2	374779.0	5082322.0	989.0	186.8	270.5	152.4	367.3	28.4	5.0
3	374877.0	5082224.0	992.0	179.4	170.4	210.9	361.3	26.9	7.3
4	374974.0	5082214.0	994.0	216.5	178.2	210.9	362.7	27.6	7.3

And for the FIP emissions scenario, I modeled the following source inputs:

Unit	XUTM (meters)	YUTM (meters)	Base Elevation (meters)	SO_2 Emission Rate (g/s)	NO_x Emission Rate (g/s)	Release Ht. (meters)	Stack Temp. (K)	Stack Exit Vel. (m/s)	Stack Diam. (m)
1	374717.0	5082325.0	989.0	34.5	64.6	152.4	366.3	29.7	5.0
2	374779.0	5082322.0	989.0	34.5	64.6	152.4	367.3	28.4	5.0
3	374877.0	5082224.0	992.0	260.8	667.9	210.9	361.3	26.9	7.3
4	374974.0	5082214.0	994.0	260.8	667.9	210.9	362.7	27.6	7.3

I did not attempt to refine stack gas exit velocity and temperature for the reported 2011 CAMD maximum emissions or the FIP BART modeling scenarios. I recognize that these parameters can vary with load conditions and that this assumption will likely understate modeled air quality impacts. This is because stack gas temperatures and exit velocities for the FIP and 2011 CAMD emissions are not likely to be as high as the values modeled for the allowable emissions scenario.

3.3 Building Dimensions for Downwash

Adjacent buildings and other structures may cause plume downwash, a condition where plumes can be dispersed towards the ground in the downwind wake-effect from these buildings. USEPA's Building Profile Input Program (BPIPPRM v. 04274 with Plume Rise Model Enhancement (PRIME)) is used to determine stack-specific good engineering practice (GEP) values and wind direction-specific building downwash parameters for each 10-degree azimuth.[21]

USEPA's FIP CALPUFF modeling files for the Colstrip facility did not include building downwash input parameters. I developed a simple BPIPPRM sensitivity analysis based on building heights and dimensions obtained from oblique imagery and Google Earth Pro. This analysis showed that modeling Colstrip emissions with or without the simple downwash inputs resulted in the same modeled concentrations. Based on this rough study, I modeled the Colstrip facility without any building downwash inputs. Future modeling of the Colstrip Power Plant, however, should be based on specific BPIPPRM inputs developed from plot plans and engineering drawings of the facility.

3.4 Receptors

I created receptors in 100 meter increments in a 10 km by 10 km Cartesian grid centered on the stack location for the Colstrip facility. Outside this grid, I generated receptors in 500 meter increments in a 20 km by 20 km area centered on the stack location for Colstrip. The 500 meter grid of receptors encompasses the nested 100 meter receptors, so any duplicate receptors with the exact same location were extracted from the data set. And outside the grid of 500 meter receptors, I created receptors in 1,000 meter increments in a 70 km by 70 km area. The 1,000 meter grid of receptors encompasses the nested 100 and 500 meter receptors, so any duplicate receptors with the exact same location were extracted from the data set. As discussed earlier, I used a flagpole height of 1.5 meters for all modeled ground-level receptors.

Modeled source and receptor locations require terrain elevation data, in meters above sea level. I obtained terrain elevation data for these locations using National Elevation Dataset (NED) GeoTiff data for the area encompassing the Colstrip facility and the modeled receptors. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. For the 100 meter and 500 meter receptors, I extracted terrain elevations from the NED files using USEPA's AERMAP program, v. 11103, with 1/3rd arc-second (10 meter horizontal) resolution. I used 1 arc-second (30 meter horizontal resolution) NED files for extracting terrain elevations for the 1,000 meter receptor grid.

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[21] USEPA, User's Guide to the Building Profile Input Program, EPA-454/R-93-038, April 21, 2004.

3.5 Meteorological Data

USEPA's definition of preferred meteorological data includes the most recent five years of National Weather Service (NWS) data. Currently, this condition is satisfied using 2007 through 2011 Automated Surface Observing Station (ASOS) data collected at the most site-appropriate airport. From Section 8.3.1.2 of the Guideline on Air Quality Models:

> a. Five years of representative meteorological data should be used when estimating concentrations with an air quality model. Consecutive years from the most recent, readily available 5-year period are preferred. The meteorological data should be *adequately representative*, and may be site specific or from a nearby NWS station. Where professional judgment indicates NWS-collected ASOS (automated surface observing stations) data are inadequate [for cloud cover observations], the most recent 5 years of NWS data that are observer-based may be considered for use.
>
> The use of 5 years of NWS meteorological data or at least l year of site specific data is required. If one year or more (including partial years), up to five years, of site specific data is available, these data are preferred for use in air quality analyses. Such data should have been subjected to quality assurance procedures as described in subsection 8.3.3.2. (Italics in original.)[22]

More importantly, pre-2006 meteorological data are usually based on airport wind measurements that include an over-stated number of calm conditions. In their modeling guidance for SO_2 NAAQS designations, USEPA addresses the concern of calm hours in verifying compliance with the one-hour SO_2 NAAQS:

> In AERMOD, concentrations are not calculated for variable wind (i.e., missing wind direction) and calm conditions, resulting in zero concentrations for those hours. Since the SO_2 NAAQS is a one hour standard, these light wind conditions may be the controlling meteorological circumstances in some cases because of the limited dilution that occurs under low wind speeds which can lead to higher concentrations. The exclusion of a greater number of instances of near-calm conditions from the modeled concentration distribution may therefore lead to underestimation of daily maximum 1-hour concentrations for calculation of the design value.[23]

To address USEPA's concerns regarding calm winds, I developed 2007 through 2011 meteorological data that incorporate methods to reduce calm and missing hours (e.g. use one-minute

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[22] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.
[23] USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

data and USEPA's AERMINUTE program).[24] The meteorological data required by AERMOD is prepared by AERMET. Required data inputs to AERMET are: surface meteorological data, twice-daily soundings of upper air data, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. AERMET creates the model-ready surface and profile data files required by AERMOD.

This section discusses how I prepared meteorological data to be used in my Colstrip one-hour SO_2 and NO_2 NAAQS modeling analyses. Using AERMET v. 11059, I created an AERMOD-ready meteorological data set to model the Colstrip facility. This data set covered five years, 2007 through 2011, and is summarized as follows:

Meteorological data used for modeling the Colstrip facility:
Surface data: Miles City Municipal Airport (KMLS);
Upper air data: Glasgow International Airport (KGGW).

3.5.1 Surface Meteorology

I used 2007 through 2011 Integrated Surface Hourly (ISH) data obtained from the National Climatic Data Center (NCDC). From the ISH dataset, I extracted ASOS data from the Miles City, MT Municipal Airport. Based on distance and site characteristics, I determined that this airport is the most site-appropriate for modeling the Colstrip facility.

I also obtained 2007 through 2011 one-minute ASOS wind data from the Miles City Airport, which I processed with AERMINUTE v. 11325. I downloaded these one-minute data from the NCDC.[25] I input the ice-free wind instrument start date (October 17, 2005) and used default settings with AERMINUTE. As a quality assurance measure, I compared values developed from the one-minute data with the corresponding ISH data file.

I processed the ISH data through AERMET Stage 1, which performs data extraction and quality control checks. I merged the AERMINUTE output files with the processed AERMET Stage 1 ISH and upper air data in AERMET stage 2.

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[24] USEPA, AERMINUTE User's Instructions, v. 11325, p. 1.
[25] See: ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/

3.5.2 Upper Air Data

I used 2007 through 2011 upper air data from twice-daily radiosonde measurements obtained from Glasgow, MT International Airport. These data are in Forecast Systems Laboratory (FSL) format which I downloaded in ASCII text format from NOAA's FSL website.[26] I downloaded and processed all reporting levels with AERMET.

Upper-air data are collected by a "weather balloon" that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawindsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. I processed the FSL upper air data through AERMET Stage 1, which performs data extraction and quality control checks.

3.5.3 AERSURFACE

AERSURFACE is USEPA's program for extracting surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location.[27] AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 NLCD to extract the necessary micrometeorological data. I used these 1992 LULC data for processing meteorological data sets which then serve as input to AERMOD.

I used AERSURFACE v. 08009 to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site (Miles City Airport). Using AERSURFACE, I extracted surface roughness in a one kilometer radius surrounding the data collection site. I also extracted Bowen ratio and albedo for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. I processed these micrometeorological data for seasonal periods using 30-degree sectors.

I developed variable Bowen ratios, based on precipitation for each season and each year (2007 through 2011). I determined the seasonal moisture conditions (wet, average, dry) using 1981

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[26] Available at: http://esrl.noaa.gov/raobs/

[27] Albedo is the fraction of total incident solar radiation reflected by the surface back to space (whiter surfaces have higher albedo). The Bowen ratio is an indicator of surface moisture. It is the ratio of sensible heat flux to latent heat flux and drier areas have a higher Bowen ratio. Surface roughness, shown in shorthand as ("z_0"), is an essential parameter in estimating turbulence and diffusion. Technically, it's the height above the ground that the log wind law extrapolates to zero. For our purposes, z_0 can be thought of as a measure of how much the surface characteristics interfere with the wind flow. Very smooth surfaces, like short grass or calm ponds, have very low values of z_0 -- on the order of 0.01 meter or less. Tall and irregular surfaces, which are a greater obstacle to wind flow, have higher values of z_0 – up to 1.0 meter or more for forests.

through 2010 climatic mean monthly rainfall data for the Miles City Airport.[28] For each season of each year, I compared the seasonal total rainfall to climatic means for that season. Seasonal rainfall less than 75% of climatic means was assessed as dry. I assessed seasonal rainfall greater than 125% of climatic means as wet.[29] Tables of the precipitation conditions for determining seasonal Bowen ratios from Miles City Airport are included in Attachment 2.

3.5.4 Data Review

I did not fill missing hours in the meteorological data sets as the data files easily exceed USEPA's 90% data completeness requirement.[30] Annual wind roses of the AERMOD-ready meteorological data sets I created, individually by year for 2007 through 2011 for Miles City /Glasgow, are included in Attachment 3.

The representativeness of airport meteorological data is a potential concern in modeling industrial source sites.[31] The meteorological data sources I used are the most site-appropriate available for modeling the Colstrip facility. In addition, I modeled the Colstrip facility with AERMOD's default rural dispersion option. Given these considerations, I believe that the meteorological data I used (developed with one-minute winds) represent the best data available for modeling Colstrip's SO_2 and NO_x emissions.

4. Background Air Concentrations

I did not add background air concentrations to the modeled Colstrip results. Therefore, the modeling results do not include impacts from other nearby SO_2 and NO_2 NAAQS-consuming sources, nor do they include regional background levels. And since the Colstrip Power Plant is a mine-mouth facility, there may be substantial NO_x emissions associated with blasting and other coal-removing activities.[32] Accordingly, these modeled impacts are likely under-estimating actual total air concentrations. Moreover, the modeled impacts presented below are caused solely by Colstrip's SO_2 and NO_x emissions. Any further modeling analyses should include background season-by-hour SO_2 and NO_2 concentrations.

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[28] See http://www.ncdc.noaa.gov/oa/climate/normals/usnormals.html
[29] USEPA, Non-Hg Case Study Chronic Inhalation Risk Assessment for the Utility MACT Appropriate and Necessary Analysis, March 16, 2011, p. 11.
[30] USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 – 5-5.
[31] USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.
[32] US Department of Interior, Bureau of Land Management, Final Environmental Impact Statement for the South Gillette Area Coal Lease Applications, August 2009, Section 3.4.

5. Modeling Results

As discussed above, I modeled three scenarios for both SO_2 and NO_x emissions: allowable (or permitted emissions), 2011 reported maximum actual emissions, and the FIP BART emission limits on units 1 and 2. The Colstrip modeled impacts are discussed below.

5.1 SO_2 Modeling Results

The 99th percentile modeled one-hour SO_2 ambient air impacts from Colstrip's allowable emissions, 2011 reported maximum actual emissions, and the FIP BART emission limits are presented in the table below. Concentrations are for surface-based receptors with a flagpole height of 1.5 meters, and are in the form of the NAAQS.

For this analysis, the one-hour SO_2 ambient air impacts (Facility H4H – highest fourth high value) are based on the 99th percentile of the annual distribution of daily maximum one-hour concentrations averaged across the five years of modeled meteorological data. The peak modeled one-hour SO_2 ambient air impacts, using 2007 through 2011 KMLS/KGGW meteorological data, steady state stack exit velocities and temperatures associated with allowable emissions, and no background SO_2 concentrations, are as follows:

Sulfur dioxide (SO_2)	KMLS 2007-2011 met, AERMINUTE		
Scenario	Facility H4H Conc. ($\mu g/m^3$)	XUTM (m)	YUTM (m)
Allowable Emissions	400.2	374700	5084900
2011 CAMD Max Emissions	207.5	374800	5084900
FIP BART Emissions	111.0	375000	5085600
No background concentrations were added to modeling results			

The modeled impacts can also be shown graphically. Figures 2 and 3 are maps showing isopleths (lines of equal air concentration) overlaid onto Bing basemaps included with ArcMap v. 10. We created the isopleths using AERMOD output plotfiles and Golden Software's Surfer, v. 10. We used kriging algorithms to grid the data for the isopleths.

Figure 2 shows modeled one-hour SO_2 concentrations from allowable Colstrip emissions, without background values. This map shows two SO_2 concentration levels: 196 and 300 $\mu g/m^3$. The regions within each isopleth have air concentrations that exceed the levels found on each isopleth. The areas encompassed by the 196 μg/m^3 isopleth exceed the one-hour SO_2 NAAQS and could result in a designation of nonattainment for that region.

Figure 3 shows modeled one-hour SO_2 concentrations caused by Colstrip's 2011 reported maximum CAMD emissions, without background concentrations. This map shows the modeled 196 μg/m^3 SO_2 concentration level. The areas encompassed by this isopleth exceed the 196 μg/m^3 one-hour SO_2 NAAQS and could also result in a designation of nonattainment for that region.

There were no modeled violations of the one-hour SO_2 NAAQS using FIP BART emissions for units 1 and 2. It should be noted that the modeling for this scenario is based on proposed 30-day averaged SO_2 emission limits for units 1 and 2, which will be much lower than peak hourly emission conditions. Based on my experience, the 30-day average measured SO_2 emissions from coal-fired boilers can be substantially less than the peak hourly emissions. For example, I examined Colstrip's hourly SO_2 emissions from the first 30 days of 2011. For this period, the reported hourly SO_2 emissions from Colstrip units 1 through 4 shows that the 30-day average is from 2.06 to 2.80 times lower than the peak hourly value (see the following table).

SO_2 (lb/hr)	Unit 1	Unit 2	Unit 3	Unit 4
30-day average emissions	1208.6	1058.5	540.6	645.7
Peak hourly emissions	2638.4	2177.3	1512.6	1718.6
Ratio peak hourly to 30-day average	2.18	2.06	2.80	2.66

Any additional SO_2 modeling for the Colstrip facility should be based on peak hourly SO_2 emissions. Accordingly, any SO_2 emission limits imposed on Colstrip should also be consistent with a one-hour averaging period, not 30-days.

5.2 NO_2 Modeling Results

The 98th percentile modeled one-hour NO_2 ambient air impacts from Colstrip's allowable NO_x emissions, 2011 reported maximum actual emissions, and the FIP BART emission limits are presented in the table below. Concentrations are for surface-based receptors with a flagpole height of 1.5 meters, and are in the form of the NAAQS.

For this analysis, the one-hour NO_2 ambient air impacts (Facility H8H – highest eighth high value) are based on the 98th percentile of the annual distribution of daily maximum one-hour concentrations averaged across the five years of modeled meteorological data. The peak modeled Tier 1 one-hour NO_2 ambient air impacts, using 2007 through 2011 KMLS/KGGW meteorological data, steady state stack exit velocities and temperatures associated with allowable emissions, and no background NO_2 concentrations, are as follows:

Tier 1 Nitrogen dioxide (NO_2)	KMLS 2007-2011 met, AERMINUTE		
Scenario	Facility H8H Conc. ($\mu g/m^3$)	XUTM (m)	YUTM (m)
Allowable Emissions	319.5	374800	5085600
2011 CAMD Max Emissions	158.6	374800	5085100
FIP BART Emissions	215.1	374800	5086100
No background concentrations were added to modeling results			

Figure 4 shows modeled Tier 1 one-hour NO_2 concentrations from allowable Colstrip emissions, without background values. This map shows two SO_2 concentration levels: 188 and 300 $\mu g/m^3$. The regions within each isopleth have air concentrations that exceed the levels found on each isopleth. The areas encompassed by the 188 $\mu g/m^3$ isopleth exceed the one-hour NO_2 NAAQS and could result in a designation of nonattainment for that region.

Figure 5 shows modeled Tier 1 one-hour NO_2 concentrations caused by Colstrip's FIP BART emissions, without background concentrations. This map shows the modeled 188 $\mu g/m^3$ NO_2 concentration level. The areas encompassed by this isopleth exceed the 188 $\mu g/m^3$ one-hour NO_2 NAAQS and could also result in a designation of nonattainment for that region.

While these are conservative Tier 1 NO_2 modeling results, it should be noted that the modeling for this scenario is based on proposed 30-day averaged NO_x emission limits for units 1 and 2, which will be much lower than peak hourly conditions. I examined Colstrip's hourly NO_x emissions from the first 30 days of 2011. For this period, the reported hourly NO_x emissions from Colstrip units 1 through 4 shows that the 30-day average is from 1.33 to 1.82 times lower than the peak hourly value (see the following table).

NO_x (lb/hr)	Unit 1	Unit 2	Unit 3	Unit 4
30-day average emissions	960.58	852.41	1106.59	1145.13
Peak hourly emissions	1496.61	1549.69	1474.58	1984.48
Ratio peak hourly to 30-day average	1.56	1.82	1.33	1.73

Any additional NO_2 modeling for the Colstrip facility should be based on peak hourly NO_x emissions. Accordingly, any NO_x emission limits imposed on Colstrip should also be consistent with a one-hour averaging period, not 30-days.

There were no modeled violations of the one-hour NO_2 NAAQS using 2011 reported CAMD maximum emissions; thus there are no isopleth maps for this scenario. Any additional Colstrip NO_2 modeling for this scenario should include stack exit velocities and temperatures that reflect the actual load conditions, not maximum allowable settings.

Figure 1: Colstrip Power Plant

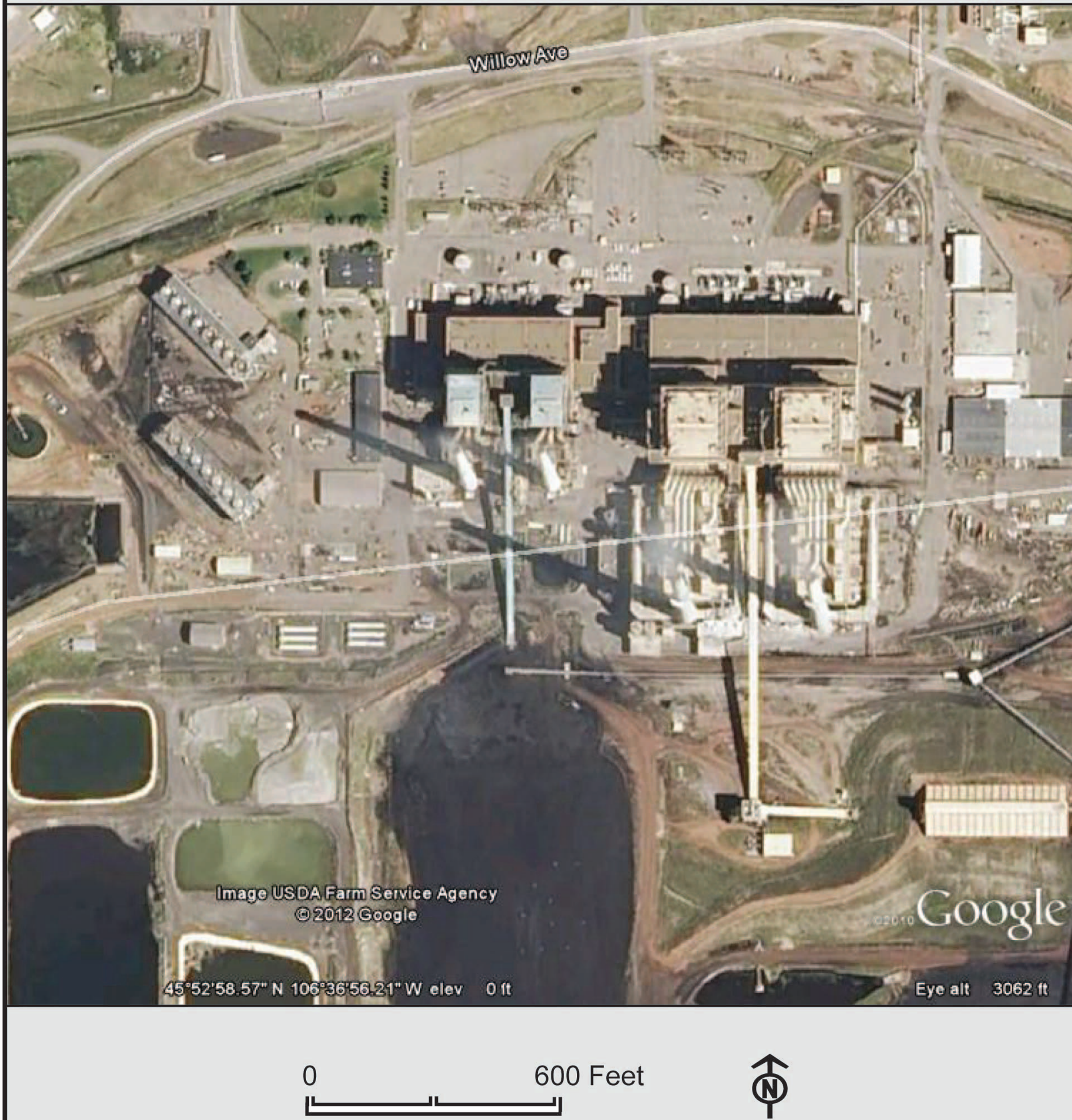
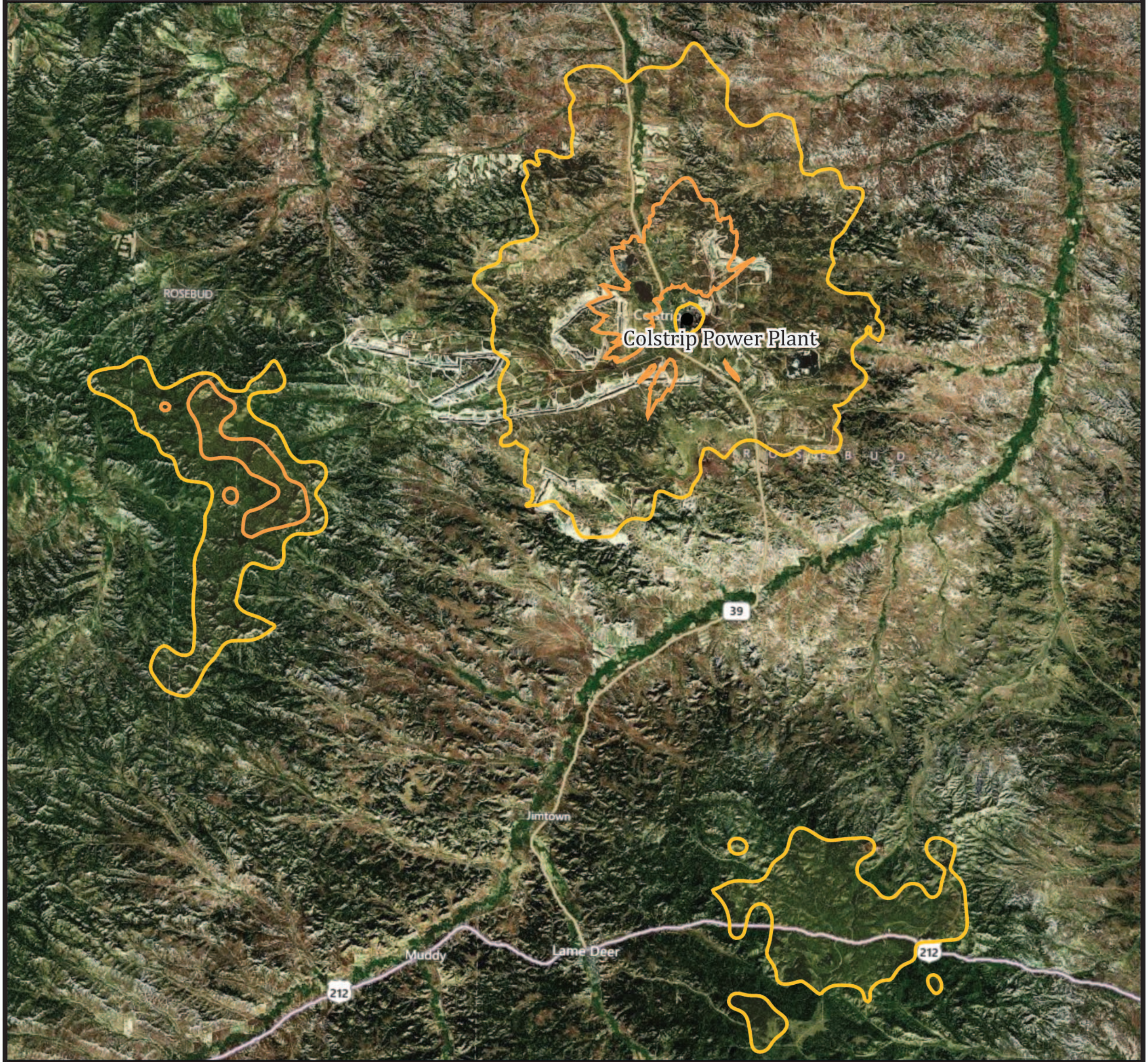


Figure 2: Colstrip Power Plant

One-hour sulfur dioxide concentrations from allowable emissions (without background).



196 μg/m³

300 μg/m³

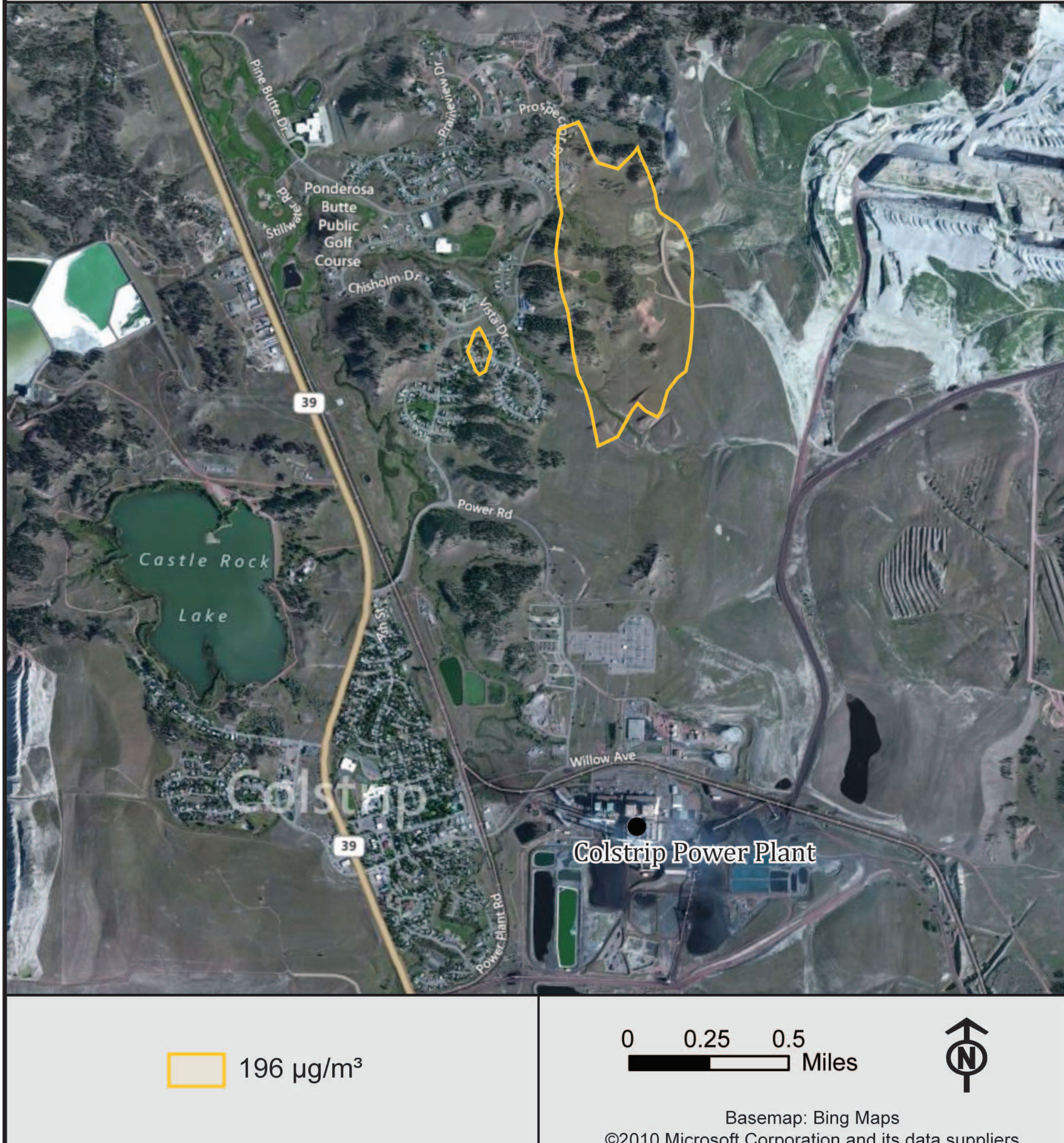
0 3 6 Miles

N

Basemap: Bing Maps

Figure 3: Colstrip Power Plant

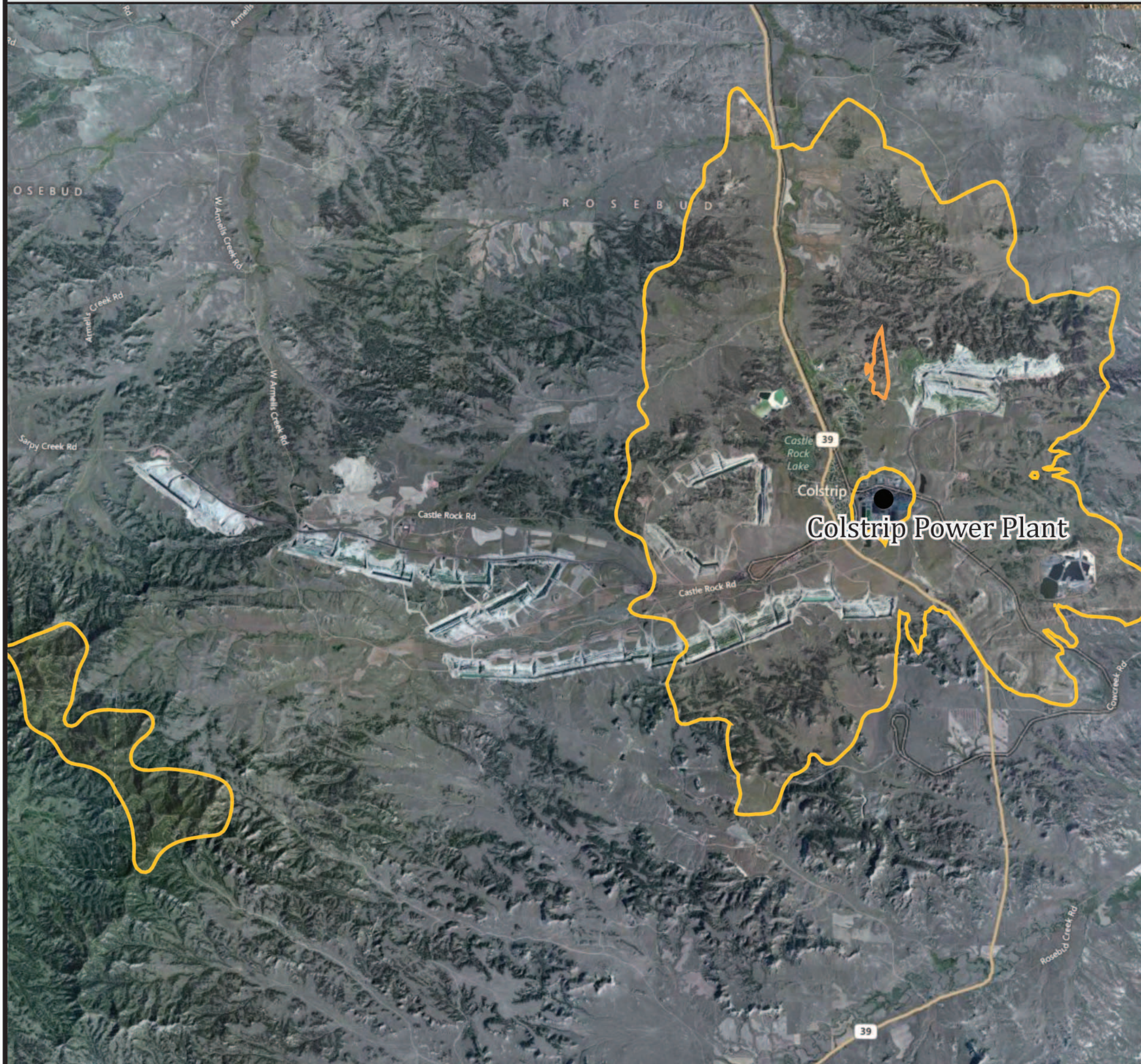
One-hour sulfur dioxide concentrations from 2011 CAMD maximum reported emissions (without background).



Basemap: Bing Maps

Figure 4: Colstrip Power Plant

Tier 1 one-hour nitrogen dioxide concentrations from allowable emissions (without background).



188 µg/m³

300 µg/m³

0 2 4 Miles

N

Basemap: Bing Maps

Figure 5: Colstrip Power Plant

Tier 1 one-hour nitrogen dioxide concentrations from FIP BART emissions (without background).

188 μg/m³

0 0.5 1 Miles

N

Basemap: Bing Maps

July 10, 2013

Ms. Jenny Harbine
Earthjustice
Northern Rockies Office
313 East Main Street
Bozeman, MT 59715
jharbine@earthjustice.org

Via Electronic Mail

RE: Response to Comments, 2013 DEQ Air Monitoring Network Plan

Dear Ms. Harbine:

Thank you for the comments submitted on behalf of the Montana Environmental Information Center (MEIC) regarding the Montana Department of Environmental Quality (DEQ) 2013 Air Monitoring Network Plan (the Plan). In response, the DEQ provides the following:

Comment I. "An Upgrade of the Seeley Lake $PM_{2.5}$ Monitoring Site is necessary."

As described in the Plan and quoted in the comments, DEQ operates a non-Federal Equivalent Method (non-FEM) monitor at Seeley Lake Elementary School to continuously measure concentrations of airborne particulate matter with an aerometric diameter of 2.5 microns or less ($PM_{2.5}$), and to inform the public of those concentrations on a near-real-time basis. The comments state that "due to the high concentration of $PM_{2.5}$ at that station, particularly in the winter months, this monitoring must be upgraded to a Federal Equivalent Method monitor that is certified to produce NAAQS-comparison data, to ensure compliance with the NAAQS and to enable DEQ to determine whether it must take steps to reduce ambient particulate levels to protect the public in the Seeley area from the health impacts of this harmful pollutant." In response, please be aware that a number of factors influence the DEQ in its choice to continue to operate a non-FEM monitor at Seeley Lake, including the following:

1. The instrument's measurement method is identical to that of an FEM instrument. The monitor was manufactured before the official equivalency determination was made, but the data quality is the same as that obtained from a FEM-designated instrument.

2. The location, operation, maintenance and quality control of this instrument meet all federal requirements and are the same as those activities conducted by the DEQ on FEM $PM_{2.5}$ instruments.

3. The monitoring conducted in the past at other locations in the community in correlation with studies conducted by DEQ in Seeley Lake during the winter of 2010 – 2011 indicate a high degree of wintertime variability in $PM_{2.5}$ concentrations between various neighborhoods in Seeley Lake. Consequently, the Seeley Lake Elementary site may frequently measure $PM_{2.5}$ concentrations that are representative of the local neighborhood, but not the entire airshed. The measurements made there are therefore not appropriate for National Ambient Air Quality Standards (NAAQS) determination purposes.

4. The $PM_{2.5}$ monitoring conducted at Seeley Lake is not required by federal rule. It is operated by DEQ and Missoula County in an effort to protect the health of the citizens of Seeley Lake.

5. The Missoula County Health Department is already engaged in a substantial, on-going process to replace aging, inefficient wood-burning devices in Seeley Lake in an effort to reduce respirable concentrations of $PM_{2.5}$ there during the wintertime.

6. The Seeley Lake monitor is planned to be directly linked to a public information sign in the community to provide direct encouragement to residents to curtail wood-combustion during periods of poor air quality.

The Seeley Lake monitor provides dependable, high quality data and contributes significantly to a broad effort to attain clean air goals in the region. Those clean air goals would not be furthered or enhanced by replacing the monitor with a FEM instrument. Therefore, the DEQ plans on continuing operation of the existing non-FEM instrument.

Comment II. "MONITORING FOR SO_2 SHOULD BE REQUIRED IN ROSEBUD COUNTY, WHICH HAS MODELED VIOLATIONS OF THE SO_2 NAAQS."

This comment points out the significance of the SO_2 emissions generated by the Colstrip steam electric generating facility, presents a summary of a modeling analysis that predicts violations of the 2010 SO_2 NAAQS, and calls for the establishment of DEQ ambient SO_2 monitoring in response.

Two major factors define the DEQ's current and future approach to ambient sulfur dioxide (SO_2) monitoring. The first factor is embodied in the current federal rules contained in 40 CFR 58 Appendix D Section 4.4, and described in Section I.D of the Plan. The federal rules focus ambient SO_2 monitoring and the resource demands associated with it on the protection of large populations of people from significant SO_2 emissions based on known data, not modeled predictions. As described in the Plan, there are no areas in Montana that meet the prescribed criteria, and no SO_2 monitoring is required within the state. However, the DEQ continues ambient SO_2 monitoring in the Billings area beyond the federal requirement because of the known combination of a relatively high population, significant sources of SO_2 emissions, historic SO_2 issues in the area, and recent monitored exceedances of the 2010 SO_2 NAAQS.

The second factor will provide increasing direction to the DEQ monitoring program in the next several years. This factor exists in the yet-to-be-finalized federal rules and Technical Assistance Documents regarding the future application of modeling and monitoring to NAAQS compliance determinations in and around significant sulfur-emitting facilities. The DEQ will tailor its SO_2 monitoring and modeling efforts to comply with these national rules and policies as appropriate and as they are finalized and become enforceable. The DEQ recognizes the significant efforts and interest that MEIC has invested in the SO_2 modeling effort around the Colstrip area, and will maintain the comments and modeling report as components of future analyses of SO_2 impacts in Montana. However, DEQ will continue the course described above and in the Plan until changing federal regulations dictate otherwise.

Thank you again for submitting comments on the Plan. Please be aware that the comments and this response letter will become Appendix I of the Plan as DEQ submits it to EPA. Please contact me if you have further questions.

Sincerely,

Hoby Rash
Air Monitoring Supervisor
Email: hrash@mt.gov
406-841-5260

cc: Anne Hedges
Adrienne Maxwell
Derf Johnson