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 eight 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 summary of network-wide monitoring results for calendar year 2013. Appendix E lists the fine particulate matter chemical components for which analysis is performed. Appendix F summarizes the DEQ's efforts to keep its fine particulate monitors comparable to national reference method standards. Appendix G summarizes the current NAAQS and MAAQS. Finally, Appendix H 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 2013. Table 3 summarizes the 8-hour O_3 values measured at monitoring sites operated by the DEQ during all of calendar year 2013.

Table 2 – 8-Hour Rolling Monitored O_3 Values for Ozone Season 2013. Values in ppm.

Station	Minimum	Maximum	Average	NAAQS Design Values[2, 3]	
				2013	2011 - 2013
Birney	0.003	0.068	0.033	0.056	0.055
Broadus	0	0.067	0.033	0.056	0.055
Lewistown[1]	0.008	0.062	0.033	0.054	--
Malta[1]	0.005	0.059	0.029	0.053	--
Missoula	0	0.065	0.03	0.057	0.055
NCore	0	0.094	0.033	0.054	0.054
Sidney	0.005	0.06	0.032	0.056	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 2013. Values in ppm.

Station	Minimum	Maximum	Average
Birney	0.003	0.064	0.035
Broadus	0.005	0.061	0.034
Lewistown	0.012	0.037	0.025
Malta	0.014	0.057	0.034
Missoula	0.002	0.060	0.028
NCore	0.003	0.052	0.032
Sidney	0.014	0.065	0.040

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 2013.

Table 5 – 1-Hour Monitored CO Values for 2013. Values in ppm.

Station	Min	Max	Average
West Yellowstone	0	12.6	0
NCore	0	0.455	0.138

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 2013.

Table 7 – 1-Hour Monitored NO_2 Values for 2013. Values in ppb.

Site	Min	Max	Average	NAAQS Design Values[1] 2013	NAAQS Design Values[1] 2011 - 2013
Birney	0	18	0	6	7
Broadus	0	14	0	10	11
Lewistown	0	26	0	9	--
Malta	0	10	0	6	--
Sidney	0	19	1	13	10
West Yellowstone	0	49	1.0	33	27

[1] 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 2013 SO_2 Emissions (tons per year):	6733
PWEI = (162,848 X 6,286.5) / 1,000,000:	1,097

*US Census Bureau did not have population estimates for any Montana Counties in 2013 at the time this document was prepared.

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 2013.

Table 9 – 1-Hour Monitored SO_2 Values for 2013. Values in ppb.

Site	Min	Max	Average	NAAQS Design Values[1]	
				2013	2011 - 2013
Billings - Coburn Road	0	77.0	3	48	64
NCore - Sieben's Flat	0	3.1	0.2	2	4
Sidney - Oil Field	0	8.0	0	3	4

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 1.67 tons for calendar 2013. This value is elevated slightly from the total of 1.63 tons reported in 2012, but both values exceed the 0.5 tpy monitoring threshold.

As stated in last year's plan 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 10 summarizes the 24-hour values measured at the PM_{10} monitoring sites operated by the DEQ during 2013.

Table 11 – 24-Hour Monitored PM_{10} Values for 2013

Site	Concentration in µg/m³			NAAQS Design Values[2,3]	
	Min	Max	Average	2013	2011 - 2013
Birney[4]	1	67	15	0	0
Broadus[4]	1	93	24	0	0
Butte	5	81	22	0	0
Flathead Valley	1	46	13	0	0
Kalispell	1	87	19	0	0
Lewistown[1]	0	43	7	0	--
Libby	0	76	17	0	0
Malta[1]	0	26	6	0	--
Missoula	1	59	15	0	0
Ncore	1	55	7	0	0
Sidney[4]	2	174	21	0	0
Thompson Falls	3	125	13	0	0
Whitefish	5	82	22	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 Design Values do not include data flagged for exceptional events.
[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 2013.

Table 13 – 24-Hour Monitored $PM_{2.5}$ Values for 2013

Site	Concentration in µg/m³			NAAQS Design Values[2]		
				2013	2011 - 2013	
	Min	Max	Average	98th Pctl.	24 hour	Annual
Billings	0	24.3	3.9	--[3]	--[3]	--[3]
Birney	0	17.1	3.9	10	12	4.8
Bozeman	0.1	24.2	6	--[3]	--[3]	--[3]
Broadus	0	20.8	5	14.3	17	6.1
Butte	1.1	58.2	9.4	34.8	31	8.8
Flathead Valley	1.1	45.2	8.4	28.8	26	8.1
Frenchtown	1.6	33.7	9.7	28.9	24	9.5
Great Falls	0	21.4	6.8	--[3]	--[3]	--[3]
Hamilton	0.7	44.8	9.3	33.6	27	7.2
Helena	0.6	33.3	7.4	21.8	24	7.4
Lewistown[1]	0	15.2	3.6	9.4	10[1]	3.1[1]
Libby	0.2	32.4	10.8	29.6	29	11.1
Malta[1]	0	14.4	3.5	8.5	8[1]	3.4[1]
Missoula	0.5	40.3	8.2	26.6	23	7.6
NCore	0	17.8	4.4	10.5	10	4.1
Seeley	2.8	79.2	16.3	--[3]	--[3]	--[3]
Sidney	0	23.5	7.1	15.9	15	7.2
West Yellowstone	0	15.4	4.3	--[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 $PM_{2.5}$, $PM_{10\text{-}2.5}$, 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, except for time periods where operational problems have occurred, have been operated continuously through the date of this report.

The monitoring directives in 40 CFR Appendix D Section 4.8 contains specific requirements for the operation of monitors for $PM_{10\text{-}2.5}$. 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. Other Monitoring Requirement Issues

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

Simply stated, the Montana DEQ is not proposing any changes to our existing air monitoring network for the coming year.

Although we recognize the need for changes to our network, such as lead monitoring near Colstrip, the situation is unchanged from last year. As we indicated in our 2013 Network plan, diminishing monitoring resources are necessitating 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, we would like to reiterate our belief that some historical PM_{10} monitoring has served its purpose and needs to be discontinued so that the resources associated with those efforts can be redirected to areas and pollutants of a higher priority. In light of this the DEQ is working to develop the documentation required by the EPA to re-designate five areas that are currently classified as nonattainment for $PM_{10,}$ however, we do not anticipate completion of that documentation in the coming year.

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

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*)."

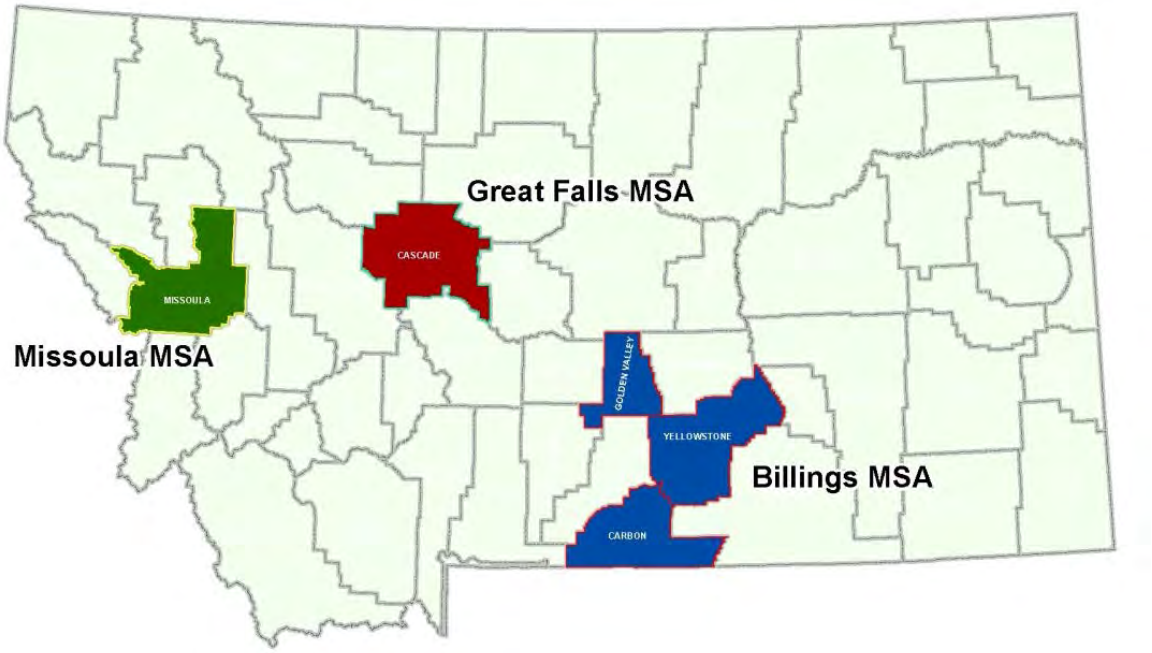
Montana Core Based Statistical Areas as of February, 2013

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

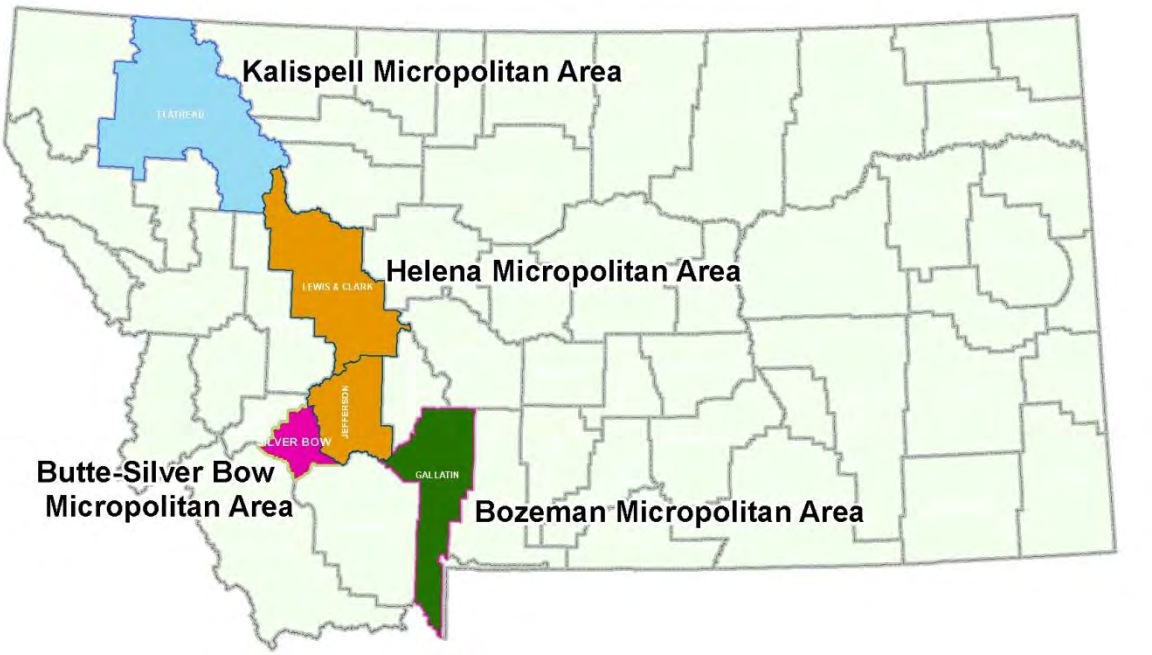
Source: U.S. Census Bureau, Population Division; Office of Management and Budget, February 2013 delineations

Internet Release Date: March 2013 *US Census Bureau does not have any population estimates for any Montana Counties in 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 Code	Method Note[5]	Method PM	Frequency	Type[6]	Spatial Scale	Monitoring Objective[1]	2014 Change
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, Ambient Air Quality Summary, Calendar Year 2013

Site	Parameter	Units	Min	Max	Average	Data Capt. %	# > NAAQS	# > 80% NAAQS	NAAQS
Billings - Coburn Road	SO2	ppb	0	77	3	93	1	2	75
Billings - St. Lukes	PM25	ug/m3	-2.6	24.3	3.9	97	0	0	35
Birney - Tongue River	NO2	ppb	0	18	0	97	0	0	100
Birney - Tongue River	OZONE	ppm	0.003	0.068	0.031	98	0	0	0.12
Birney - Tongue River	PM10 STD	ug/m3	1	67	15	89	0	0	150
Birney - Tongue River	PM25	ug/m3	-1	17.1	3.9	90	0	0	35
Bozeman High School	PM25	ug/m3	0.1	24.2	6	85	0	0	35
Broadus - Powder River	NO2	ppb	0	14	0	89	0	0	100
Broadus - Powder River	OZONE	ppm	0	0.067	0.032	99	0	0	0.12
Broadus - Powder River	PM10 STD	ug/m3	1	93	24	89	0	0	150
Broadus - Powder River	PM25	ug/m3	-1.2	20.8	5	94	0	0	35
Butte - Greeley School	PM10 STD	ug/m3	5	81	22	98	0	0	150
Butte - Greeley School	PM25	ug/m3	1.1	58.2	9.4	98	6	13	35
Flathead Valley	PM10 STD	ug/m3	1	46	13	95	0	0	150
Flathead Valley	PM25	ug/m3	1.1	45.2	8.4	95	4	7	35
Frenchtown - Beckwith	PM25	ug/m3	1.6	33.7	9.7	99	0	9	35
Great Falls - Overlook Park	PM25	ug/m3	-0.7	21.4	6.8	92	0	0	35
Hamilton - PS #46	PM25	ug/m3	0.7	44.8	9.3	93	7	19	35
Helena - Rossiter Pump House	PM25	ug/m3	0.6	33.3	7.4	98	0	3	35
Kalispell - Flathead Electric	PM10 STD	ug/m3	1	87	19	84	0	0	150
Lewistown - Lewistown	NO2	ppb	0	26	0	97	0	0	100
Lewistown - Lewistown	OZONE	ppm	0.008	0.062	0.032	99	0	0	0.12
Lewistown - Lewistown	PM10 STD	ug/m3	0	43	7	98	0	0	150
Lewistown - Lewistown	PM25	ug/m3	0	15.2	3.6	98	0	0	35
Libby - Courthouse Annex	PM10 STD	ug/m3	0	76	17	92	0	0	150
Libby - Courthouse Annex	PM25	ug/m3	0.2	32.4	10.8	99	0	16	35
Malta - Malta	NO2	ppb	0	10	0	90	0	0	100
Malta - Malta	OZONE	ppm	0.005	0.059	0.03	93	0	0	0.12
Malta - Malta	PM10 STD	ug/m3	0	26	6	97	0	0	150
Malta - Malta	PM25	ug/m3	-0.2	14.4	3.5	99	0	0	35
Missoula - Boyd Park	OZONE	ppm	0	0.105	0.024	95	0	1	0.12
Missoula - Boyd Park	PM10 STD	ug/m3	1	59	15	99	0	0	150
Missoula - Boyd Park	PM25	ug/m3	0.5	40.3	8.2	98	4	8	35
Missoula - Boyd Park	PM25 COL	ug/m3	0	44.2	8.6	93	3	9	35
NCore - Sieben's Flat	CO TRACE	ppb	0	455	138	84	0	0	35000
NCore - Sieben's Flat	NOY	ppb	0	11.5	1.3	80			
NCore - Sieben's Flat	OZONE	ppm	0	0.094	0.031	97	0	0	0.12
NCore - Sieben's Flat	PM10 STD	ug/m3	1	55	7	92	0	0	150
NCore - Sieben's Flat	PM25	ug/m3	-0.3	44.8	4.5	91	1	1	35
NCore - Sieben's Flat	PMCOARSE	ug/m3	0	41	2	85			
NCore - Sieben's Flat	SO2	ppb	0	3.1	0.2	92	0	0	75
Seeley - Elementary School	PM25	ug/m3	2.8	79.2	16.3	96	22	43	35
Sidney - Oil Field	NO2	ppb	0	19	1	97	0	0	100
Sidney - Oil Field	OZONE	ppm	0.003	0.064	0.033	98	0	0	0.12
Sidney - Oil Field	PM10 STD	ug/m3	2	174	21	91	2	2	150
Sidney - Oil Field	PM25	ug/m3	0	23.5	7.1	94	0	0	35
Sidney - Oil Field	SO2	ppb	0	8	0	92	0	0	75
Thompson Falls High School	PM10 STD	ug/m3	3	125	13	28	0	1	150
West Yellowstone - Park Ent # 2	CO	ppm	0	12.6	0	87	0	0	35
West Yellowstone - Park Ent # 2	NO2	ppb	0	49	1	95	0	0	100
West Yellowstone - Park Ent # 2	PM25	ug/m3	-0.8	15.4	4.3	97	0	0	35
Whitefish - Dead End	PM10 STD	ug/m3	5	82	22	97	0	0	150

Appendix E, $PM_{2.5}$ 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 F, PM2.5 FRM / FEM Comparisons

$PM_{2.5}$ FRM / FEM Comparison, Helena Rossiter School Site - 2013

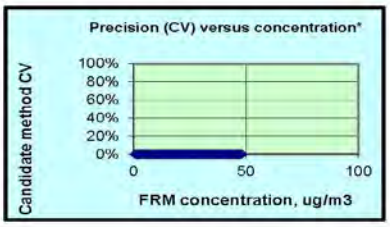
Summary - FRM/FEM Comparability

Brand	Thermo 5014i
method:	183
Test site:	Helena Rossiter Pumphouse - (Site location 30-049-0026)

Data sets	Number
Valid data sets available:	49
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	**Insufficient**
Additional data sets needed:	41

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

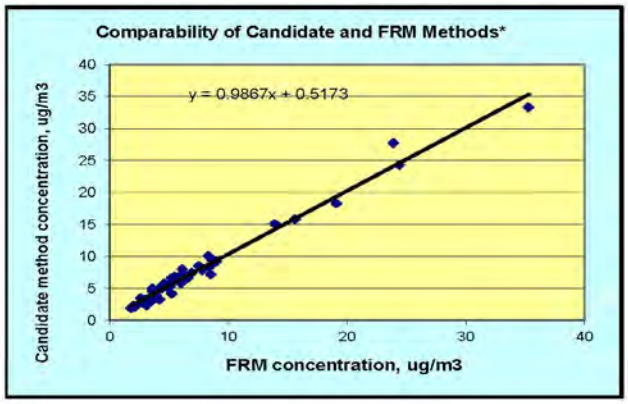
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	7.3	7.7				
Maximum:	35.3	33.3				
Minimum:	1.8	1.9				
Candidate / FRM Ratio:		105.8%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						

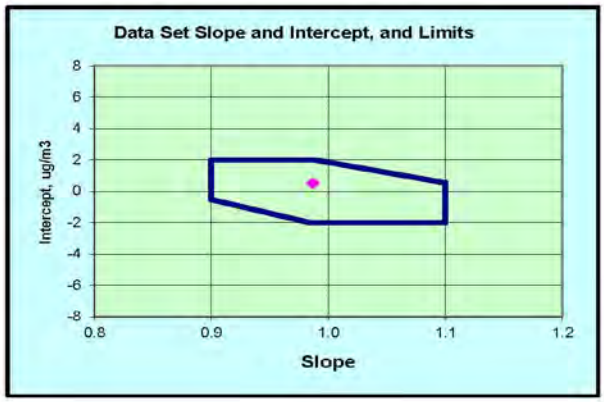


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.987	0.517	0.98976
Limits for	**Upper:**	1.100	2.000	
Class III	**Lower:**	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

[1]Multiplicative bias [2]Additive bias

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





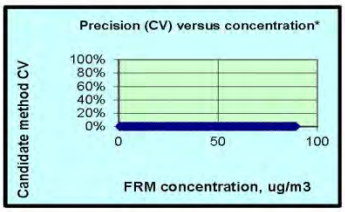
$PM_{2.5}$ FRM / FEM Comparison, NCore Site - 2013

Summary - FRM/FEM Comparability

Brand	MetOne BAM 1020
Method	170
Test site:	Ncore - Sieben' Flats (30-049-0004) - (Site location)

Data sets	Number
Valid data sets available:	45
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	**Insufficient**
Additional data sets needed:	45

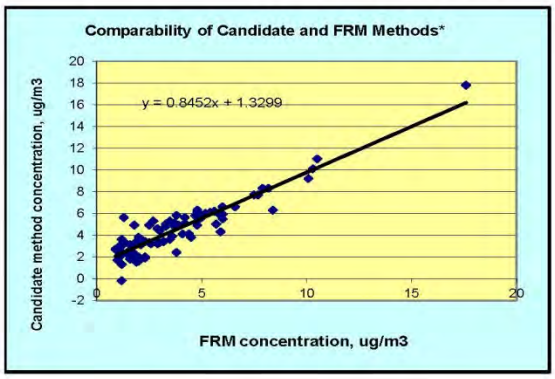
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	3.7	4.5				
Maximum:	17.6	17.8				
Minimum:	0.9	-0.2				
Candidate / FRM Ratio:		120.5%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						



Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.845	1.330	0.92652
Limits for Class III	Upper:	1.100	2.000	
	Lower:	0.900	0.411	0.95000
Test Results (Pass/Fail):		FAIL	PASS	FAIL

[1]Multiplicative bias [2]Additive bias

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



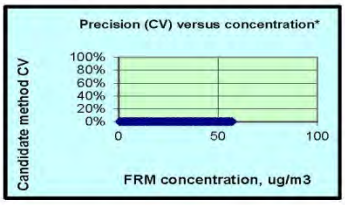
$PM_{2.5}$ FRM / FEM Comparison, Butte Site- 2013

Summary - Candidate ARM Comparability

Brand	MetOne BAM 1020
Method	170
Test site:	Butte Greeley School (30-093-0005) - (Site location)

Data sets	Number
Valid data sets available:	57
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	**Insufficient**
Additional data sets needed:	33

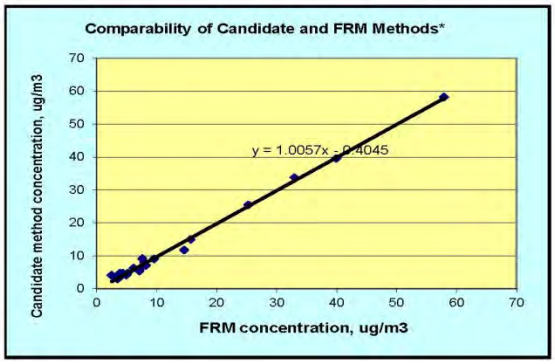
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	**10.3**	**9.9**				
Maximum:	57.9	58.2				
Minimum:	1.6	2.0				
Candidate / FRM Ratio:		96.5%				
RMS Relative Precision for this site:						
Test requirements - Class III:					**10.0%**	**15.0%**
Precision Test Results for site:						

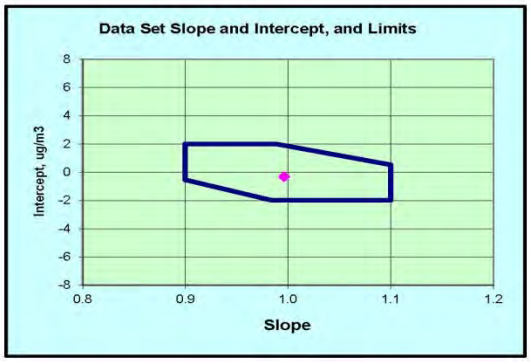


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		**0.997**	**-0.325**	**0.99460**
Limits for Class III	**Upper:**	**1.100**	**1.895**	
	Lower:	**0.900**	**-2.000**	**0.95000**
Test Results (Pass/Fail):		**PASS**	**PASS**	**PASS**

[1]Multiplicative bias [2]Additive bias

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





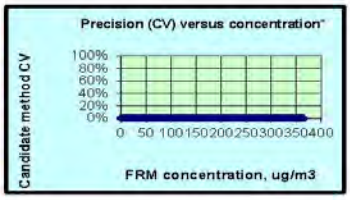
$PM_{2.5}$ FEM / FEM Comparison, Missoula - Boyd Park Site - 2013

Summary - Candidate ARM Comparability

Brand	Co-Located MetOne BAM 1020s
Method:	Both 170
Test site:	Missoula Boyd Park - (Site location 30-063-0024)

Data sets	Number
Valid data sets available:	344 (Including 42 data sets excluded because Actual conc. < 3.)
Number of valid data sets required for ARM Comparison:	90
Number of valid data sets for this test is:	OK
Additional data sets needed:	–

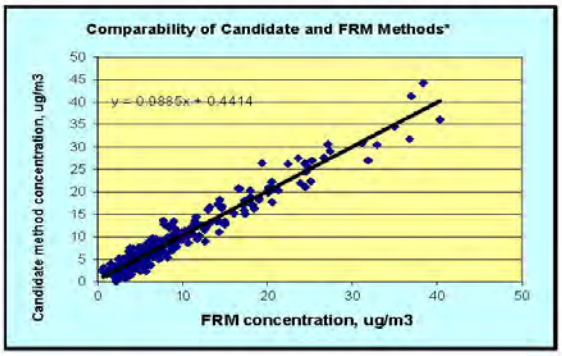
Precision (if data are available)	Data set mean, µg/m³		Data set precision, µg/m³		Relative precision (CV)	
	FRM	Candidate	FRM	Candidate	FRM	Candidate
Mean:	8.3	8.7				
Maximum:	40.3	44.2				
Minimum:	0.6	0.0				
Candidate / FRM Ratio:		104.9%				
RMS Relative Precision for this site:						
Test requirements - Class III:					10.0%	15.0%
Precision Test Results for site:						

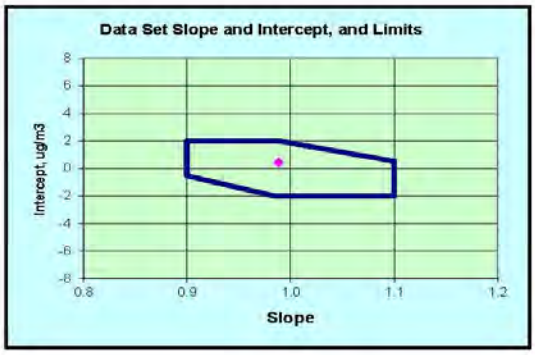


Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:		0.988	0.441	0.97155
Limits for Class III	Upper:	1.100	2.000	
	Lower:	0.900	-2.000	0.95000
Test Results (Pass/Fail):		PASS	PASS	PASS

[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 G, 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 x 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 H, 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 15, 2014. No comments were received.