STATE OF MONTANA

AIR QUALITY MONITORING NETWORK PLAN

May 2018

Montana Department of Environmental Quality
Air Quality Bureau

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Contents

Introduction

This Air Quality Monitoring Network Plan (Plan) is developed and submitted on an annual basis in accordance with the requirements contained in Title 40 of the Code of Federal Regulations (CFR) Part 58.10. The intent of this plan is to accurately describe the monitoring sites in the Montana Department of Environmental Quality's (DEQ) network, identify each site's 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. In turn, providing 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.

The Plan development process establishes the structure for 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.

DEQ monitors air quality principally by measuring concentrations of criteria air pollutants pursuant to the federal Clean Air Act (CAA) 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)
- 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 the environment. Two types of federally-mandated air quality standards may exist. Primary standards set limits to protect public health, including the health of at-risk populations such as people with pre-existing heart or lung disease (e.g. asthmatics), children, and older adults. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings. Montana has adopted similar air quality standards known as the Montana Ambient Air Quality Standards (MAAQS).

This Plan is presented 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 appendices which provide supplemental information and data in support of specific elements outlined within this Plan.

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 United States Environmental Protection Agency (EPA) require each state to establish a network of monitors to measure concentrations of criteria pollutants in 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.

A. Ozone (O3) Monitoring Criteria

The minimum number of ozone monitors required by 40 CFR Part 58, 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 percent (%) of any O3 NAAQS[4]	Most recent 3-year design value concentrations < 85% of any O3 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 to this Plan, 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. 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 indicate 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 monitoring efforts related to the three MSAs, the DEQ has endeavored, in several cases with collaborative funding from the Bureau of Land Management (BLM), to define background levels of O_3 across Montana and to assess impacts from petroleum exploration within the eastern portion of the state. DEQ conducts O_3 monitoring in Broadus (30-075-0001), Birney (30-087-0001), Sidney (30-083-0002; formely 30-83-0001), Malta (30-071-0010), Lewistown (30-027-0006), and at the National Core Monitoring Site (NCore) (30-049-0004). See Appendix A of this Plan for a map displaying the location of these sites. Table 2 summarizes the 8-hour rolling average O_3 values measured at monitoring sites operated by the DEQ during the designated 2017 ozone season (April – September), while Table 3 summarizes the 8-hour O_3 values measured at monitoring sites operated by the DEQ during the entire 2017 calendar year.

Table 2 – 8-Hour Rolling Monitored O_3 Values for Ozone Season 2017

Station	Concentrations (ppm)			NAAQS Design Values (ppm)[1]	
	Minimum	Maximum	Average	2017	2015 - 2017
Birney	0.005	0.063	0.035	0.059	0.057
Broadus	0.003	0.063	0.038	0.061	0.057
Lewistown	0.009	0.069	0.039	0.60	0.057
Malta	0.009	0.056	0.034	0.055	0.056
Missoula	0	0.064	0.030	0.059	0.055
NCore	0.007	0.064	0.039	0.062	0.058
Sidney-OF[2]	--	--	--	0.048	0.054
Sidney-201[2]	0.008	0.061	0.036	0.060	--

[1] Design Values calculated by the USEPA Air Quality System (AQS) database.
[2] The Sidney station was relocated in May of 2017.
-- Insufficient data collected.

Table 3 – 8-Hour Rolling Monitored O_3 2017 Annual Values

Station	Concentrations (ppm)		
	Minimum	Maximum	Average
Birney	0.005	0.063	0.032
Broadus	0.003	0.062	0.034
Lewistown	0.009	0.069	0.038
Malta	0.007	0.059	0.029
Missoula	0	0.064	0.023
NCore	0.007	0.064	0.036
Sidney-OF[2]	0.013	0.053	0.034
Sidney-201[2]	0.008	0.061	0.034

As demonstrated in Tables 2 and 3, little variability has been observed 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 occurrence. 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, 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, with little anthropogenic source input from within Montana.

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, therefore 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. of this Plan). Table 4 summarizes the number of required CO monitoring sites.

Table 4 – Minimum CO Monitoring Requirements[1]

Criteria	Number of Near-Road CO Monitors Required
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 documented in Appendix B to this Plan, no Montana Core Based Statistical Areas (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 ambient air remain extremely low. As a result, 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 trace-level CO monitor at the NCore station north of Helena to track background concentrations of this pollutant over time. Section I.H describes NCore monitoring efforts.

Table 5 summarizes the 1-hour CO values measured at the NCore monitoring site during 2017.

Table 5 – 1-Hour Monitored CO Values for 2017

Station	Concentrations (ppm)		
	Min	Max	Average
NCore	0.0	1.018	0.132

C. Nitrogen Dioxide (NO2) 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[1]

Requirement Type	Criteria[2]	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
Requirement Type	**Criteria[2]**	**Minimum Number of NO_2 Monitors Required**
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).

[1] From Appendix D to 40 CFR Part 58, Sec 4.3.1

[2] CBSA populations based on latest available census figures

As demonstrated 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 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 along with 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; formerly 30-083-0002), Broadus (30-075-0001), and Birney (30-087-0001), as well as Malta (30-071-0010) and Lewistown (30-027-0006) which are operated 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 7 summarizes the 1-hour NO_2 values measured at monitoring sites operated by the DEQ during 2017.

Table 7 – 1-Hour Monitored NO_2 Values for 2017

Site	Concentrations (ppb)			NAAQS Design Values (ppb)[1]	
	Min	Max	Average	2017	2015 – 2017
Birney	0	37	2.89	13.0	8
Broadus	0	14	0.83	10.0	10
Lewistown	0	16	0.54	9.0	10
Malta	0	11	0.70	8.0	7
Sidney - OF[2]	0	10	0.86	10	9
Sidney - 201[2]	0	12	0.90	8.0	--

[1] Design Values calculated by the USEPA Air Quality System database.
[2] The Sidney station was relocated in May of 2017.
-- Insufficient data collected.

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 summarized within Table 8.

Table 8 – Minimum SO_2 Monitoring Requirements[1]

CBSA PWEI[2][3]	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] CBSA populations based on latest available census figures
[3] Core Based Statistical Area Population Weighted Emissions Index

This EPA criteria used to determine the number of required SO_2 monitors is based on two metrics: the 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 population in the CBSA multiplied by the annual tons of SO_2 emitted using the most recent aggregated emissions data available in the National Emissions Inventory, 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 prescribed metrics. Table 9 summarizes the current PWEI for the Billings CBSA using the latest published National Emission Inventory (NEI) values.

Table 9 – Billings CBS PWEI Calculation[1]

Population[1] (a)	Reported Emission[2] (b)	PWEI[3] (c)
169,728	6227.61	1,057.0

[1] US Census Bureau Population Estimate as of July 1, 2015.
[2] 2014 National Emissions Inventory.
[3] PWEI (c) = a x b/1,000,000

SO_2 monitoring is triggered within a CBSA when the calculated WPEI value is equal to or greater than 5,000. Based on the prescribed 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.

DEQ continues to operate one long-term SO_2 monitor at the Coburn Road site in Billings (30-111-0066) as part of the approved Maintenance Plan (81 FR 28718, Resdesignation request and associated maintain plan for Billings, MT 2010 SO_2) to provide an ongoing assessment of SO_2 compliance in the Billings area. The Coburn Road site, located within the former Yellowstone County (partial) SO_2 Nonattainment Area, has been in continuous operation since 1981 as a State or Local Air Monitoring Station (SLAMS) site for NAAQS comparison purposes.

Additionally, DEQ operates one SO_2 monitor at the Sidney site (30-083-0002; formerly 30-083-0001) to gauge impacts from oil and gas production in eastern Montana, and one trace-level background monitor at the NCore station (30-049-0004). Section I.H describes NCore monitoring. Table 10 summarizes the 1-hour values measured at the SO_2 monitoring sites operated by the DEQ during 2017.

Table 10 – 1-Hour Monitored SO_2 Values for 2017

Site	Concentrations (ppb)			NAAQS Design Values (ppb)[1]	
	Min	Max	Average	2017	2015 - 2017
Billings - Coburn Road	0	53.7	1.7	32	33
NCore - Sieben's Flat	0	19.8	0.2	4	3
Sidney - OF[2]	0	34	0.12	18	11
Sidney - 201[2]	0	79.1	2.0	37	--

[1] Design Values calculated by the USEPA Air Quality System database.
[2] The Sidney station was relocated in May of 2017. Data only relects 2017 collected values.
-- Insufficient data collected.

Beyond 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 location (Race Track Site, 30-013-2001) in the community of Black Eagle is operated by the Calumet Montana Refining Company, LLC (Calumet) as required by their air quality permit. Data from this site is not entered into the AQS database but is used by DEQ's air quality compliance program. In the Billings/Laurel area there is currently a single industry-operated SO_2 monitoring site (Johnson Lane, 30-111-2006), maintained by Yellowstone Electric Limited Partnership (YELP) as a condition of their air quality permit. Three additional monitors were historically operated by a consortium of local SO_2-emitting industries, known as the Billings Laurel Air Quality Technical Committee (BLAQTC). The Brickyard (30-111-2005) and Laurel (30-111-0016) sites were discontinued in June of 2015; while the third site, Lockwood (30-111-1065), failed in 2011 and was not replaced. The DEQ 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 YELP and BLAQTC performed monitoring under an approved Quality Assurance Project Plan (QAPP) as individual Primary Quality Assurance Organizations (PQAOs) independent of the DEQ. DEQ believes that the data obtained from the YELP and BLAQTC monitors met the commitments of the individual QAPPs and are therefore of regulatory quality. DEQ looks principally to the Coburn Road SLAMS monitor for NAAQS compliance determination in the Billings area, but has historically examined, and continues to examine, available data for contrast and comparison purposes.

On August 10, 2015, EPA finalized the Data Requirements Rule (DRR) for the 2010 1-hour SO_2 primary NAAQS (40 CFR 51, Subpart BB). The SO_2 DRR required that air agencies identify and characterize air quality around large sources. Talen Montana, LLC's (Talen) Colstrip Steam Electric Station located in Rosebud County was the sole source in Montana identified as applicable to the rule. As required in the rule for characterizing air quality for the primary 2010 SO_2 NAAQS, Montana submitted the appropriate designation of attainment for Rosebud County as demonstrated through modeling on December 20, 2016. On January 9, 2018 within 83 Federal Register (FR) 1098, EPA published a notice that they agreed with Montana's determination and designated Rosebud county as Attaining/Unclassifiable for the 2010 SO_2 standard. In the same notice EPA designed all the remaining counties in Montana as Attaining/Unclassifiable for the 2010 SO_2 standard with the exception of the a portion of Yellowstone county which was previously designated as Attainment.

E. Lead (Pb) Monitoring Criteria

On November 12, 2008, EPA lowered the NAAQS for Pb to 0.15 $\mu g/m^3$ (micrograms per cubic meter) (73 FR, 66964).

The Pb design criteria in 40 CFR 58 Appendix D Section 4.5 (a) requires local agencies conduct ambient air Pb monitoring near Pb sources. These regulations require, at a minimum, the installation of one source-oriented SLAMS site to measure the maximum Pb concentration in the ambient air resulting from each non-airport Pb source that emits 0.50 or more tons per year (tpy). The emission threshold was lowered from 1.0 tpy to 0.50 tpy on December 30, 2009 (74 FR 69050). As stated in 40 CFR 58 Appendix D Section 4.5 (a) (ii) (73 FR 67062 from November 12, 2008), the Regional EPA Administrator may waive the requirement stated above if the local air agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means).

Currently in Montana, the only source that meets this requirement is the Talen Colstrip Steam Electric Station located in Rosebud County. According to DEQ emission inventory database, Colstrip reported total actual Pb emissions of 1.80 tons in 2016, 1.96 tons in 2015, 1.84 tons in 2014, 1.67 tons in 2013, and 1.63 tons in 2012.

On May 18, 2018, the State of Montana submitted a monitoring waiver request and supporting demonstration to EPA Region 8 to forego monitoring in Colstrip due to modeled Pb concentrations in the ambient air less than 50% of the NAAQS.

F. Particulate Matter (PM10) Monitoring Criteria

The minimum number of PM_{10} monitoring sites required by 40 CFR 58 Appendix D Section 4.6 is shown in Table 11.

Table 11 - Minimum PM_{10} Monitoring Requirements[1]

	Number of Monitors per MSA[1]		
Population category	**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 shown in Appendix B of this Plan, none of the Montana MSAs currently meet the combination of population and PM_{10} concentration listed in Table 11. However, the DEQ continues to operate a network of PM_{10} monitors throughout the state serving various objectives. DEQ operates 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 (30-093-0005), Columbia Falls (30-029-0049), Kalispell (30-029-0047), Libby (30-053-0018), Missoula (30-063-0024), Thompson Falls (30-089-0007), and Whitefish (30-029-0009).

The DEQ also operates PM_{10} monitors in several areas in an attempt to further define background concentrations and spatial distribution of this pollutant within the state of Montana. These areas include Sidney (30-083-0002; formerly 30-083-0001), Broadus (30-075-0001), Birney (30-087-0001), Malta (30-071-0010) and Lewistown (30-027-0006).

Table 12 summarizes the 24-hour average values measured in $\mu g/m^3$ at PM_{10} monitoring sites operated by the DEQ during 2017. PM_{10} monitoring is discussed further in Section II.

Table 12 – 24-Hour Average Monitored PM_{10} Values for 2017[1]

	Concentration ($\mu g/m^3$)			NAAQS Design Values[2]	
Site	**Min**	**Max**	**Average**	**2017**	**2015 - 2017**
Birney[3]	0	69	13.4	--	--
Broadus[3]	1	89	19.4	--	--
Butte	1	80	13.1	0	0
Flathead Valley	2	42	12.7	0	0
Kalispell	8	89	25.2	0	0
Lewistown	0	34	7.7	0	0
Libby	4	51	16.4	0	0
Malta	1	29	8.1	0	0
Missoula	3	50	14.8	0	0
Sidney - OF[3][4]	1	50	7.7	--	--
Sidney - 201[4]	1	68	9.7	0	--
Thompson Falls	3	61	12.9	0	0.3
Whitefish	2	90	19.4	0	0

[1] Dataset excludes DEQ defined exceptional events.
[2] PM_{10} Design Values are in the form of numbers of estimated exceedances as calculated by the USEPA Air Quality System database in accordance with the procedure in 40 CFR 50 Appendix K.
[3] Designated as Special Purpose Monitor (SPM) which are non-regulatory (NAAQS excluded) as they do not meet appropriate sighting criteria for the spatial scale of representation (See Section I of this Plan).
[4] The Sidney station was relocated in May of 2017. Change was addressed within the 2017 Network Plan.
-- Insufficient data collected.

G. Fine Particulate Matter (PM2.5) 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 13.

Table 13 – Minimum $PM_{2.5}$ Monitoring Requirements[1]

	Number of Monitors per MSA	
MSA population[2]	**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	1	0

(1) From Table D-5 of Appendix D to 40 CFR Part 58. Minimum monitoring requirements applicable 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.

As described in Appendix B of this Plan, Montana possesses three MSAs (Billings, Missoula, and Great Falls), and all three fall into the smallest population category listed in Table 13. 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 nearly a decade. 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 as specified in Table 13. DEQ, along with several county air quality programs, operate $PM_{2.5}$ monitors in various locations to demonstrate continuing NAAQS compliance, to provide information to various health departments $PM_{2.5}$ control strategies, and to inform the public of potential health impacts during both winter inversions and summer wildfire events.

DEQ continues to operate a $PM_{2.5}$ monitor in the community of Libby as required by EPA and to demonstrate the adequacy of $PM_{2.5}$ control plans resulting from the previous nonattainment designation of the 24-hour $PM_{2.5}$ NAAQS. In addition, DEQ operates $PM_{2.5}$ monitors in Sidney (30-083-0001; formerly 30-083-0002), Broadus (30-075-0001), Birney (30-087-0001), Malta (30-071-0010) and Lewistown (30-027-0006) in an attempt to further define background concentrations and spatial distribution of this pollutant within the state of Montana. Additionally, DEQ operates multipurpose community-based monitors in Billings (30-111-0087; formerly 30-111-0085), Bozeman (30-031-0019), Butte (30-093-0005), Columbia Falls (30-029-0049), Dillon (30-001-003), Frenchtown (30-063-0037), Great Falls (30-013-0001), Hamilton (30-081-0007), Helena (30-049-0026), Missoula (30-063-0024), and Seeley (30-063-0038). These sites, along with the NCore site (30-049-0004) 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 PM2.5 monitoring site within the network.

Table 14 summarizes the 24-hour average values measured at the $PM_{2.5}$ monitoring sites operated by the DEQ during 2017.

Table 14 – 24-Hour Average Monitored $PM_{2.5}$ Values for 2017[1]

	Concentration (µg/m³)			NAAQS Design Values (µg/m³)		
				2017	2015 - 2017	
Site	**Min**	**Max**	**Average**	**98th Pctl.**	**24 hour**	**Annual**
Billings – Lockwood[2]	2.7	13.8	6.7	13.8	--	--

Billings – St. Luke's[2]	0.2	21.1	6	15.9	17	6.6
Birney	0.7	18.3	4.8	11.4	12	5.1
Bozeman[3][4]	0.1	56.9	8.2	--	--	--
Broadus	0.3	36.4	6.3	21.7	16	6.0
Butte	0	38.4	9.3	31.2	28	8.0
Dillon[3][4][5]	0	45.3	4.8	--	--	--
Flathead Valley	0	29.8	6.9	21.9	21	6.9
Frenchtown	2.6	36.4	8.8	27.5	26	8.8
Great Falls[3]	2.1	37.3	8.3	--	--	--
Hamilton	0	46.9	8.7	30.2	30	7.6
Helena-Rossiter	0.6	65.1	9.1	44.7	36	7.8
Lewistown	0.3	14.9	3.86	10.9	11	3.9
Libby	2.0	38.9	11.28	29	27	10.5
Malta	0	12.0	4.2	10.5	11	4.5
Missoula	1.3	36.4	7.6	27.7	25	7.5
Ncore	0	12.2	2.6	9.7	10	2.6
Seeley[3]	5.4	72.9	18.5	--	--	--
Sidney - OF[6]	2.1	10.7	4.6	10.3	11	5.0
Sidney - 201[6]	0.5	13.6	4.9	11.5	12	5.2
Thompson Falls[3]	2.7	23.3	9.7	--	--	--

[1] 24-hour monitored concentrations. Dataset excludes DEQ defined exceptional events, unless otherwise noted.
[2] The Billings station was relocated in December of 2017.
[3] Monitors are non-Federal Equivalent Method (non-FEM) monitors operated for public information only. They are not certified to produce NAAQS-comparison data.
[4] Dataset does not excluded values eligible for exceptional events exclusion.
[5] The Dillon station establishment was addressed within the 2017 Network Plan. Data is not currently reported to AQS.
[6] The Sidney station was relocated in May of 2017.

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) that are operated as part of the Chemical Speciation Network (CSN). Two sites in Montana are currently included in the CSN; Butte (30-093-0005) and NCore (30-049-0004). Appendix E 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 13, 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 Monitoring Network Design Criteria 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 DEQ's $PM_{2.5}$ network is 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 DEQ and to the citizens of Montana.

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. 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, NO_Y, lead, and basic meteorology. The majority of NCore sites across the nation are established in urban areas. In Montana however, 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, with the exception of lead, are functional and acquiring ongoing data.

The monitoring directives in 40 CFR Appendix D Section 4.8.1 contains specific requirements for the operation of monitors for $PM_{10-2.5}$ at NCore sites. 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. General Monitoring Network Design Considerations

1. 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 three sites that do not meet all of the siting requirements of 40 CFR Part 58, Appendix E. 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 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.

Two PM_{10} monitors located in eastern Montana, Broadus (30-075-0001) and Birney (3-087-0001), were established to define background concentrations of this pollutant on a neighborhood or broader scale. Each of these sites is located in a remote region, and of logistic necessity, near unpaved gravel roads traveled by ranching and agricultural 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, 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 producing non-regulatory (SPM-NR), or NAAQS excluded, data. EPA approved the redesignation on April 8, 2013.

2. PM2.5 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. Currently, the only $PM_{2.5}$ site in the Montana network of this nature is the Overlook Park station in Great Falls. 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. 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.

3. **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 underwent an update which was adopted on February 9, 2018 and is currently under USEPA review. Last USEPA QAPP approval date was May 3, 2013

II. Changes to the Monitoring Network

A. Introduction

DEQ regards the requirement to develop and submit an Annual Network Plan as an opportunity to review the existing air monitoring network and to plan for future needs. In the process of producing this document, 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. Likewise, in 2015 the DEQ completed a periodic network assessment in accordance to 40 CFR 58.10(d). The changes proposed in this document reflect the results of both efforts.

Immediate changes are proposed in this annual network plan, while long-term evaluation and direction of DEQ's air quality surveillance system continue to be addressed within the periodic network assessment, and the resulting system modifications. DEQ anticipates occasional changes to the focus and direction of Montana's air monitoring network in response to future federal rulemaking. The following sections outline network changes completed since submission of the 2017 Annual Monitoring Network Plan and proposed changes to Montana DEQ's air monitoring network for the 2018 planning period.

B. Billings Station

DEQ discontinued monitoring at the Billings-St Luke's site (30-111-0085) on November 29, 2017, and successively established a new site, Billings-Lockwood (30-111-0087). Due to the monitors failure in meeting USEPA siting criteria, associated with the previous site location in the downtown Billings area, DEQ opted to relocate $PM_{2.5}$ monitoring to the suburb of Lockwood at the ballfield complex located adjacent to Old Hardin Road.

The Billings-Lockwood preserves the population based exposure monitoring objective in providing PM2.5 concentration data for the greater Billings area. The $PM_{2.5}$ monitor operating at the St. Luke's station was non-regulatory (NAAQS excluded); therefore, no formal network modification documentation is provided in this Plan. See appendix A for site location information and Appendix C for details related to monitoring instrumentation and operation.

C. Ongoing Network Changes

As indicated in our previous network plans, diminishing monitoring resources necessitate 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 historical PM_{10} monitoring from multiple sites 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, DEQ is working to develop the documentation required by the EPA to redesignate five areas that are currently classified as nonattainment for PM_{10}.

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
30-111-0087	Billings-Lockwood	2320 Old Hardin Road	-108.426551	45.806357	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
30-001-0003	Dillon	State Hwy 91 S. and Barrett St.	-112.642516	45.206442	--	--
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
30-083-0002	Sidney 201	Intersection of Hwy 201 and Cnty R 326	-104.676864	47.867900	--	--
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	--	--
30-029-0009	Whitefish Dead End	End of 10th St.	-114.335973	48.400523	Micro	Flathead County, 28060

Montana Ambient Air Quality Monitoring Sites

Appendix B
Montana Core Based Statistical Areas (CBSAs)

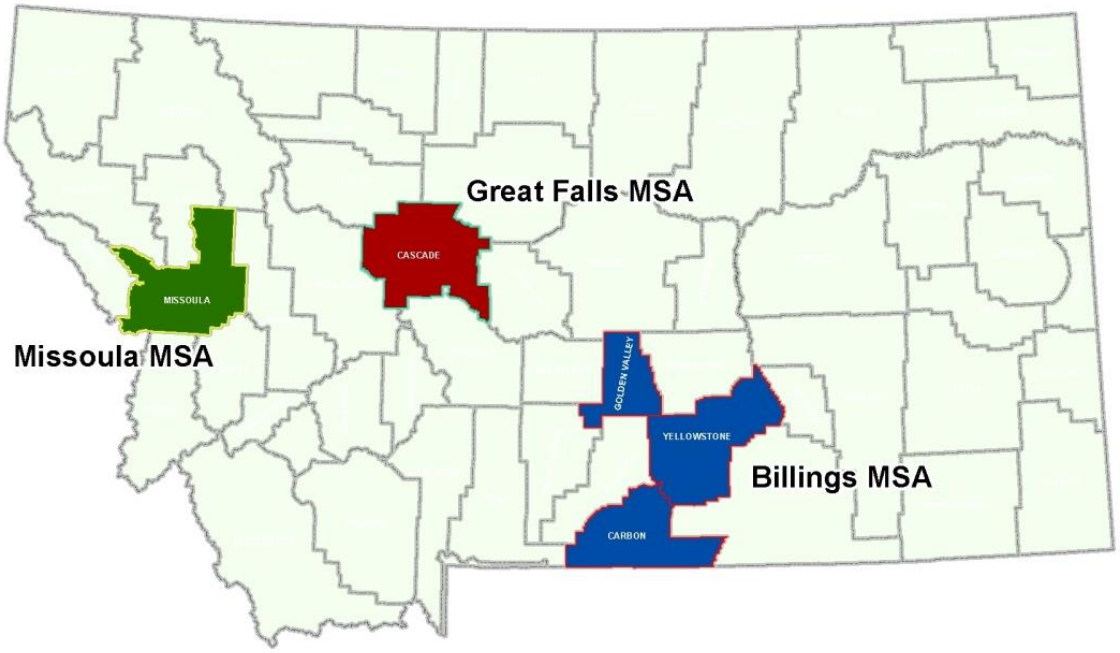
CBSA definition per 40 CFR 58.1: "*Core-based statistical area (CBSA)* is defined by the U.S. Office of Management and Budget, as a statistical geographic entity consisting of the county or counties associated with at least one urbanized area/urban cluster of at least 10,000 population, plus adjacent counties having a high degree of social and economic integration. Metropolitan Statistical Areas and Micropolitan Statistical Areas (MSAs) 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).

Montana Core Based Statistical Areas[(1)(2)]

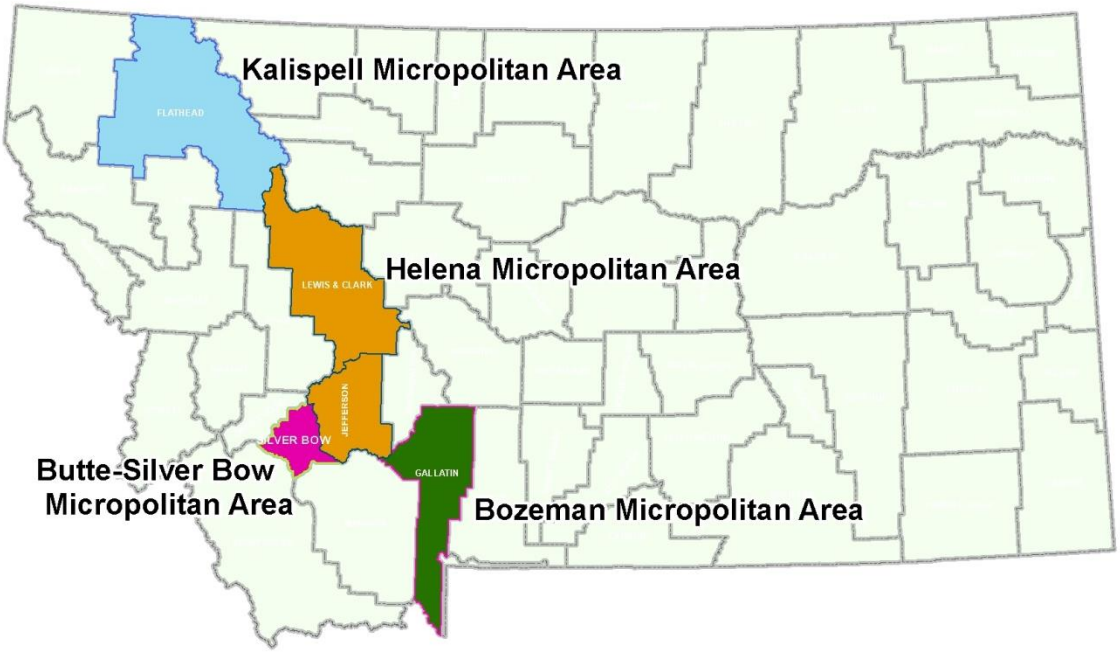
CBSA Code	CBSA Title	Metropolitan or Micropolitan Statistical Area	Estimated Total Population	County/County Equivalent	Estimated County Population	FIPS State Code	FIPS County Code	Central or Outlying County
13740	Billings, MT	Metro	169,728	Golden Valley County	831	30	037	Outlying
				Carbon County	10,460	30	009	Outlying
				Yellowstone County	158,437	30	111	Central
33540	Missoula, MT	Metro	116,130	Missoula County	116,130	30	063	Central
24500	Great Falls, MT	Metro	82,278	Cascade County	82,278	30	013	Central
14580	Bozeman, MT	Micro	104,502	Gallatin County	104,502	30	031	Central
28060	Kalispell, MT	Micro	98,082	Flathead County	98,082	30	029	Central
25740	Helena, MT	Micro	79,135	Jefferson County	11,853	30	043	Outlying
				Lewis and Clark County	67,282	30	049	Central
15580	Butte-Silver Bow, MT	Micro	34,553	Silver Bow County	34,553	30	093	Central

(1) U.S. Census Bureau, Population Division; Office of Management and Budget, Metropolitan and Micropolitan Statistical Areas.
(2) US Census Bureau Population Estimate as of July 1, 2016.

Montana Metropolitan Statistical Areas (MSAs)



Montana Micropolitan Statistical Areas



Appendix C
Existing and Proposed Air Monitoring Network Summary

Ambient Air Quality Monitoring Network By Location With Proposed or Actual Changes

AQS Number	Site Name	Pollutant	Parameter - POC	Method			Frequency	Type[3]	Spatial Scale	Monitoring Objective[4]	2018 Change
				Code	Note[1]	PM[2]					
30-111-0066	**Billings-Coburn**	SO_2	42401-1	600	7		Continuous	SLAMS	Neigh.	H,S	
		SO_2 - 5 min	42406-1	600	7		Continuous	SLAMS	Neigh.	H,S	
30-111-0087	**Billings-**	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SPM	Neigh.	P	✓
30-111-0085	**Billings-St. Luke's**	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SPM	Micro	P	✓
30-087-0001	**Birney**	NO	42601-1	574	11		Continuous	SLAMS	Regional	B	
		NO_2	42602-1	574	11		Continuous	SLAMS	Regional	B	
		NO_X	42603-1	574	11		Continuous	SLAMS	Regional	B	
		O_3	44201-1	047	9		Continuous	SLAMS	Regional	B	
		PM_{10}	81102-1	150	15	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	Regional	B	
30-031-0019	**Bozeman**	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM NR	Neigh.	P	
30-075-0001	**Broadus**	NO	42601-1	574	11		Continuous	SLAMS	Regional	B	
		NO_2	42602-1	574	11		Continuous	SLAMS	Regional	B	
		NO_X	42603-1	574	11		Continuous	SLAMS	Regional	B	
		O_3	44201-1	047	9		Continuous	SLAMS	Regional	B	
		PM_{10}	81102-1	150	15	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	Regional	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	SLAMS		QA Coll[5]	
		$PM_{2.5}$ Spc'n	Various		6		1 in 6	SLAMS[7]	Neigh.	H,P	
30-001-0003	**Dillon**	$PM_{2.5}$	88502-1	734	17	Non	Continuous	SPM NR	Neigh.	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 NR	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	16	FEM	Continuous	SLAMS	Neigh.	H,P	
		$PM_{2.5}$	88101-2	116	2	FRM	1 in 6 coll[5]	SLAMS		QA Coll[5]	
		$PM_{2.5}$	88101-4	170	8	FEM	Continuous	SPM		QA Coll[6]	
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	150	15	FEM	Continuous	SLAMS	Neigh.	H,P	
		$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	Neigh.	H,P	
30-027-0006	**Lewistown**	NO	42601-1	599	10		Continuous	SPM	Regional	B	
		NO_2	42602-1	599	10		Continuous	SPM	Regional	B	
		NO_X	42603-1	599	10		Continuous	SPM	Regional	B	
		O_3	44201-1	047	9		Continuous	SPM	Regional	B	
		PM_{10}	81102-1	150	15	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	183	15	FEM	Continuous	SPM	Regional	B	
30-071-0010	**Malta**	NO	42601-1	599	10		Continuous	SPM	Regional	B	
		NO_2	42602-1	599	10		Continuous	SPM	Regional	B	
		NO_X	42603-1	599	10		Continuous	SPM	Regional	B	
		O_3	44201-1	047	9		Continuous	SPM	Regional	B	
		PM_{10}	81102-1	150	15	FEM	Continuous	SPM NR	Neigh.	B	
		$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SPM	Regional	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	
30-049-0004	**NCore-Sieben Flats**	CO	42101-1	554	13		Continuous	NCore	Region	B	
		NO	42601-1	674	14		Continuous	NCore	Region	B	
		NOy	42600-1	674	14		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		1 in 3	SLAMS[7]	Region	B	
		PM_{coarse}	86101-1	185	12	FEM	Continuous	SLAMS	Region	B	

Continued...

Ambient Air Quality Monitoring Network By Location With Proposed or Actual Changes (continued)

AQS Number	Site Name	Pollutant	Parameter - POC	Method			Frequency	Type[3]	Spatial Scale	Monitoring Objective[4]	2018 Change
				Code	Note[1]	PM[2]					
30-063-0038	**Seeley Lake**	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM NR	Neigh.	H,P	
30-083-0002	**Sidney 201**	NO	42601-1	599	10		Continuous	SLAMS	Neigh.	S	
		NO2	42602-1	599	10		Continuous	SLAMS	Neigh.	S	
		NOX	42603-1	599	10		Continuous	SLAMS	Neigh.	S	
		O3	44201-1	047	9		Continuous	SLAMS	Neigh.	S	
		SO2	42401-1	600	7		Continuous	SLAMS	Neigh.	S	
		SO2 - 5 min	42406-1	600	7		Continuous	SLAMS	Neigh.	S	
		PM10	81102-1	150	15	FEM	Continuous	SLAMS	Neigh.	S	
		PM2.5	88101-3	183	16	FEM	Continuous	SLAMS	Neigh.	S	
30-089-0007	**Thompson Falls**	PM_{10}	81102-3	122	4	FEM	Continuous	SLAMS	Neigh.	H, P	
		$PM_{2.5}$	88502-3	731	5	FEM	Continuous	SPM NR	Neigh.	P	
30-029-0009	**Whitefish**	PM_{10}	81102-1	122	4	FEM	Continuous	SLAMS	Neigh.	P	

[1] Method Notes

1 Teledyne-API Model 300 Nondispersive infrared CO analyzer (FEM)
2 BGI-PQ200 with very sharp cut cyclone (FEM)
4 MetOne BAM 1020 Beta Attenuation Monitor (PM_{10} FEM)
5 MetOne BAM 1020 Beta Attenuation Monitor with $PM_{2.5}$ sharp cut cyclone (SCC)
6 MetOne / URG Speciation Air Sampling System
7 Teledyne-API Model T100U Ultraviolet SO_2 fluorescence (FEM)
8 MetOne FEM-BAM 1020 with $PM_{2.5}$ very sharp cut cyclone Beta attenuation monitor ($PM_{2.5}$ FEM)
9 Thermo Model 49i UV Photometric O_3 analyzer (FEM)
10 Teledyne-API Model T200U Chemiluminescence analyzer $NO/NO_x/NO_2$ (FRM)
11 Thermo Model 42i TL Chemiluminescence $NO/NO_x/NO_2$ analyzer (FRM)
12 MetOne BAM1020 $PM_{10\text{-}2.5}$ measurement system -- Paired beta attenuation monitors (FEM)
13 Thermo Model 48i-TLE enhanced trace level CO analyzer
14 Thermo Model 42i-TLE. NO-DIF-NOy chemiluminescent specialty trace level gas analyzer
15 Thermo Scientific 5014i Beta Attenuation Monitor for PM_{10} (FEM)
16 Thermo Scientific, 5014i Beta Attenuation Monitor for $PM_{2.5}$ (FEM)
17 MetOne E-BAM Beta Attenuation Monitor with $PM_{2.5}$ sharp cut cyclone (SCC)

[2] Method PM Monitor Type: FEM = Federal Equivalent Method, FRM = Federal Reference Method, Non = Not FEM or FRM method

[3] Monitor Site 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

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

[5] "Coll" = collocated sampler

[6] "Continuous - Coll" = collocated continuous (BAM) sampler

[7] Network Affiliation: CSN-STN

Summary of Proposed or Actual Changes to the Existing Ambient Air Quality Monitoring Network

AQS Number	Site Name	Pollutant	Description of Change(s)	Network Plan Reference
30-111-0085	**Billings-St. Luke's**	$PM_{2.5}$	Discontinuation of Monitoring and removal station.	Section II.B
30-111-0087	**Billings-Lockwood**	$PM_{2.5}$	Establish monitoring site and initiate monitoring of $PM_{2.5}$ and associated meteorological instrumentation.	Section II.B

Appendix D
Ambient Air Quality Summary, Calendar Year 2017

Site	Parameter	Units	Annual Values[1]			Data Capture	NAAQS Comparison[2]		NAAQS[3]	
			Min.	Max.	Ave.		# >	# > 85%	Short-Term	Extended
Billings - Coburn Road	SO2	ppb	0	53.7	1.7	94%	0	0	75	500
Billings - St. Luke's	PM25	ug/m³	0.2	51.6	7.7	89%	5	7	35	12
Billings Lockwood	PM25	ug/m³	2.7	13.8	6.7	8%	0	0	35	12
Birney - Tongue River	NO2	ppb	0	37	2	98%	0	0	100	53
	OZONE	ppm	0.002	0.07	0.032	96%	0	17	0.070	--
	PM10 STD	ug/m³	0	69	11.4	95%	0	0	150	--
	PM25	ug/m³	0.7	119.8	7.7	99%	9	11	35	12
Bozeman High School	PM25	ug/m³	0.1	56.9	8.2	95%	2	7	35	12
Broadus - Powder River	NO2	ppb	0	14	0	91%	0	0	100	53
	OZONE	ppm	0.002	0.073	0.034	96%	0	23	0.070	--
	PM10 STD	ug/m³	1	89	19.4	96%	2	4	150	--
	PM25	ug/m³	0.3	92.5	9.6	96%	9	23	35	12
Butte - Greeley School	PM10 STD	ug/m³	1	144	18	95%	0	1	35	12
	PM25	ug/m³	-0.9	112	13.4	90%	24	38	35	12
Dillon	PM25	ug/m³	0	45.3	4.6	99%	6	10	35	12
Flathead Valley (C Falls HS)	PM10 STD	ug/m³	2	228	17	99%	3	3	150	--
	PM25	ug/m³	-0.3	200.4	10.6	97%	12	14	35	12
Frenchtown - Beckwith	PM25	ug/m³	2.6	155.1	13.2	99%	19	28	35	12
Great Falls - Overlook Park	PM25	ug/m³	2.1	37.3	8.3	95%	2	6	35	12
Hamilton - PS #46	PM25	ug/m³	-0.1	122.7	14.9	98%	40	49	35	12
Helena - Rossiter Pump House	PM25	ug/m³	0.6	92	12.4	99%	29	36	35	12
	PM25 COL	ug/m³	-0.2	84.1	11.4	98%	22	31	35	12
Kalispell - Flathead Electric	PM10 STD	ug/m³	8	228	27	99%	5	6	150	--
Lewistown - Lewistown	NO2	ppb	0	16	0	89%	0	0	100	53
	OZONE	ppm	0.008	0.078	0.038	98%	4	18	0.070	--
	PM10 STD	ug/m³	0	90	10	98%	0	0	150	--
	PM25	ug/m³	0.3	61.8	5.9	99%	7	9	35	12
Libby - Courthouse Annex	PM10 STD	ug/m³	4	158	19	97%	1	2	150	--
	PM25	ug/m³	2	165.7	14.3	99%	14	20	35	12
Malta - Malta	NO2	ppb	0	11	0	82%	0	0	100	53
	OZONE	ppm	0.004	0.066	0.03	97%	0	2	0.070	--
	PM10 STD	ug/m³	1	71	10	98%	0	0	150	--
	PM25	ug/m³	-0.1	40.5	5.5	98%	4	6	35	12
Missoula - Boyd Park	OZONE	ppm	0	0.081	0.023	93%	2	27	0.070	--
	PM10 STD	ug/m³	3	233	22	99%	4	5	150	--
	PM25	ug/m³	1.3	144.8	12.6	95%	21	30	35	12
NCore - Sieben's Flat	CO	ppb	0	1018	132	84%	0	0	35000	9000
	NOY	ppb	0	15.4	1.1	89%	--	--	--	--
	OZONE	ppm	0	0.078	0.037	98%	3	26	0.070	--
	PM10 STD	ug/m³	1	103	11	99%	0	0	150	--
	PM25	ug/m³	-0.6	76.1	5.6	99%	10	14	35	12
	PMCOARS	ug/m³	0	45	4	99%	--	--	--	--
	SO2	ppb	0	19.8	0.2	92%	0	0	75	0.5
Seeley - Elementary School	PM25	ug/m³	5.4	681.1	47.5	98%	75	87	35	12
Sidney - 201	NO2	ppb	0	12	0	80%	0	0	100	53
	OZONE	ppm	0.004	0.068	0.034	98%	0	8	0.070	--
	PM10 STD	ug/m³	1	68	9.7	53%	0	0	150	--
	PM25	ug/m³	0.5	59.9	6.6	68%	2	3	35	12
	SO2	ppb	0	79.1	2	96%	1	1	75	500
Sidney - Oil Field	NO2	ppb	0	10	0	43%	0	0	100	53
	OZONE	ppm	0.01	0.054	0.034	91%	0	0	0.070	--
	PM10 STD	ug/m³	1	50	7	31%	0	0	150	--
	PM25	ug/m³	0.8	10.7	4.6	30%	0	0	35	12
	SO2	ppb	0	34	0	83%	0	0	75	500
Thompson Falls High School	PM10 STD	ug/m³	3	251	17	96%	3	3	150	--
	PM25	ug/m³	2.7	299.8	19.2	53%	13	19	35	12
Whitefish - Dead End	PM10 STD	ug/m³	2	215	21	99%	3	5	150	--

[1] Based on 1-hour average values for gaseous parameters and 24-hour average for particulate. Dataset excludes DEQ defined flagged exceptional events.

[2] Short-Term NAAQS standard comparison only. Comparison based on 8-hour rolling average for ozone, 1-hour average values for all other gaseous pollutants, and 24-hour average values for particulates. Comparisons based on highest values observed and does not account for the calculated form of the standard (See Appendix G for actual NAAQS standard). Count of values above the given NAAQS does not necessarily indicate an exceedance occurred.

[3] NAAQS averaging times:

Averaging Time	CO	NO_2	Ozone	$PM_{2.5}$	PM_{10}	SO_2
Short-term	1-hour	1-hour		24-hour		1-hour
Extended	8-hour	Annual		Annual		3-hour

Appendix E
PM2.5 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
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 $\mu g/m^3$ [c, o]	1.5 $\mu g/m^3$ [c]	NA
	Rolling 3-Month	0.15 $\mu g/m^3$ [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	0.070 ppm [h]	NA	Primary & Secondary
Particulate Matter ≤ 10 μm (PM_{10})	24-Hour	150 $\mu g/m^3$ [j]	150 $\mu g/m^3$ [j]	Primary & Secondary
	Annual	NA	50 $\mu g/m^3$ [k]	Primary & Secondary
Particulate Matter ≤ 2.5 μm ($PM_{2.5}$)	24-Hour	35 $\mu g/m^3$ [l]	NA	Primary & Secondary
	Annual	12.0 $\mu g/m^3$ [m]	NA	Primary
	Annual	15.0 $\mu g/m^3$ [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.
[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. (3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
[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. Final rule June 22, 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 G
Public Inspection & Comment

The DEQ Air Quality Monitoring Network Plan was made available for public inspection as required by 40 CFR 58.10(a)(1) on May 31, 2018. No comments were received.