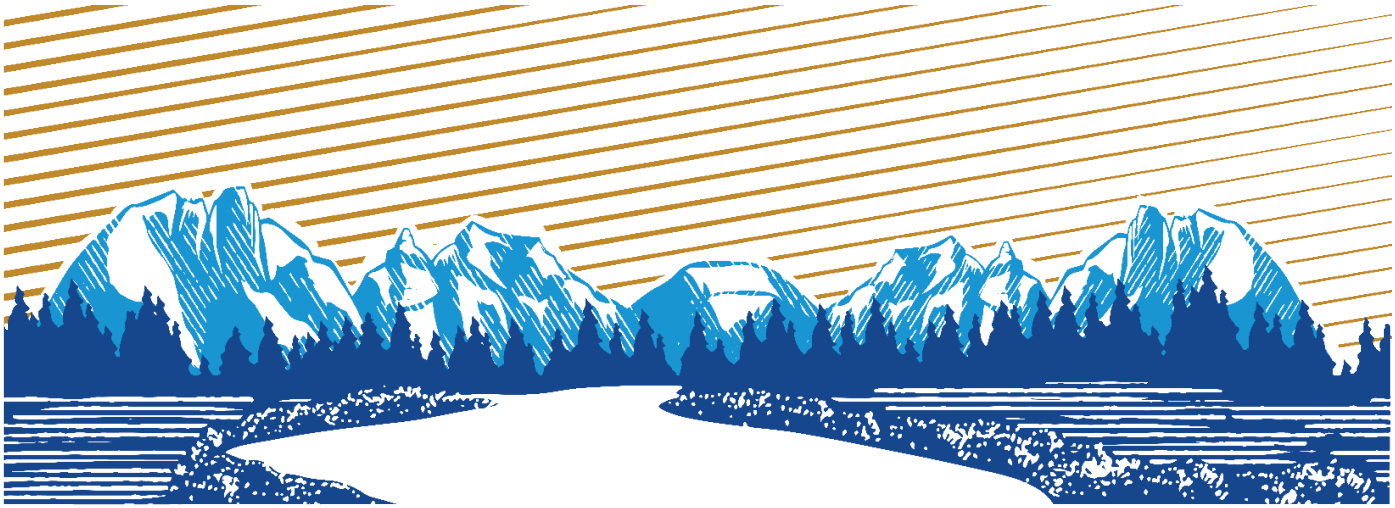
Montana Department of Environmental Quality

AIR QUALITY

2023 ANNUAL MONITORING NETWORK PLAN



June 26, 2023

Montana Department of Environmental Quality
Air Quality Bureau

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Contents

Introduction

The Montana Department of Environmental Quality (DEQ), Air Quality Bureau produces an Air Quality Monitoring Network Plan (Plan) on an annual basis in accordance with the requirements of Title 40 of the Code of Federal Regulations Part 58.10 (40 CFR 58.10). The intent of this plan is to accurately describe the ambient air monitoring sites in DEQ's statewide network, identify each site's monitoring purpose, describe how the sites fulfill national Network Design Criteria requirements (40 CFR 58, Appendix D), and describe any deviations in physical characteristics or operation from regulatory requirements. The Plan also describes the changes DEQ anticipates making to the network in the next year.

During Plan development, DEQ evaluates its existing ambient air monitoring network and assesses how to tailor the network based on modified data needs, changing regulatory requirements, and available resources. In addition, the development process provides an opportunity for DEQ to solicit, evaluate, and respond to comments and input from the public, county agencies, and other interested parties regarding the monitoring network.

This Plan consists of three broad sections. Section I describes the various pollutant-specific ambient air monitoring design requirements and explains how and why DEQ has implemented each, as applicable. Section II describes changes to the monitoring network that DEQ is proposing to make in the following year. Section III is comprised of appendices which provide supplemental information and data in support of specific elements outlined within this Plan.

Background

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." The Federal Clean Air Act requires the United States Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants in the ambient air known as "criteria air pollutants." Criteria air pollutants are the most common air pollutants with known harmful human health effects. The six criteria pollutants are:

- Ozone (O_3);
- Carbon Monoxide (CO);
- Nitrogen Dioxide (NO_2);
- Sulfur Dioxide (SO_2);
- Lead (Pb); and
- Particulate Matter (PM). PM concentrations of airborne materials are currently measured 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 ($PM_{2.5}$). At one Montana monitoring station DEQ collects an additional PM fraction referred to as PM_{coarse} or $PM_{10\text{-}2.5}$ which is the portion of PM_{10} larger than $PM_{2.5}$.

For each criteria air pollutant, NAAQS limits for ambient air have been 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 and damage to animals, crops, vegetation, and buildings. Montana has, in the past, adopted similar air quality standards known as the Montana Ambient Air Quality Standards (MAAQS). These standards

have generally, but not completely, been superseded by more stringent NAAQS. Unique, Montana-specific MAAQS for fluoride in forage, hydrogen sulfide, and settleable PM remain in place.

To determine if the NAAQS are being met, federal rules implemented by the EPA require each state to establish a network of monitors to measure concentrations of the criteria pollutants in ambient air. The design and extent of the required monitors within the network is based primarily on population size and density and, to a lesser degree, on measured air quality concentrations in comparison to the NAAQS. When assessing population impacts, the rules use population-based designations established by the Office of Management and Budget and the United States Census Bureau summarized together as "Core Based Statistical Areas" (CSBAs). By federal definition, a CBSA is a geographic space defined by at least one *urbanized area* with a surrounding population. A CBSA with at least one urbanized area of 50,000 or more people is termed a *Metropolitan* or *Metro* Statistical Area (MSA), and a CBSA with at least one urbanized cluster of 10,000 to 50,000 people is termed a *Micropolitan* or *Micro* Statistical Area. As described in Appendix B to this Plan, there are currently three federally-designated MSAs in Montana: Billings, Missoula, and Great Falls. In addition, there are four federally-designated Micro Statistical Areas in the state: Kalispell, Helena, Bozeman, and Butte-Silver Bow. These population-summarizing designations are used throughout this Plan document.

The means of assessing monitored ambient air pollution impacts is embodied in a concept referred to as a "design value." A design value is a statistic that describes the air quality status of a given location relative to the level and form of the NAAQS. For example, if a NAAQS limit is in the form of a *three-year* average, then monitored *hourly* values cannot be directly compared to that standard to determine if the ambient air quality complies with the NAAQS. To make such a comparison, hourly measurements must be statistically transformed into the same units as the NAAQS. In the example above, the hourly measured values must be transformed into a three-year average (the design value) so that a direct comparison may be made. Design values for each criteria pollutant are communicated in detail in 40 CFR Part 50 and are referred to throughout this Plan document.

DEQ endeavors to continually achieve three basic overall objectives in its ambient air monitoring program as detailed in 40 CFR 58 Appendix D Section 1.1:

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.

Beyond direct rule requirements, these objectives also influence DEQ's decisions regarding the types, numbers, and locations of ambient air monitors that it operates across the state of Montana.

I. Ambient Air Monitoring Requirements

The following sections summarize the ambient air monitoring requirements for each of the criteria air pollutants and explain DEQ's implementation of those requirements.

A. O_3 Monitoring Criteria

The minimum number of ozone monitors required in a network is defined by the federal Design Criteria found in 40 CFR Part 58, Appendix D. Table 1 summarizes those requirements.

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 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.

All three of Montana's designated MSAs fall within the 50,000 to 350,000 population category. In the Billings MSA, DEQ conducted O_3 monitoring from 2005 to 2007 (station number 30-111-0086) with a resulting 8-hour O_3 design value of 0.059 parts per million by volume (ppm). As listed in Appendix F, the primary and secondary NAAQS for ozone is 0.070 ppm based on a rolling 8-hour average, and 85% (see Table 1) of that value is 0.060 ppm. The Billings design value was less than that measure, so no additional O_3 monitoring has been required in that MSA. However, Billings remains Montana's largest metropolitan area, and a considerable amount of time has passed since O_3 monitoring was conducted there. In addition, as discussed below, DEQ remains interested and invested in tracking background O_3 trends within the state. Therefore, in its 2022 Annual Network Plan DEQ proposed and received EPA concurrence to install an O_3 monitor in Billings through funds made available as part of the "American Rescue Plan Direct Award for Enhancing Continuous Monitoring of $PM_{2.5}$ and Other NAAQS Air Pollutants" grant. The O_3 monitor, along with an NO_2 monitor, were slated for installation at the existing Lockwood monitoring site (30-111-0087) before the end of calendar year 2023, and that schedule remains intact.

In the Missoula MSA, O_3 monitoring has been conducted continuously since June 1 of 2010.

In the Great Falls MSA, historical monitoring data, meteorological patterns including consistently windy conditions, and professional judgment indicate that O_3 monitoring in this MSA is not warranted given the low O_3 levels monitored in the two larger MSAs.

Beyond the monitoring efforts related to the three MSAs, DEQ has endeavored to define and track background levels of O_3 across Montana and to assess air quality impacts from petroleum exploration within the eastern portion of the state. In several cases, the Bureau of Land Management (BLM) has provided collaborative funding in this effort. DEQ conducts O_3 monitoring in Broadus (30-075-0001),

Sidney (30-083-0002), Malta (30-071-0010), Lewistown (30-027-0006), Miles City (30-017-0005), and at the National Core Monitoring Site (NCore) north of Helena (30-049-0004). Appendix A of this Plan provides a map displaying the locations of these sites.

Table 2 summarizes the 8-hour rolling average O_3 values measured at monitoring sites operated by DEQ during the federally-designated 2022 ozone season (April through September for Montana). Table 3 summarizes the 8-hour O_3 values measured at monitoring sites operated by DEQ during the entire 2022 calendar year.

Table 2 – 8-Hour Rolling Monitored O_3 Values for the 2022 Ozone Season [1]

Station	Concentrations (ppm)			NAAQS Design Values (ppm) [2]		NAAQS
	Minimum	Maximum	Average	2022 [3]	2020 – 2022	
Broadus	0.008	0.062	0.034	.059	.062	0.070
Lewistown	0.010	0.061	0.037	.057	.062	
Malta	0.005	0.053	0.033	.051	.055	
Miles City [4]	0.003	0.064	0.033	.058	-- [4]	
Missoula	0.000	0.058	0.030	.056	.058	
NCore	0.010	0.060	0.037	.057	.061	
Sidney	0.007	0.055	0.035	.054	.059	

[1] Ozone Monitoring Season for Montana is April through September as established under 40 CFR Part 58, Table D-3.
[2] Design Values calculated by the US EPA Air Quality System (AQS) database.
[3] The 2022 design value is the 4th-high max value for the year.
[4] The Miles City monitoring station began reporting data to AQS as of January 1, 2022. Therefore, a 3-year design value is not yet available.

Table 3 – 8-Hour Rolling Monitored O_3 2022 Annual Values

Station	Concentrations (ppm)		
	Minimum	Maximum	Average
Broadus	0.007	0.062	0.032
Lewistown	0.009	0.061	0.037
Malta	0.005	0.053	0.031
Miles City	0.001	0.064	0.030
Missoula	0.000	0.058	0.024
NCore	0.008	0.060	0.036
Sidney	0.007	0.055	0.033

As demonstrated in Tables 2 and 3, minor variability continues to be observed in the monitored ambient O_3 concentrations across the state. This is particularly interesting given the spatial breadth, the significant topographic variability, and the population diversity of the monitoring sites. The seven monitoring sites (in addition to the 2005–2007 Billings site) are established in very diverse locations including large-population communities, small towns, a rural oilfield, rural settings with minimal population and no industry, and a pristine background location adjacent to a federal wilderness area. This siting diversity indicates that monitored O_3 concentrations in the ambient air across Montana represent general background levels produced principally from natural sources, stratospheric intrusion, or transported in from sources outside the state, with little anthropogenic source input from within Montana.

In recent years, the overall population of Montana has increased, with notable growth in communities outside of the three designated MSAs but currently within several of Montana's Micropolitan

Statistical Areas. DEQ will continue to observe growth patterns in these areas and assess whether additional O_3 monitoring sites are warranted (see further discussion in Section II.E.2).

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 PAMS monitoring is not required, nor currently conducted, in the DEQ network.

B. CO Monitoring Criteria

As detailed in 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 [(2)]	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.
[(2)] CBSA populations must be based on latest available census figures.

As documented in Appendix B to this Plan, no Montana CBSAs meet the criteria listed in Table 4, and no CO monitors are required in Montana on this basis.

Historically, 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 improved urban traffic patterns and the gradual upgrade of Montana's vehicle fleet to newer, cleaner-burning engines, monitored CO concentrations in Montana's ambient air were reduced and 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.

As described in Appendix F, the 1-hour NAAQS for CO is 35 ppm, and the 8-hour NAAQS is 9 ppm. Table 5 summarizes the CO values measured at the NCore monitoring site during 2022.

Table 5 –Monitored CO Values for 2022 at NCore

Station	Concentrations (ppm)			NAAQS
	Min	Max	Average	
NCore 1-hour averages	0.040	0.773	0.130	35
NCore 8-hour averages	0.049	0.756	0.130	9

C. 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 [1]	Minimum NO_2 Monitors Required
Near Road Monitors [2]	CBSA Population ≥ 1 million	1, for hourly maximum concentrations
	CBSA Population ≥ 2.5 million	1, plus the station above for a total of 2
	CBSA Population ≥ 1 million and with 1 or more roadway segments with annual average daily traffic counts (AADT) ≥250,000	2, as in the description above
Area-Wide Monitoring [3]	CBSA Population ≥ 1 million	1, for expected highest area concentration
Protection of Susceptible and Vulnerable Populations [4]	Any area inside or outside CBSAs, nation wide	As Required by EPA Regional Administrator per Appendix D Section 4.3.4.

[1] CBSA populations must be based on the latest available census figures.
[2] 40 CFR Part 58, Appendix D Sec 4.3.2.
[3] 40 CFR Part 58, Appendix D Sec 4.3.3.
[4] 40 CFR Part 58, Appendix D Sec 4.3.4.

As discussed in Appendix B, no Montana communities meet any of the population 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, 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. DEQ monitors NO_2 at Sidney (30-083-0002), Broadus (30-075-0001), Miles City (30-17-0005), Malta (30-071-0010) and Lewistown (30-027-0006).

As listed in Appendix F, the primary 1-hour NAAQS for NO_2 is 100 ppb. Table 7 summarizes the 1-hour NO_2 values measured at monitoring sites operated by the DEQ during 2022.

Table 7 – 1-Hour Monitored NO_2 Values for 2022

Site	Concentrations (ppb)			NAAQS Design Values (ppb) [1]		NAAQS
	Min	Max	Average	2022[2]	2020 – 2022	
Broadus	0	13	0.8	9.0	9	100
Lewistown	0	14	0.6	8.0	10	
Miles City	0	35	3.8	29.0	-- [3]	
Malta	0	17	0.8	8.0	7	
Sidney	0	20	1.1	12.0	11	

[1] Design Values are calculated by the USEPA AQS database.
[2] The 2022 design value is the 98th percentile value for the year.
[3] The Miles City monitoring station began reporting data to AQS as of January 1, 2022. Therefore, a 3-year design value is not yet available.

DEQ's Annual Network Plan for 2022 proposed and received EPA concurrence to install an NO_2 monitor in Billings through funds made available as part of the "American Rescue Plan Direct Award for Enhancing Continuous Monitoring of $PM_{2.5}$ and Other NAAQS Air Pollutants" grant. The NO_2 monitor, along with an O_3 monitor, were slated for installation at the existing Lockwood monitoring site (30-111-0087) before the end of calendar year 2023, and that schedule remains intact.

Related to NO_2 monitoring, Section 4.3.6 of 40 CFR 58 Appendix D requires monitoring of NO/NO_y at NCore and PAMS monitoring sites. Per that rule, NO/NO_y monitoring "will produce conservative estimates for NO_2 that can be used to ensure tracking continued compliance with the NO_2 NAAQS;" and for providing "data on total reactive nitrogen species for understanding O_3 photochemistry." As noted in the Ozone monitoring discussion above (Section I.A), PAMS monitoring is not required, nor currently conducted, in the DEQ network. However, DEQ is required to operate an NCore monitoring site that includes measurement of NO/NO_y. Table 8 summarizes the 1-hour NO and NO_y values measured at the DEQ NCore station in calendar year 2022.

Table 8 – 1-Hour Monitored NO and NO_y Values at NCore for 2022, in ppb.

Pollutant	Min	Max	Average
NO	0	2.3	0.1
NO_y	0	11	1.2

D. SO_2 Monitoring Criteria

The minimum number of SO_2 monitoring sites required by 40 CFR 58 Appendix D Section 4.4 is summarized in Table 9.

Table 9 – Minimum SO_2 Monitoring Requirements [1]

Requirement Type	Criteria	Minimum SO_2 Monitors Required
Population Weighted Emissions Index (PWEI [2][3])	≥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 must be based on latest available census figures.
[3] CBSA PWEI means Core Based Statistical Area Population Weighted Emissions Index in units of million person-tons per year.

The EPA criteria used to determine the number of required SO_2 monitors is similar to other pollutants in that it is based upon population and pollutant concentration. However, SO_2 requires additional statistical formulations for analyzing those impacts. Two metrics are used in this analysis: the population and the total emissions of SO_2 in a defined CBSA (a county or counties with at least one urbanized area of at least 10,000 people population). The product of those factors is a metric defined as the Population Weighted Emissions Index (PWEI). The PWEI is the population in the CBSA multiplied by the annual tons of SO_2 emitted in the CBSA (using the most recent aggregated emissions data available in the National Emissions Inventory (NEI)); divided by 1,000,000. Billings is the only CBSA in Montana where SO_2 monitoring could potentially be required based on these prescribed metrics. Table 10 summarizes the current PWEI for the Billings CBSA using the latest published (2020) NEI values.

Table 10 – Billings CBSA PWEI Calculation

Population [1] (a)	Reported Emissions [2] (b)	PWEI [3] (c)
190,208	4,291	816.2

[1] US Census Bureau *Population Estimate* as of July 1, 2022.
[2] Aggregate tons of SO_2 per 2020 National Emissions Inventory for Yellowstone, Stillwater and Carbon Counties (the Billings MSA).
[3] PWEI (c) = (a) x (b) ÷ 1,000,000.

SO_2 monitoring is required within a CBSA when the calculated PWEI value is equal to or greater than 5,000 as reflected in Table 9. 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. Based on this criterion, no DEQ SO_2 monitoring is required in Montana.

Beyond the CFR-required monitoring, DEQ continues to operate one long-term SO_2 monitor at the Coburn Road site in Billings (30-111-0066) as part of an approved Maintenance Plan to provide an on-going assessment of SO_2 compliance in the Billings area. (81 FR 28718, *Re-designation Request and Associated Maintenance Plan for Billings, MT 2010 SO_2 Nonattainment 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) to assess impacts from oil and gas production in eastern Montana, and one required trace-level background SO_2 monitor at the NCore station (30-049-0004). Section I.H describes NCore monitoring.

As listed in Appendix F, the 1-hour primary NAAQS for SO_2 is 75 ppb. Table 11 summarizes the 1-hour values measured at the SO_2 monitoring sites operated by DEQ during 2022.

Table 11 – 1-Hour Monitored SO_2 Values for 2022

Site	Concentrations (ppb)			NAAQS Design Values (ppb) [1]		NAAQS
	Min	Max	Average	2022[2]	2020 - 2022	
Billings - Coburn Road	0.0	37.0	1.0	25.6	21	75
NCore - Sieben's Flat	0.0	1.6	0.4	1.0	1	
Sidney	0.0	9.2	0.4	6.7	6	

[1] Design Values are calculated by the USEPA AQS database.
[2] The 2022 design value is the 99th percentile value for the year.

E. Pb Monitoring Criteria

The minimum number of Pb monitoring sites required by 40 CFR 58 Appendix D Section 4.5 is summarized in Table 12.

Table 12 – Minimum Pb Monitoring Requirements [1]

Criteria	Minimum Number of Pb Monitors Required
Non-Airport Source emitting ≥ 0.50 tons of Pb per year	1 each
Airport Source emitting ≥ 1.0 tons of Pb per year	1 each

[1] From Appendix D to 40 CFR Part 58, Sec 4.5(a). Monitoring must be "near" the Pb source.

The requirements in Appendix D to 40 CFR Part 58, Section 4.5(a) specify that lead emissions assessments for monitoring determination be based on either "the most recent National Emission Inventory (NEI) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure." The most recent NEI (from 2020) indicates that no airports in Montana emitted more than the 1.0 tons per year of Pb.

One non-airport source in the state emitted more than the monitoring threshold of 0.5 tons per year of Pb, triggering the monitoring requirement. Montana Resources, LLP, operates an open pit copper and molybdenum mine and associated processing facilities in Butte, Montana. The source-oriented Pb monitoring requirement was triggered by Montana Resources through reported estimated Pb emissions of 0.82 tons as presented in the 2020 NEI.

Montana Resources has contracted with Bison Engineering, Inc. (Bison) to conduct independent ambient air monitoring for Pb and other particulate matter constituents in the Butte community just offsite of the mine property. Bison has continuously conducted total suspended particulate (TSP) Pb monitoring via a non-Federal Reference Method (FRM) monitor at the Greeley site since March 2019 through the present time; and plans to continue that effort in the future. Resulting data provides credible evidence of low Pb levels in the ambient air in Butte.

Appendix D to 40 CFR Part 58, Section 4.5(a)(ii) establishes that the EPA Regional Administrator may waive the Pb monitoring requirement if DEQ can "demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means)." The NAAQS for Pb established in 40 CFR 50.16 is 0.15 micrograms per cubic meter (µg/m3), arithmetic mean concentration over any rolling 3-month period.

DEQ is taking deliberate steps to engage Montana Resources and clearly define the most appropriate path forward to address this source-oriented monitoring requirement. It is anticipated that a final direction will be established before the end of 2023.

F. PM_{10} Monitoring Criteria

The approximate minimum number of permanent PM_{10} monitoring sites required by 40 CFR 58 Appendix D Section 4.6 is shown in Table 13.

Table 13 - 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.

Currently all designated MSAs in Montana are within the lowest population category and have historically consistently demonstrated measured PM_{10} concentrations in either the low or medium categories in Table 13. Therefore, the present PM_{10} network, as described below, satisfies the PM_{10} network design criteria.

DEQ operates PM_{10} monitors in seven areas previously designated as nonattainment for the 24-hour PM_{10} NAAQS. This monitoring is required by EPA to demonstrate the adequacy of Montana's PM_{10} control or maintenance plans for those areas which have been re-designated to a NAAQS attainment status. 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 to define and track background concentrations and spatial distribution of this pollutant within the state of Montana. These areas include Sidney (30-083-0002), Broadus (30-075-0001), Malta (30-071-0010) Lewistown (30-027-0006) and Miles City (30-17-0005).

As described in Appendix F, the 24-hour NAAQS for PM_{10} is 150 $\mu g/m^3$. Table 14 summarizes the 24-hour average values measured at PM_{10} monitoring sites operated by DEQ in 2022.

Table 14 – 24-Hour Average Monitored PM_{10} Values for 2022[1]

Site	Concentration ($\mu g/m^3$)			NAAQS Comparison			NAAQS
	Min	Max	Average	AQS Estimated Exceedances [2]		3-Year DV Est. Concentration [3]	
				2022	3-Year		
Broadus [4]	1	168	23	--	--	--	150 $\mu g/m^3$
Butte	3	122	20	0	0	121	
Flathead Valley	0	68	12	0	0.4	91	
Kalispell	8	84	24	0	0	131	
Lewistown	0	60	8	0	0	78	
Libby	1	101	15	0	1	131	
Malta	0	94	10	0	0.7	145	
Miles City	1	63	11	0	0	54 [5]	
Missoula	2	146	16	0	0	129	
Sidney	0	68	11	0	0	68	
Thompson Falls	10	119	22	0	0.7	168	
Whitefish	4	119	26	0	0	136	

[1] Dataset includes all values (flagged exceptional events *included*).

[2] PM_{10} Design Values are in the form of numbers of estimated exceedances as calculated by the US EPA AQS database in accordance with the procedure in 40 CFR 50 Appendix K.

[3] Based on PM_{10} SIP Development Guideline-Table Look-up Method (EPA Table 6-1). See EPA-450/2-86-001.

[4] This monitor is a non-Federal Equivalent Method (non-FEM) Special Purpose Monitor operated for informational purposes only and is not certified to produce NAAQS-comparison data.

[5] The Miles City station has only operated for one year (2022) thus this value represents the 4^{th}-high 24-hr average for that year rather than for a 3-year period.

G. $PM_{2.5}$ 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 15.

Table 15 – Minimum $PM_{2.5}$ Monitoring Requirements [1]

MSA population [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	1	0

[1] From Table D-5 of Appendix D to 40 CFR Part 58. Minimum monitoring requirements per MSA.
[2] Population based on latest available census figures.
[3] $PM_{2.5}$ NAAQS levels and forms are defined in 40 CFR part 50.
[4] These minimum monitoring requirements apply in the absence of a design value.

As described in Appendix B of this Plan, Montana's three currently federally-designated MSAs (Billings, Missoula, and Great Falls) all fall into the smallest population category listed in Table 15. Appendix F of this Plan lists the 3-year 24-hour 98th percentile and the 3-year average annual mean NAAQS for $PM_{2.5}$ are 35 and 12.0 µg/m^3 respectively; and the 85% thresholds (per Table 15) for those limits are 29.75 and 10.2 µg/m^3. For the most recent 3-year design period, the Missoula MSA exceeded the 85% threshold for the 24-hour NAAQS as reflected in Table 16, thus one $PM_{2.5}$ monitor is required in Missoula. The continuous $PM_{2.5}$ monitor operating at Boyd Park in Missoula (30-063-0024) fulfills this requirement. No other $PM_{2.5}$ monitors or near-road $PM_{2.5}$ monitors are required within any community in Montana based on the current CFR criteria.

The $PM_{2.5}$ monitoring criteria in 40 CFR 58 Appendix D include three additional requirements:

First, Section 40 CFR 58 Appendix D, 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 15, 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 (manual) FRM analyzer. As previously discussed, only one $PM_{2.5}$ monitor is required by federal Monitoring Network Design Criteria to be operated in any Montana community. That monitor, in Missoula, is a continuous FEM instrument. It is operated as part of a larger network of continuous $PM_{2.5}$ monitors (see the following paragraph) and therefore meets the FRM collocation requirement on a network-wide basis as provided in 40 CFR 58 Appendix A, Section 3.2.3.1.

$PM_{2.5}$ is a significant pollutant in Montana. Impacts from summer wildfires, prescribed burning and wintertime inversions have established a strong need and demand for continuous, near-real time $PM_{2.5}$ data for assessing and communicating public health impacts in addition to determining NAAQS compliance. To meet this need, DEQ's $PM_{2.5}$ pollutant *measurement* network is comprised solely of continuous monitors. However, DEQ also operates an appropriate number of manual FRM $PM_{2.5}$ monitors exclusively for *quality assurance* (QA) collocation and validation oversight of its continuous $PM_{2.5}$ monitoring network. Several changes in the QA collocation equipment are proposed for 2023 due to DEQ's addition of a new continuous monitoring method as discussed in Sections II.C and D of this Plan.

Second, 40 CFR 58 Appendix D, Section 4.7.3 requires each state to install and operate at least one $PM_{2.5}$ site to monitor *regional background* and at least one $PM_{2.5}$ site to monitor *regional transpor*t. In its 2022 Network Plan DEQ proposed the establishment of its NCore site (30-049-

004) as a background and regional transport site for Montana. EPA concurred with this proposal in its response to that Network Plan submittal. The NCore site continues to fulfill the regional and transport site criteria for 2023.

Third, 40 CFR 58 Appendix D, Section 4.7.4 requires each state to conduct $PM_{2.5}$ chemical speciation monitoring at locations designated as part of the national Speciation Trends Network (STN) and 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.

Because $PM_{2.5}$ is a pollutant of significant concern within Montana, DEQ's $PM_{2.5}$ monitoring network goes well beyond the minimum requirements specified in Table 15. DEQ, in partnership with several county air quality programs, operate $PM_{2.5}$ monitors in a number of locations statewide to communicate potential $PM_{2.5}$-related health impacts to the public, to demonstrate continuing NAAQS compliance, and to inform local health departments' $PM_{2.5}$ control strategies. For these purposes DEQ operates $PM_{2.5}$ monitors in Billings (30-111-0087), Bozeman (30-031-0019), Broadus (30-075-0001), Butte (30-093-0005), Columbia Falls (30-029-0049), Frenchtown (30-063-0037), Great Falls (30-013-0001), Hamilton (30-081-0007), Helena (30-049-0026), Lewistown (30-027-0006), Malta (30-071-0010), Miles City (30-17-0005), Missoula (30-063-0024), Seeley Lake (30-063-0038), Sidney (30-083-0002), and Thompson Falls.

In addition, DEQ conducts $PM_{2.5}$ monitoring at its NCore site (30-049-0004, see Section I.H.) to complement its network of $PM_{2.5}$ monitors listed above per the requirements in 40 CFR 58 Appendix D Section 4.7.1(a). Further, DEQ operates a $PM_{2.5}$ monitor in the community of Libby as required by EPA to demonstrate the adequacy of Montana's $PM_{2.5}$ maintenance plan for this area. The maintenance plan was established as part of the re-designation of the Libby area from nonattainment to attainment for the 24-hour $PM_{2.5}$ NAAQS. Finally, in late 2022 and early 2023, DEQ replaced temporary, portable $PM_{2.5}$ monitors at Dillon (30-001-0003), Cut Bank (30-035-0006), and Havre (AQS number to be assigned) with permanent FEM monitors as proposed and approved in its 2022 Network Plan. These monitors are now operating continuously as part of the DEQ monitoring network.

As discussed in Section II of this Plan, DEQ continually assesses its $PM_{2.5}$ monitoring network to evaluate suitability and changing needs. Continuing in 2023 DEQ is placing particular emphasis on community-scale monitoring in Montana's historically underserved and at-risk populations. DEQ anticipates an expansion of its $PM_{2.5}$ monitoring/sensing capabilities over the next three years. Section II.C.1 discusses specific network changes planned for 2023 and 2024 in implementation of this emphasis.

Table 16 summarizes the 24-hour average values along with the annual and 24-hour NAAQS design values, where appropriate, as measured at the $PM_{2.5}$ monitoring sites operated by DEQ during 2022.

Table 16 – 24-Hour Average Monitored $PM_{2.5}$ Values for 2022[1]

Site	Concentration (µg/m³)			NAAQS Design Values (µg/m³)			NAAQS
				2022 98th	2020 - 2022		
	Min	Max	Average	Percentile	24-hour	Annual	
Billings – Lockwood	0.8	61.8	6.7	21.6	29	7.9	**24-hour** 35 µg/m³ **Annual** 12.0 µg/m³
Bozeman [2]	1.6	54.5	6.9	--	--	--	
Broadus	0.0	38.5	5.9	20.8	29	7.7	
Butte	0.2	70.8	7.7	40.1	43	7.8	
Flathead Valley	0.0	57	8.4	30.4	35	7.7	
Frenchtown	2.4	99.9	10.8	35.7	39	10.1	
Great Falls [2]	0.8	46.4	5.3	--	--	--	
Hamilton	0.0	188.2	8.5	64.6	51	7.8	
Helena-Rossiter	0.5	77.8	8.3	33.7	34	8.4	
Lewistown	0.0	44.1	4.1	21.3	28	5.2	
Libby	0.0	88.6	11.9	32.2	43	13.4	
Malta	0.0	29.4	4.1	12.2	24	5.6	
Miles City	0.8	24.4	5.0	13.2	13 [3]	5.2 [3]	
Missoula	0.0	110.5	6.2	33.1	37	7.2	
NCore	0.0	57.9	4.1	23.5	30	4.3	
Seeley Lake [2]	0.4	72.4	12.4	--	--	--	
Sidney	0.0	24.2	4.8	14.1	19	5.2	
Thompson Falls [2]	1.3	85.9	8.1	--	--	--	

[1] Dataset includes all values (exceptional events are included).

[2] These monitors are non-FEM monitors operated for informational purposes only and are not certified to produce NAAQS-comparison data.

[3] The Miles City monitoring station has only operated for one year. These values represent only measurements conducted in 2022 and not the 3-year averages specified in the NAAQS and Table 15.

H. 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 $PM_{2.5}$, speciated $PM_{2.5}$, $PM_{10-2.5}$, O_3, SO_2, CO, NO (nitric oxide), NO_Y (a range of nitrogen oxide compounds), and meteorology. The majority of NCore sites across the nation are established in urban areas. In Montana however, the NCore site was established near a wilderness area as a long-term trend background site in an area believed to be relatively pristine and un-impacted by anthropogenic sources. Montana's NCore site (Sieben's Flat, 30-049-0004) was established in late 2010. Data is continuously being acquired from all required monitors. Previous sections of this Plan document include summaries of pollutant data monitored at NCore.

The monitoring directives in 40 CFR Appendix D Section 4.8.1 contain specific requirements for the operation of monitors for $PM_{10-2.5}$ at NCore sites. This requirement is fully met at Montana's NCore site at Sieben's Flat. Table 17 summarizes the $PM_{10-2.5}$ data collected at the DEQ NCore site during 2022.

Table 17 – 1-Hour Monitored $PM_{10-2.5}$ Values at NCore for 2022, in µg/m³.

Pollutant	Min	Max	Average
$PM_{10-2.5}$	0	70	3

I. General Monitoring Network Design Considerations

1. Monitors Not Meeting Siting Criteria

DEQ designs its network and operates its air monitoring sites in compliance with EPA's national requirements for ambient air monitoring sites (40 CFR Part 58, Appendices A, C, D and E). Within DEQ's network there are two sites that do not meet all the siting requirements of 40 CFR Part 58, Appendix E. First, the Hamilton PM2.5 site (30-081-0007) 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 Plan documents submitted by DEQ.

Second, the PM10 monitor located in eastern Montana at the Broadus (30-075-0001) monitoring site was established to define background concentrations of this pollutant on a neighborhood or broader scale. This site is in a remote region, and because of logistic necessity, was located near an unpaved gravel road traveled by ranching and agricultural equipment. As a result, the monitor is unduly influenced by dust generated by that road traffic and does not appropriately represent background PM10 concentrations on a "regional scale" as was intended when the site was established. However, because the site provides desirable spatial and local representation, DEQ finds value in continuing to operate it. Consequently, in its 2012 Network Plan, DEQ proposed to designate the PM10 monitor at Broadus as a Special Purpose Monitor producing non-regulatory (SPM-NR), or NAAQS-excluded, data. EPA approved this designation on April 8, 2013. The Broadus PM10 monitor continues to operate under the conditions and designation described above.

2. $PM_{2.5}$ Spatial Scales and Monitoring Methods

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 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 (30-013-0001) which is designated a "middle" range spatial scale remaining from historical monitoring purposes.

The network description table in Appendix C indicates a notation of the monitor classification for all $PM_{2.5}$ monitors operated by DEQ in the column labeled "PM". Monitors designated there as "FRM" or "FEM" generate data suitable for determining compliance with the $PM_{2.5}$ NAAQS. In addition, DEQ has historically operated non-FEM $PM_{2.5}$ monitoring equipment for general information purposes and will continue to do so. These monitors are classified as "Non" in the "PM" column of Appendix C.

3. Quality Assurance Project Plan (QAPP)

Federal rules and associated guidance establish a detailed and appropriate system of quality requirements and direction with respect to ambient monitoring; and 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 by the Montana Board of Environmental Review on February 9, 2018. DEQ is conducting a required 5-year update of its QAPP for resubmission to EPA, and plans to begin operating within an approved version of the revised QAPP before the end of 2023.

II. Proposed Changes to the Monitoring Network

A. Introduction

DEQ regards the requirement to develop and submit an Annual Monitoring Network Plan as an opportunity to review its 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, revisions to the NAAQS and monitoring rules, and the needs of Montana's population to receive appropriate and timely information related to ambient air quality impacts. Based on that breadth of understanding, DEQ attempts to balance monitoring requirements and needs against available resources. In addition, DEQ completes periodic Network Assessments in accordance with 40 CFR 58.10(d). The last Network Assessment was completed in 2020.

Depending on the immediacy of the need for program changes, near-term network modifications are typically proposed in the Annual Network Plan, while longer-term or broader impact evaluation and direction of DEQ's air quality surveillance system is addressed within the periodic Network Assessment. DEQ also anticipates occasional changes to the focus and direction of Montana's Air Monitoring Network in response to federal rulemaking and nation-wide policy direction; and resulting modification proposals follow in an appropriate time window.

Montana DEQ anticipates the following potential changes to its air monitoring network for the 2023 planning period.

B. Lockwood O_3 and NO_2

As referenced in Sections I.A. and I.C. above, DEQ applied for and has received an EPA direct grant in support of enhanced monitoring ("American Rescue Plan Direct Award for Enhancing Continuous Monitoring of $PM_{2.5}$ and Other NAAQS Air Pollutants" grant). One component of the application for this grant included DEQ's plan for installing new NO_2 and O_3 monitors in Billings. That network change received EPA approval in the grant review process and in the 2022 Annual Network Plan. The equipment for installation at the existing Billings-Lockwood monitoring site (30-111-0087) was ordered in July of 2022 but not received until Spring of 2023. Installation, complete testing and checkout, and full operation of this equipment are anticipated before the end of calendar year 2023.

C. $PM_{2.5}$ Network Additions

In implementation of the EPA direct grant referenced in Sections II.B. and II.E.1 of this Plan, DEQ anticipates the establishment of new FEM $PM_{2.5}$ monitoring sites in Choteau, Glendive, and Glasgow in 2023. DEQ plans to begin uploading data from these new FEM instruments to AQS, *AirNow*, and Montana's *Today's Air* website by January 1, 2024. Per this plan, DEQ is also anticipating installation of a new non-FEM Portable Environmental Beta-Attenuation Mass monitor (E-BAM) site in Eureka, Montana. The E-BAM at Eureka will provide data to *Today's Air* and *AirNow* by that same planned deadline.

D. $PM_{2.5}$ Collocated Monitors

Section I.G of this Plan reports that DEQ has added instrumentation of a new method to its $PM_{2.5}$ monitoring network. The instruments installed in Dillon (30-001-0003), Cut Bank (30-035-0006), and Havre (AQS number to be assigned) are Met One Model 1022 continuous FEM monitors. Additionally, the instruments planned for installation in Choteau, Glendive, and Glasgow as described in Section II.C will be of the same FEM method. To ensure continued QA oversight of these instruments and demonstrate compliance with the requirements in 40 CFR 58 Appendix A, Section 3.2.3, DEQ is proposing the following modifications to its established $PM_{2.5}$ QA collocation system in 2023:

At Butte (30-093-0005):

1. Replace the existing Met One Model 1020 monitor (FEM Method 170) currently operating in Butte with a Met One Model 1022 monitor (FEM Method 209). (Butte is presently the designated Model 1020 network collocation site).

2. Designate the new Model 1022 as the Primary $PM_{2.5}$ monitor at the Butte site, and establish it as collocated with the BGI PQ200 manual FRM monitor (FRM Method 116) currently operating at that site.

At NCore (30-049-0004):

1. Designate the existing Met One Model 1020 Monitor at the NCore site as the Primary $PM_{2.5}$ monitor at that site, and establish it as collocated with the BGI PQ200 manual FRM monitor pair (FRM Method 116) currently operating at that site.

Through these changes DEQ will ensure the required QA collocation for both its Model 1020 and Model 1022 $PM_{2.5}$ networks located throughout the state. [Note: The Helena-Rossiter site (30-049-0026) will remain the collocation site for DEQ's network of Thermo Scientific Model 5014i $PM_{2.5}$ monitors. No changes are planned for this site.]

E. Ongoing and Future Network Changes

1. $PM_{2.5}$ Monitoring

Because $PM_{2.5}$ continues to be the pollutant of greatest concern in Montana, DEQ is continuously looking for opportunities to enhance Montana's $PM_{2.5}$ monitoring network to better capture $PM_{2.5}$ impacts and trends in the state. DEQ is particularly focused on better communication of potential $PM_{2.5}$-related health impacts to all of Montana's citizens, especially those living in under-served communities and in at-risk populations. The "American Rescue Plan Direct Award for Enhancing Continuous Monitoring of $PM_{2.5}$ and Other NAAQS Air Pollutants" grant, referenced in sections I.A., C., and G of this Plan, includes funding for equipment to modify and enhance DEQ's $PM_{2.5}$ monitoring network. New equipment approved by EPA in the grant process included the replacement of non-FEM E-BAM $PM_{2.5}$ instruments in Dillon, Cut Bank, and Havre with FEM instrumentation. These network modifications have been completed as discussed in Section I.G.

In addition, DEQ has applied for and received approval for an "Enhanced Air Quality Monitoring for Communities Grant" from EPA. DEQ's grant proposal aimed to address spatial limitations in its existing $PM_{2.5}$ network by installing additional monitoring stations and low-cost sensors in key locations, particularly in communities where air quality information is not currently available.

DEQ's grant application included proposals for six additional FEM monitors, 13 non-FEM E-BAMs, and 164 personal $PM_{2.5}$ sensors. The proposal described a path for transforming Montana's air quality network in a way that is practical, maintainable, and scalable for the future. The result is intended to be a monitoring network that serves more numerous and more diverse communities in this expansive state. The application process has helped formalize DEQ's $PM_{2.5}$ network goals and the proposal will serve as a roadmap for future years of network development. However, the funds from this grant have not yet been distributed, making the timing and actual plan for DEQ's implementation of this project challenging and unclear. We anticipate work on our Community Monitoring project to begin before the end of 2023.

2. Monitoring Network Analysis Related to Population Changes

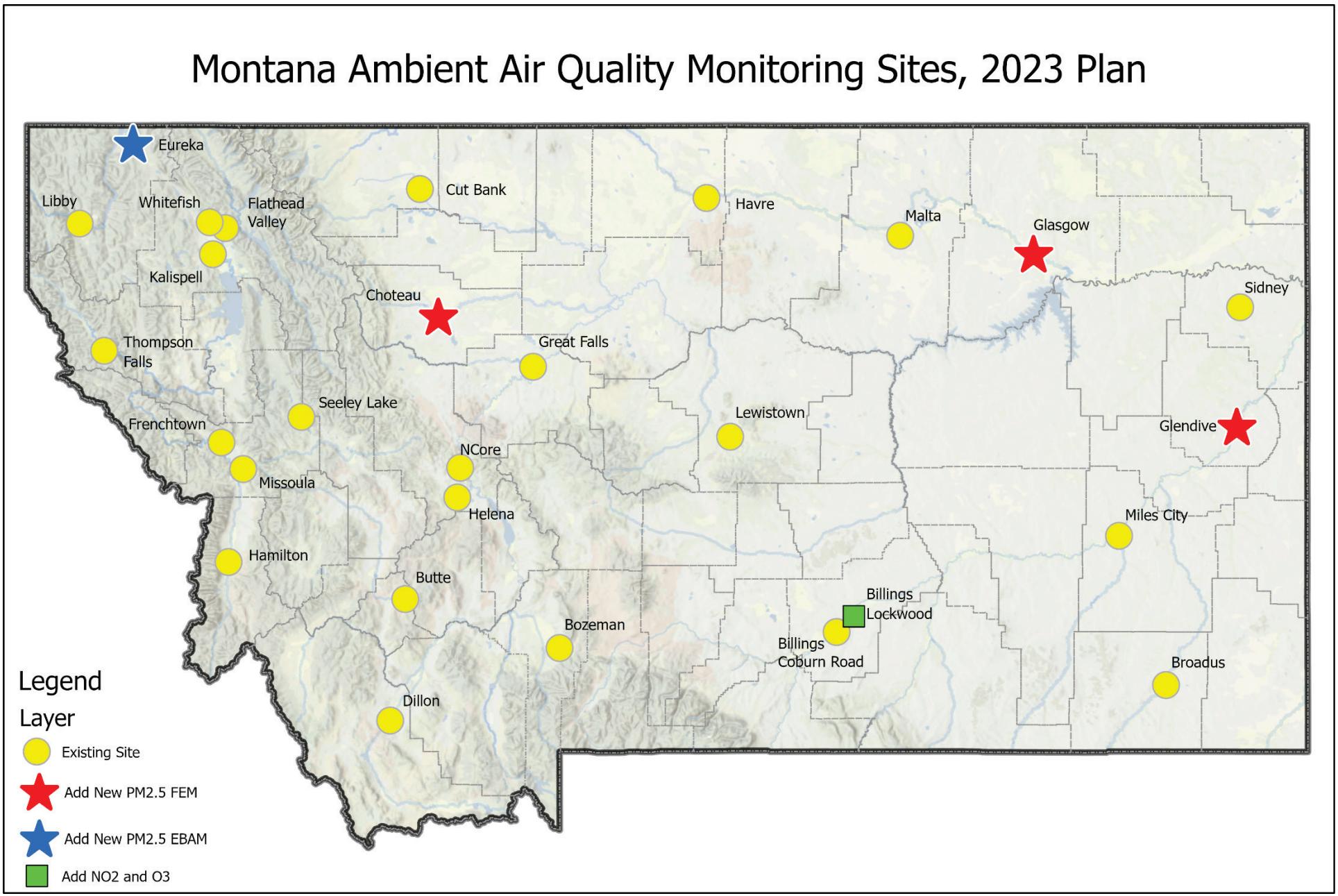
The state of Montana continues to experience significant population changes, with several counties growing dramatically while others are experiencing population declines. Notably, Montana now has three federally designated *Micropolitan* Statistical Areas with populations that are larger than one of its three designated *Metropolitan* Statistical Areas (see the CBSA table in Appendix B). Population growth in these micro-designated areas is predicted to continue at increased rates. Over the next year DEQ plans to evaluate populations and growth trends in these areas with the aim of determining the most appropriate allocation of monitoring assets.

III. Appendices

Appendix A

Monitoring Site Locations

Montana Ambient Air Quality Monitoring Sites, 2023 Plan



Current Ambient Air Monitoring Site Location Summary

AQS No.	City - Site Name	Montana Address	Longitude	Latitude	CBSA	
					Desig-nation	Name and ID Number
30-111-0066	Billings Coburn Road	Coburn Hill Rd.	-108.45878	45.786579	Metro	Billings, MT, 13740
30-111-0087	Billings-Lockwood	2320 Old Hardin Road	-108.426551	45.806357	Metro	Billings, MT, 13740
30-031-0019	Bozeman High School	N 15th Avenue, H.S. Parking Lot	-111.056282	45.683765	Micro	Bozeman, MT, 14580
30-075-0001	Broadus Powder River	Big Powder River Road East	-105.370283	45.440295	--	--
30-093-0005	Butte Greeley School	Alley Between N. Park Pl. and S. Park Pl.	-112.501247	46.002602	Micro	Butte-Silver Bow, MT, 15580
30-035-0006	Cut Bank	Cut Bank Airport, 2705 Valier Hwy, 59427	-112.367003	48.606569	--	--
30-001-0003	Dillon	30 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	Kalispell, MT, 28060
30-063-0037	Frenchtown Beckwith	16134 Beckwith Street	-114.224273	47.012907	Metro	Missoula, MT, 33540
30-013-0001	Great Falls Overlook Park	10th Ave. S. and 2nd St. E.	-111.303317	47.494318	Metro	Great Falls, MT, 24500
30-081-0007	Hamilton PS#46	Madison and 3rd St. S.	-114.158889	46.243621	--	--
30-041-	Havre	300 13th Street West	-109.684538	48.540382	--	--
30-049-0026	Helena Rossiter Pump House	1497 Sierra Rd. East	-112.013089	46.658762	Micro	Helena, MT, 25740
30-029-0047	Kalispell Flathead Electric	E Center St. and Woodland Ave.	-114.305334	48.20054	Micro	Kalispell, MT, 28060
30-027-0006	Lewistown	303 East Aztec Drive	-109.455315	47.048537	--	--
30-053-0018	Libby Courthouse Annex	418 Mineral Ave.	-115.55228	48.391672	--	--
30-071-0010	Malta	2309 Short Oil Road	-107.862471	48.317507	--	--
30-017-0005	Miles City-Pine Hills	3710 Leighton Blvd	-105.81264	46.41141	--	--
30-063-0024	Missoula Boyd Park	3100 Washburn Rd.	-114.020549	46.842297	Metro	Missoula, MT, 33540
30-063-0038	Seeley Lake Elem. School	School Lane	-113.476182	47.17563	Metro	Missoula, MT, 33540
30-083-0002	Sidney 201	Intersection of Hwy 201 and County R 326	-104.676864	47.8679	--	--
30-049-0004	Sieben's Flat NCore	I-15 Exit 209, then Sperry Dr.	-111.987164	46.8505	Micro	Helena, MT, 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	Kalispell, MT, 28060

Appendix B
Montana Core Based Statistical Areas (CBSAs)

Definition of CBSA

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 CBSAs (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 does not have any CSAs.

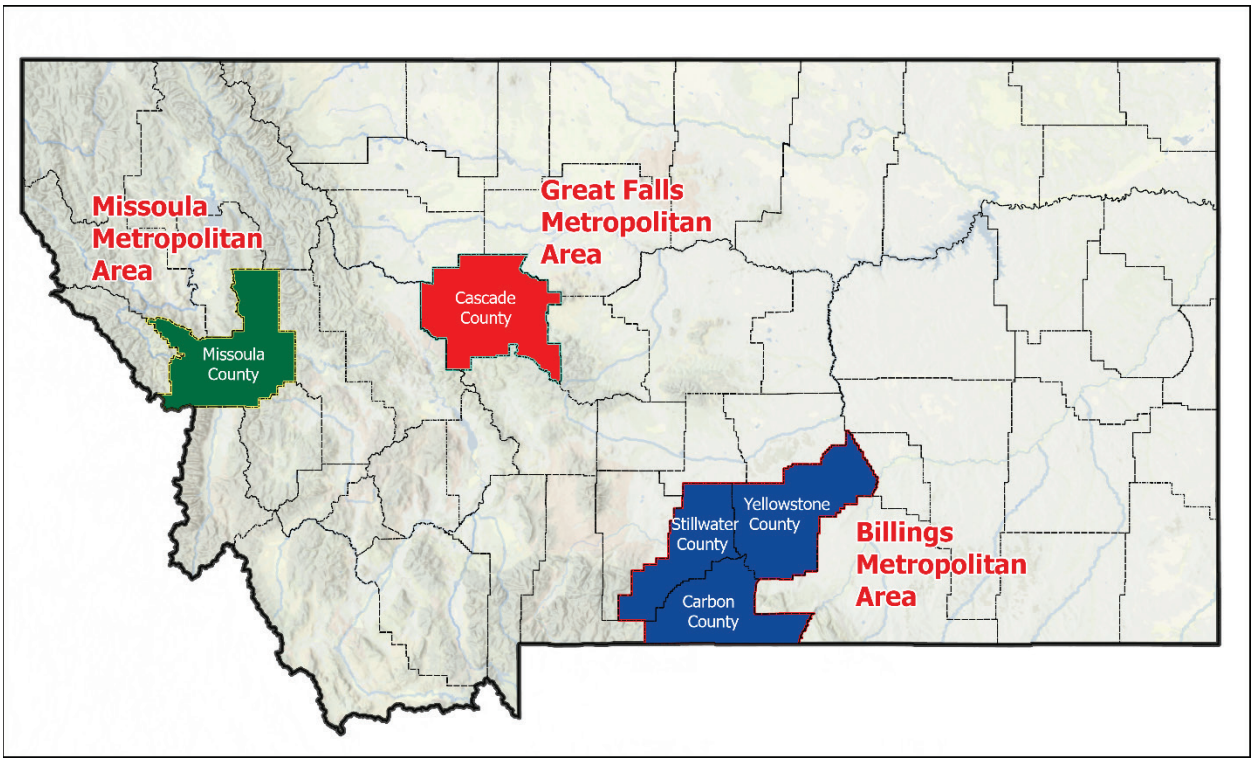
Montana's CBSAs are summarized in the table below with color-correlated map graphics on the following page.

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

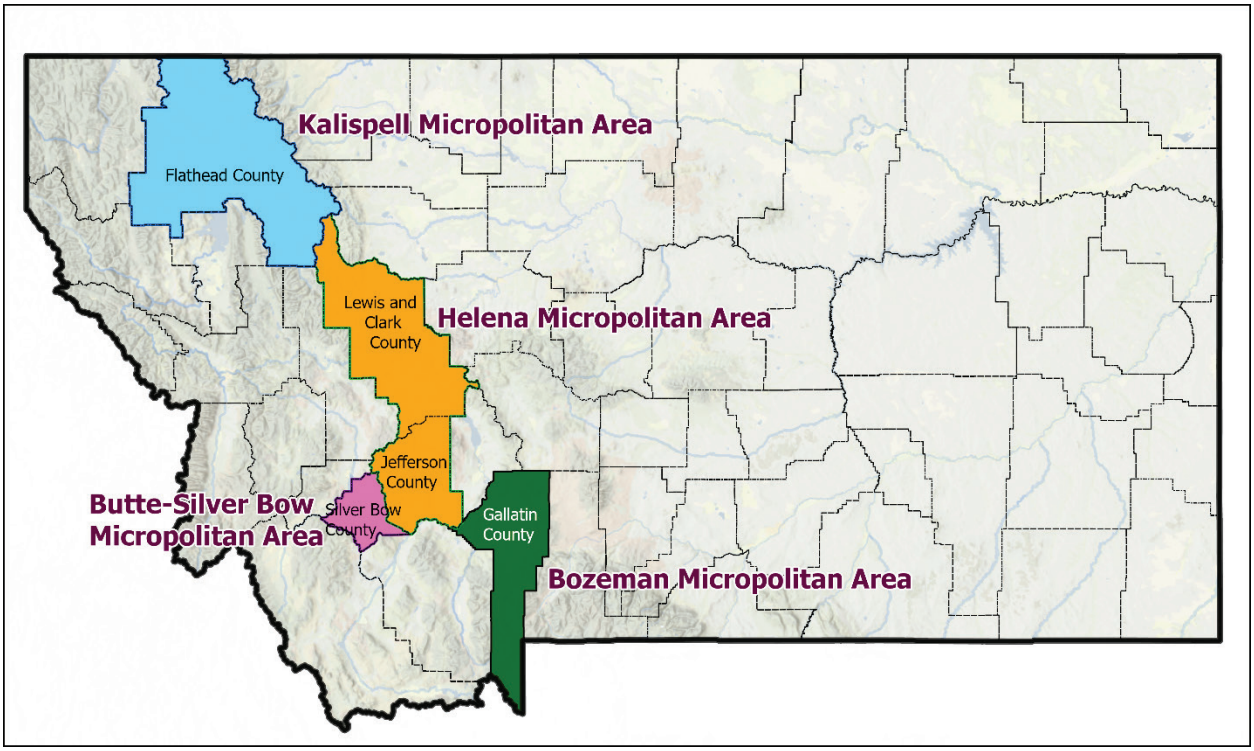
CBSA Code	CBSA Title	Metropolitan or Micropolitan Statistical Area	Estimated Total Population	County/County Equivalent	Estimated County Population	FIPS State Code	FIPS County Code	Central or Outlying County
13740	Billings, MT	**Metro (MSA)**	190,208	Stillwater County	9,177	30	095	Outlying
				Carbon County	11,179	30	009	Outlying
				Yellowstone County	169,852	30	111	Central
33540	Missoula, MT	**Metro (MSA)**	121,041	Missoula County	121,041	30	063	Central
24500	Great Falls, MT	**Metro (MSA)**	84,864	Cascade County	84,864	30	013	Central
14580	Bozeman, MT	**Micro**	124,857	Gallatin County	124,857	30	031	Central
28060	Kalispell, MT	**Micro**	111,814	Flathead County	111,814	30	029	Central
25740	Helena, MT	**Micro**	86,658	Jefferson County	12,826	30	043	Outlying
				Lewis and Clark County	73,832	30	049	Central
15580	Butte-Silver Bow, MT	**Micro**	36,068	Silver Bow County	36,068	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, 2022.

Montana Metropolitan Statistical Areas (MSAs)



Montana Micropolitan Statistical Areas



Appendix C
Monitoring Network Parameter and Equipment Summary

Site Abr.	Site Name	AQS Number	Pollutant	Parameter-POC	Method			Operating Schedule	Type[4]	Monitoring Objective[5]	Spatial Scale	2023 Change ?
					Code	Note[2]	PM[2]					
CB	Billings-Coburn	30-111-0066	SO_2	42401-1	600	7		Continuous	SLAMS	H,S	Neigh.	
			SO_2 - 5 min	42406-1	600	7		Continuous	SLAMS	H,S	Neigh.	
LW	Billings-Lockwood	30-111-0087	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SPM	P	Neigh.	
			NO	*42601-1*	*599*	*10*		*Continuous*	*SLAMS*	*B*	*Regional*	✓
			NO2	*42602-1*	*599*	*10*		*Continuous*	*SLAMS*	*B*	*Regional*	✓
			NOX	*42603-1*	*599*	*10*		*Continuous*	*SLAMS*	*B*	*Regional*	✓
			O3	*44201-1*	*87*	*19*		*Continuous*	*SLAMS*	*B*	*Regional*	✓
BH	Bozeman	30-031-0019	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM (NR)	P	Neigh.	
BD	Broadus	30-075-0001	NO	42601-1	574	11		Continuous	SLAMS	B	Regional	
			NO_2	42602-1	574	11		Continuous	SLAMS	B	Regional	
			NO_x	42603-1	574	11		Continuous	SLAMS	B	Regional	
			O_3	44201-1	47	9		Continuous	SLAMS	B	Regional	
			PM_{10} [1]	81102-1	150	15	FEM	Continuous	SPM (NR)	B	Neigh.	
			$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	B	Regional	
BN	Butte-Greeley	30-093-0005	PM_{10} [1]	81102-4	122	4	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-3	209	18	FEM	Continuous	SLAMS	H,P, QA Coll	Neigh.	✓
			$PM_{2.5}$	88101-2	116	2	FRM	1 in 6 Coll	SLAMS	QA Coll	Neigh.	✓
			$PM_{2.5}$ Spc'n	Various		6		1 in 6	SLAMS CSN	H,P	Neigh.	
	Cut Bank	30-035-0006	$PM_{2.5}$	88101-3	209	18	FEM	Continuous	SLAMS	P	Neigh.	
DN	Dillon	30-001-0003	$PM_{2.5}$	88101-3	209	18	FEM	Continuous	SLAMS	P	Neigh.	
FV	Flathead Valley	30-029-0049	PM_{10} [1]	81102-1	122	4	FEM	Continuous	SLAMS	P	Neigh	
			$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	P	Neigh	
FT	Frenchtown	30-063-0037	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	P	Neigh.	
OP	Great Falls-OP	30-013-0001	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM (NR)	H,P	Middle	
PS	Hamilton	30-081-0007	$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	H,P	Neigh.	
	Havre	30-041-XXXX	$PM_{2.5}$	88101-1	209	18	FEM	Continuous	SLAMS	P	Neigh.	
RP	Helena-Rossiter	30-049-0026	$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-4	170	8	FEM	Continuous	SPM	QA Cont-Coll	Neigh.	
			$PM_{2.5}$	88101-2	116	2	FRM	1 in 6 Coll	SLAMS	QA Coll	Neigh.	
FE	Kalispell-FEC	30-029-0047	PM_{10} [1]	81102-1	122	4	FEM	Continuous	SLAMS	H,P	Neigh.	
LB	Libby	30-053-0018	PM_{10} [1]	81102-1	150	15	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	H,P	Neigh.	
LT	Lewistown	30-027-0006	NO	42601-1	599	10		Continuous	SPM	B	Regional	
			NO_2	42602-1	599	10		Continuous	SPM	B	Regional	
			NO_x	42603-1	599	10		Continuous	SPM	B	Regional	
			O_3	44201-1	47	9		Continuous	SPM	B	Regional	
			PM_{10} [1]	81102-1	150	15	FEM	Continuous	SPM	B	Neigh.	
			$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SPM	B	Regional	
ML	Malta	30-071-0010	NO	42601-1	599	10		Continuous	SPM	B	Regional	
			NO_2	42602-1	599	10		Continuous	SPM	B	Regional	
			NO_x	42603-1	599	10		Continuous	SPM	B	Regional	
			O_3	44201-1	47	9		Continuous	SPM	B	Regional	
			PM_{10} [1]	81102-1	150	15	FEM	Continuous	SPM	B	Neigh.	
			$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SPM	B	Regional	
MC	Miles City-Pine Hills	30-017-0005	NO	42601-1	599	10		Continuous	SLAMS	B	Regional	
			NO_2	42602-1	599	10		Continuous	SLAMS	B	Regional	
			NO_x	42603-1	599	10		Continuous	SLAMS	B	Regional	
			O_3	44201-1	87	19		Continuous	SLAMS	B	Regional	
			PM_{10} [1]	81102-1	150	15	FEM	Continuous	SLAMS	B	Neigh.	
			$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	B	Regional	
MS	Missoula-Boyd	30-063-0024	O_3	44201-1	47	9		Continuous	SLAMS	P	Neigh.	
			PM_{10} [1]	81102-6	122	4	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	H,P	Neigh.	
NC	NCore-Sieben Flats	30-049-0004	CO	42101-1	554	13		Continuous	SLAMS	B	Region	
			NO	42601-1	674	14		Continuous	SLAMS	B	Region	
			NOy	42600-1	674	14		Continuous	SLAMS	B	Region	
			O_3	44201-1	47	9		Continuous	SLAMS	B	Region	
			SO_2	42401-1	600	7		Continuous	SLAMS	B	Region	
			SO_2 - 5 min	42406-1	600	7		Continuous	SLAMS	B	Region	
			$PM_{2.5}$	88101-3	170	8	FEM	Continuous	SLAMS	B, QA Coll	Region	✓
			$PM_{2.5}$	88101-1	116	2	FRM	1 in 6	SLAMS	QA Coll	Region	✓
			$PM_{2.5}$	88101-2	116	2	FRM	1 in 6	SLAMS	QA Coll	Region	✓
			$PM_{2.5}$ Spc'n	Various		6		1 in 3	SLAMS CSN	B	Region	
			$PM_{10-2.5}$	86101-1	185	12	FEM	Continuous	SLAMS	B	Region	
SE	Seeley Lake	30-063-0038	$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM (NR)	H,P	Neigh.	
SD	Sidney 201	30-083-0002	NO	42601-1	599	10		Continuous	SLAMS	S	Neigh.	
			NO_2	42602-1	599	10		Continuous	SLAMS	S	Neigh.	
			NO_x	42603-1	599	10		Continuous	SLAMS	S	Neigh.	
			O_3	44201-1	47	9		Continuous	SLAMS	S	Neigh.	
			SO_2	42401-1	600	7		Continuous	SLAMS	S	Neigh.	
			SO_2 - 5 min	42406-1	600	7		Continuous	SLAMS	S	Neigh.	
			PM_{10} [1]	81102-1	150	15	FEM	Continuous	SLAMS	S	Neigh.	
			$PM_{2.5}$	88101-3	183	16	FEM	Continuous	SLAMS	S	Neigh.	
TF	Thompson Falls	30-089-0007	PM_{10} [1]	81102-3	122	4	FEM	Continuous	SLAMS	H, P	Neigh.	
			$PM_{2.5}$	88502-3	731	5	Non	Continuous	SPM (NR)	P	Neigh.	
DE	Whitefish	30-029-0009	PM_{10} [1]	81102-1	122	4	FEM	Continuous	SLAMS	P	Neigh.	
	Choteau	*Planned*	$PM_{2.5}$	88101-3	209	18	FEM	Continuous	SLAMS	P	Neigh.	✓
	Glendive	*Planned*	$PM_{2.5}$	88101-3	209	18	FEM	Continuous	SLAMS	P	Neigh.	✓
	Glasgow	*Planned*	$PM_{2.5}$	88101-3	209	18	FEM	Continuous	SLAMS	P	Neigh.	✓
	Eureka	*Planned*	$PM_{2.5}$	88502-3		17	Non	Continuous	SPM (NR)	P	Neigh.	✓

See notes next page…

Pollutant

(1) **PM_{10} measurements** are reported in both Standard (STD) and local Actual (ACT) conditions.

Method

(2) **Note**

1 Reserved
2 BGI-PQ200 with very sharp cut cyclone (FRM)
4 Met One BAM 1020 Beta Attenuation Monitor (PM10 FEM)
5 Met One BAM 1020 Beta Attenuation Monitor with PM2.5 sharp cut cyclone (SCC)
6 Met One / URG Speciation Air Sampling System
7 Teledyne API Model T100U Ultraviolet SO_2 fluorescence (FEM)
8 Met One FEM BAM 1020 with PM2.5 very sharp cut cyclone Beta attenuation monitor (PM2.5 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 Met One BAM1020 PM10-2.5 measurement system -- Paired beta attenuation monitors (FEM)
13 Thermo Model 48i-TLE enhanced trace level CO analyzer
14 Thermo Model 42i-Y. 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 Met One E-BAM Beta Attenuation Monitor with PM2.5 sharp cut cyclone (SCC)
18 Met One 1022 FEM E-BAM Beta Attenuation Monitor with PM2.5 very sharp cut cyclone (SCC)
19 Teledyne API Model T400 UV Photometric O_3 analyzer (FEM)

(3) **PM --**Monitor Type: FEM = Federal Equivalent Method, FRM = Federal Reference Method,
Non = Not FEM or FRM method

Type

(4) **Monitor Site Type:**

SLAMS : State or Local Air Monitoring Station
SPM : Special Purpose Monitor
CSN : Chemical Speciation Network
(NR) : Non-Regulatory Data

Operating Schedule

Continuous : Samples continuously, reports a result at the end of each hour
1 in 6 : Collects a 24-hour sample every 6 days
1 in 3 : Collects a 24-hour sample every 3 days

Monitoring Objective

(5) **Monitoring Objective Descriptions:**

B = Background, H = Highest Concentration, P = Population Exposure,
S = Source Impact, QA Coll = Quality Assurance Collocated Monitor
QA Coll : FRM / Continuous-FEM Collocation
QA Cont-Coll : Continuous-FEM / Continuous-FEM Collocation

Appendix D
Ambient Air Quality Network 2022 Raw Data Summary

Montana DEQ Ambient Air Monitoring Network Summary

Summary for Period: 1/1/2022 through 12/31/2022 Exceptional Events Included

The data below may not be final, and can be revised upon full quality assurance review.

Site	Parameter	Units	Min	Max	Average	Data Capt %	# >NAAQS	#>85% NAAQS	NAAQS
Billings - Coburn Road	SO2	ppb	0	37	1	98	0	0	75
Billings Lockwood	PM25	ug/m3	0.8	61.8	6.7	100	2	3	35
Bozeman High School	PM25	ug/m3	1.6	54.5	6.9	100	4	4	35
Broadus - Powder River	NO2	ppb	0	13	0	92	0	0	100
Broadus - Powder River	OZONE	ppm	0.004	0.067	0.032	98	0	33	0.07
Broadus - Powder River	PM10 STD	ug/m3	1	168	23	96	1	1	150
Broadus - Powder River	PM25	ug/m3	0	38.5	5.9	100	2	3	35
Butte - Greeley School	PM10 STD	ug/m3	3	122	20	98	0	0	150
Butte - Greeley School	PM25	ug/m3	0.2	70.8	7.7	96	9	14	35
Cut Bank (combined EBAM and 1022)	PM25	ug/m3	-1.7	41	3	60	1	2	35
Dillon (combined EBAM and 1022)	PM25	ug/m3	-0.8	64	3	60	5	8	35
Flathead Valley (Columbia Falls HS)	PM10 STD	ug/m3	0	68	12	98	0	0	150
Flathead Valley (Columbia Falls HS)	PM25	ug/m3	-1.3	57	8.4	99	3	8	35
Frenchtown - Beckwith	PM25	ug/m3	2.4	99.9	10.8	99	8	10	35
Great Falls - Overlook Park	PM25	ug/m3	0.8	46.4	5.3	98	2	5	35
Hamilton	PM25	ug/m3	-0.2	188.2	8.5	99	11	13	35
Helena - Rossiter Pump House	PM25	ug/m3	0.5	77.8	8.3	100	6	9	35
Helena - Rossiter Pump House	PM25 COL	ug/m3	1.5	71.1	8.6	100	6	8	35
Kalispell - Flathead Electric	PM10 STD	ug/m3	8	84	24	99	0	0	150
Lewistown	NO2	ppb	0	14	0	98	0	0	100
Lewistown	OZONE	ppm	0.007	0.12	0.036	98	1	23	0.07
Lewistown	PM10 STD	ug/m3	0	60	8	100	0	0	150
Lewistown	PM25	ug/m3	-0.4	44.1	4.1	100	2	3	35
Libby - Courthouse Annex	PM10 STD	ug/m3	1	101	15	100	0	0	150
Libby - Courthouse Annex	PM25	ug/m3	0	88.6	11.9	100	6	12	35
Malta	NO2	ppb	0	17	0	95	0	0	100
Malta	OZONE	ppm	0.002	0.057	0.031	98	0	0	0.07
Malta	PM10 STD	ug/m3	0	94	10	100	0	0	150
Malta	PM25	ug/m3	-1	29.4	4.1	100	0	0	35
Miles City	NO2	ppb	0	35	3	98	0	0	100
Miles City	OZONE	ppm	0	0.067	0.03	98	0	43	0.07
Miles City	PM10 STD	ug/m3	1	63	11	84	0	0	150
Miles City	PM25	ug/m3	0.8	24.4	5	97	0	0	35
Missoula - Boyd Park	OZONE	ppm	0	0.067	0.024	99	0	28	0.07
Missoula - Boyd Park	PM10 STD	ug/m3	2	146	16	99	0	2	150
Missoula - Boyd Park	PM25	ug/m3	-2.1	110.5	6.2	99	6	9	35
NCore - Sieben's Flat	CO TRACE	ppb	40	773	129	92	0	0	35000
NCore - Sieben's Flat	NOY	ppb	0	10.8	1.2	89			--
NCore - Sieben's Flat	OZONE	ppm	0.006	0.063	0.036	98	0	25	0.07
NCore - Sieben's Flat	PM10 STD	ug/m3	0	74	7	98	0	0	150
NCore - Sieben's Flat	PM25	ug/m3	-1.5	57.9	4.1	98	5	6	35
NCore - Sieben's Flat	PMCOARSE	ug/m3	0	70	3	98			--
NCore - Sieben's Flat	SO2	ppb	0	1.6	0.4	97	0	0	75
Seeley - Elementary School	PM25	ug/m3	0.4	72.4	12.4	100	10	19	35
Sidney	NO2	ppb	0	20	1	97	0	0	100
Sidney	OZONE	ppm	0.007	0.11	0.033	97	1	1	0.07
Sidney	PM10 STD	ug/m3	0	68	11	99	0	0	150
Sidney	PM25	ug/m3	-0.2	24.2	4.8	94	0	0	35
Sidney	SO2	ppb	0	9.2	0.4	96	0	0	75
Thompson Falls High School	PM10 STD	ug/m3	10	119	22	100	0	0	150
Thompson Falls High School	PM25	ug/m3	1.3	85.9	8.1	100	4	5	35
Whitefish - Dead End	PM10 STD	ug/m3	4	119	26	95	0	0	150

NAAQS averaging times (for reference only):

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

Appendix E
$PM_{2.5}$ Speciation Analytes

CSN Parameters

Param Code	Parameter Description	Filter Type	Sampler	Method Code	Unit Code	Unit Description
88401	Reconstructed Mass PM2.5 LC	All	Calculated	819	105	ug/m3 (LC)
68105	Avg. Ambient Temp	Teflon & Nylon	MetOne SASS/SuperSASS	810	017	Degrees C
68108	Avg. Ambient Pressure	Teflon & Nylon	MetOne SASS/SuperSASS	810	059	Millimeters (Hg)
68112	Sample Flow Rate CV	Nylon	MetOne SASS/SuperSASS	812	107	Percent
68115	Sample Volume	Nylon	MetOne SASS/SuperSASS	812	065	Cubic meter
88203	Chloride Ion	Nylon	MetOne SASS/SuperSASS	812	105	ug/m3 (LC)
88301	Ammonium Ion	Nylon	MetOne SASS/SuperSASS	812	105	ug/m3 (LC)
88302	Sodium Ion	Nylon	MetOne SASS/SuperSASS	812	105	ug/m3 (LC)
88303	Potassium Ion	Nylon	MetOne SASS/SuperSASS	812	105	ug/m3 (LC)
88306	Total Nitrate	Nylon	MetOne SASS/SuperSASS	812	105	ug/m3 (LC)
88403	Sulfate	Nylon	MetOne SASS/SuperSASS	812	105	ug/m3 (LC)
88502	PM2.5 mass	Teflon	MetOne SASS/SuperSASS	810	105	ug/m3 (LC)
68111	Sample Flow Rate CV	Teflon	MetOne SASS/SuperSASS	810	107	Percent
68114	Sample Volume	Teflon	MetOne SASS/SuperSASS	810	065	Cubic meter
88348	Soil PM2.5 LC	Teflon	Calculated (SASS)	818	105	ug/m3 (LC)
88102	Antimony (Sb)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88103	Arsenic (As)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88104	Aluminum (Al)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88107	Barium (Ba)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88109	Bromine (Br)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88110	Cadmium (Cd)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88111	Calcium (Ca)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88112	Chromium (Cr)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88113	Cobalt (Co)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88114	Copper (Cu)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88115	Chlorine (Cl)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88117	Cerium (Ce)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88118	Cesium (Cs)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88126	Iron (Fe)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88128	Lead (Pb)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88131	Indium (In)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88132	Manganese (Mn)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88136	Nickel (Ni)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88140	Magnesium (Mg)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88152	Phosphorous (P)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88154	Selenium (Se)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88160	Tin (Sn)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88161	Titanium (Ti)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88164	Vanadium (V)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88165	Silicon (Si)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88166	Silver (Ag)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88167	Zinc (Zn)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88168	Strontium (Sr)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88169	Sulfur (S)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88176	Rubidium (Rb)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88180	Potassium (K)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88184	Sodium (Na)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
88185	Zirconium (Zr)	Teflon	MetOne SASS/SuperSASS	811	105	ug/m3 (LC)
68113	Sample Flow Rate CV	Quartz	URG 3000N	838	107	Percent
68116	Sample Volume	Quartz	URG 3000N	838	065	Cubic meter
68117	Avg. Ambient Temp	Quartz	URG 3000N	838	017	Degrees C
68118	Avg. Ambient Pressure	Quartz	URG 3000N	838	059	Millimeters (Hg)
88320	OC PM2.5 LC TOR	Quartz	URG 3000N	838	105	ug/m3 (LC)
88321	EC PM2.5 LC TOR	Quartz	URG 3000N	838	105	ug/m3 (LC)
88324	OC1 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88325	OC2 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88326	OC3 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88327	OC4 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88328	OP PM2.5 LC TOR	Quartz	URG 3000N	838	105	ug/m3 (LC)
88329	EC1 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88330	EC2 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88331	EC3 PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88355	OC CSN Unadj. PM2.5 LC TOT	Quartz	URG 3000N	838	105	ug/m3 (LC)
88357	EC CSN Unadj. PM2.5 LC TOT	Quartz	URG 3000N	838	105	ug/m3 (LC)
88370	OC CSN Unadj. PM2.5 LC TOR	Quartz	URG 3000N	838	105	ug/m3 (LC)
88374	OC1 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88375	OC2 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88376	OC3 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88377	OC4 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88378	OP CSN Unadj. PM2.5 LC TOR	Quartz	URG 3000N	838	105	ug/m3 (LC)
88379	OP PM2.5 LC TOT	Quartz	URG 3000N	838	105	ug/m3 (LC)
88380	EC CSN Unadj. PM2.5 LC TOR	Quartz	URG 3000N	838	105	ug/m3 (LC)
88381	EC PM2.5 LC TOT	Quartz	URG 3000N	838	105	ug/m3 (LC)
88382	OC PM2.5 LC TOT	Quartz	URG 3000N	838	105	ug/m3 (LC)
88383	EC1 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88384	EC2 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88385	EC3 CSN Unadj. PM2.5 LC	Quartz	URG 3000N	838	105	ug/m3 (LC)
88388	OP CSN Unadj. PM2.5 LC TOT	Quartz	URG 3000N	838	105	ug/m3 (LC)

OC Organic Carbon
EC Elemental Carbon
OP Organic Pyrolized Carbon (?)

Teflon filters are for elements.
Nylon filters are for ions.
Quartz filters are for carbon.

LC: Local Conditions of Temp and Press

SASS: 40 URG: 26 Total Params: 66

Appendix F
National and Montana Ambient Air Quality Standards

National Ambient Air Quality Standards					
Pollutant	**Primary/ Secondary**	**Averaging Time**	**Level**	**Form**	***Montana Ambient Air Quality Standards****
CO Carbon Monoxide	primary	8-hour (Average Backward)	**9 ppm**	Not to be exceeded more than once per year	*9 ppm*
		1-hour	**35 ppm**		*23 ppm*
NO_2 Nitrogen Dioxide	primary	1-hour	**100 ppb**	98th percentile of 1-hr daily max conc., avg'd over 3 years	*0.30 ppm*
	primary and secondary	Annual	**53 ppb** (2)	Annual Mean	*0.05 ppm*
O_3 Ozone	primary and secondary	8-hour (Average Forward)	**0.070 ppm** (3)	Annual fourth-highest daily maximum 8-hr concentration,	--
					1-hour 0.10 ppm
SO_2 Sulfur Dioxide	primary	1-hour	**75 ppb** (4)	99th percentile of 1-hour daily max concentrations, avg'd over 3 years	*0.50 ppm*
	secondary	3-hour	**0.5 ppm**	Not to be exceeded more than once per year	--
					24-hour 0.10 ppm
					Annual 0.02 ppm
Pb Lead	primary and secondary	Rolling 3 month average	**0.15 µg/m^3** (1)	Not to be exceeded	--
	primary	*Quarterly Average*	***1.5 µg/m^3*** (1)	*Remains in effect only in E. Helena N.A. Area*	*1.5 µg/m^3*
$PM_{2.5}$ Particulate Matter	primary	Annual	**12.0 µg/m^3**	annual mean, averaged over 3 years	--
	secondary	Annual	**15.0 µg/m^3**	annual mean, averaged over 3 years	--
	primary and secondary	24-hour	**35 µg/m^3**	98th percentile, averaged over 3 years	--
PM_{10}	primary and secondary	24-hour	**150 µg/m^3**	Not to be exceeded more than once per year on average over 3 years	*150 µg/m^3*
					Annual 50 µg/m^3

*** MAAQS** also include: **Fluoride in forage,** monthly: 50 µg/g & grazing season: 35 µg/g; **H_2S** hourly: 0.05 ppm; **Settleable PM** 30-day avg: 10 g/m^2

(**1**) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

(**2**) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(**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.

(**4**) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Appendix G

Annual SO_2 Data Requirements Rule Report

Annual SO_2 Data Requirements Rule Report

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 Colstrip Steam Electric Generating Station, a coal-fired power plant located in Rosebud County, was the sole source in Montana to which this rule applied. As required in the rule for characterizing air quality for the primary 2010 SO_2 NAAQS, Montana DEQ submitted the appropriate designation of attainment for Rosebud County to the EPA, as demonstrated through modeling, on December 20, 2016. On January 9, 2018, EPA classified Rosebud County as Attainment/Unclassifiable (40 CFR Part 81).

The SO_2 DRR (40 CFR 51.1205), requires DEQ to submit an annual report of SO_2 emissions at Talen Montana, LLC's Colstrip Steam Electric Generating Station; an assessment of the cause of any emission increases compared with modeled emissions; and a recommendation regarding if additional modeling is needed to ensure compliance with the rule. The report may be submitted directly or included as an Appendix to the agency's Annual Network Plan document. The following information is provided to meet those requirements.

1. Summary of Emissions

Table G-1 shows a summary of the three years of actual emissions modeled for the DRR compared to 2022 actual emissions as provided by Talen Montana, LLC for each of its coal-fired emitting units.

TableG-1. Emission Summary at Colstrip Steam Electric Generating Station

Modeled Emission Sources	Modeled Actual SO_2 Emissions (tons/year)				2022 Actual SO_2 Emissions (tons/year)	Actual Emissions Compared to Modeled Average
	2012	2013	2014	Average (2012-2014)		
Unit 1	2,212.03	4,109.70	2,467.51	2,929.74	0.0	-100%
Unit 2	2,589.72	4,889.66	3,393.30	3,624.23	0.0	-100%
Unit 3	2,144.72	2,533.16	2,057.54	2,245.14	2,376.03	6%
Unit 4	2,257.88	942.34	2,303.83	1,834.68	2,375.57	29%
Colstrip Total	**9,204.35**	**12,474.86**	**10,222.18**	**10,633.79**	**4,751.59**	**-55%**

2. Recommendation Regarding Additional Modeling

Total actual emissions from the Colstrip plant are significantly less than the modeled emissions; therefore, no further modeling is recommended to show compliance with the 1-hour SO_2 NAAQS.

Appendix H
Public Inspection and Comments

Public Inspection and Comments

This Plan was made available for a 30-day period of public inspection and comment beginning on May 25, 2023. No public comments were received.