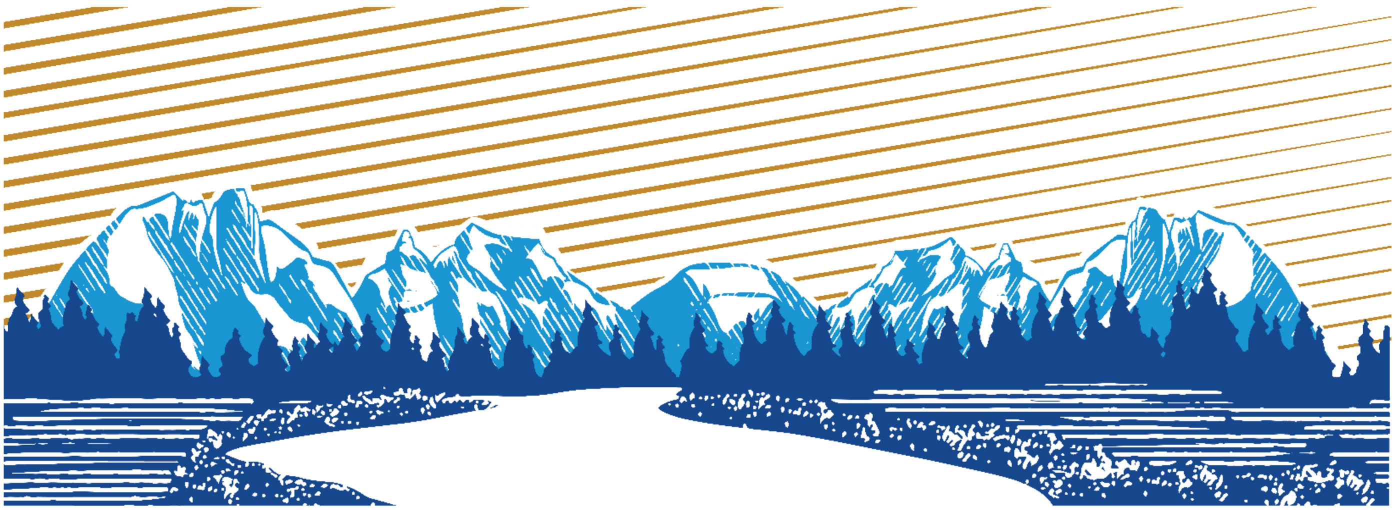
Montana Department of Environmental Quality

AIR QUALITY

2024 ANNUAL MONITORING NETWORK PLAN



June 25, 2024

DEQ
MONTANA

Montana Department of Environmental Quality
Air Quality Bureau

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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. Within that context, the Plan then summarizes the results of monitoring conducted during the previous calendar year. Finally, 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, explains how and why DEQ has implemented each, and summarizes the results of monitoring conducted in the previous calendar year.
- **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

Ambient Air and Criteria Pollutants

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 in ambient air are currently regulated and 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 measures concentrations of an additional PM fraction referred to as PM_{coarse} or $PM_{10-2.5}$ which is the airborne portion of PM_{10} larger in aerometric diameter than $PM_{2.5}$.

For each criteria air pollutant, NAAQS limits are established and implemented 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., asthma or COPD), 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.

Measuring Criteria Pollutants

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 types, locations and numbers of required monitors within each state are based primarily on population size and density and, to a lesser degree, on measured air quality concentrations in comparison to the NAAQS. However, air pollution impacts unique to an individual state or localities within a state can lead to the operation of monitors beyond those that are required by federal rule. This dynamic is true in the state of Montana, most particularly in regard to the impacts of $PM_{2.5}$ as discussed in detail in Sections I.G. and II.B. and E. of this document. As a result, Montana DEQ's air monitoring network is established and operated in conformance with the federal requirements as a baseline, with other types, locations and numbers of monitors added to meet the specific needs of Montana. To that end, the DEQ air monitoring network design and operation is conducted in conformity with three essential overall objectives 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 (the NAAQS) and emissions strategy development.
3. Support air pollution research studies.

The content of this Plan reflects the pursuit of these three objectives.

Designations of Higher-Populated Areas

As noted above, the federal rules directing monitoring network design focus significantly on human population size and density. When assessing these factors, the rules use population-based designations established by the federal Office of Management and Budget (OMB) 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. In previous years and until July 21, 2023, Montana had three federally designated MSAs: Billings, Great Falls, and Missoula; and four Micropolitan Statistical Areas: Kalispell, Helena, Butte-Silver Bow, and Bozeman. On July 21, 2023, the OMB revised many CBSA designations across the United States. Subsequently, and as described in Appendix B to this Plan, there are now five federally designated MSAs in Montana: Billings, Bozeman, Great Falls, Helena, and Missoula. In addition, there are two federally designated Micro Statistical Areas in the state: Kalispell, and Butte-Silver Bow. These population-summarizing designations are used throughout this Plan document.

Metrics for NAAQS Compliance

The means of assessing whether monitored ambient air pollution concentrations are within the federal NAAQS limits is reflected in a concept referred to as a "design value." A design value is a statistic that describes the air quality status of a criteria pollutant at 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 mathematically transformed into the same units as the NAAQS. In the example above, the hourly measured values must be assembled into a three-year average (the design value) so that a direct comparison may be made with the corresponding NAAQS limits. Design values for each criteria pollutant are communicated in detail in 40 CFR Part 50 and are referred to throughout this Plan document.

I. 2023 Ambient Air Monitoring Network Summary

This section summarizes the ambient air monitoring requirements for each of the criteria air pollutants and explains DEQ's implementation of those requirements through calendar year 2023. Proposed changes to the monitoring network are detailed in Section II.

A. O_3 Monitoring

Required O_3 Monitoring

The minimum number of ozone (O_3) monitors required in a network is defined by the federal Design Criteria found in Section 4.1 of Appendix D to 40 CFR Part 58. 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 Metropolitan Statistical Areas (MSAs).
(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 people.

As introduced in the *Background* Section above, and described in Appendix B to this Plan, Montana had three designated MSAs through most of 2023, and all three of those MSAs fall within the 50,000 to 350,000 population range listed in Table 1. In the Billings MSA, DEQ conducted O_3 monitoring from 2005 to 2007 (station number 30-111-0086). Because the resulting 8-hour O_3 design value was less than 85% of the primary and secondary NAAQS, the monitoring was discontinued. However, because Billings remains Montana's largest metropolitan area and continues to grow in population, DEQ re-initiated O_3 monitoring in the Billings area, as approved by EPA in the DEQ 2022 Network Plan Process. This monitor is discussed further in the Section below titled "Changes to O_3 Monitoring."

In the Missoula MSA, O_3 monitoring has been conducted continuously since June 1 of 2010 and continues in 2024.

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. In addition, the population of Great Falls has been surpassed by other communities in Montana. DEQ resources for O_3 monitoring in the state were focused elsewhere through 2023, as described in the following.

Additional O_3 Monitoring

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. To assess these data needs O_3 monitoring was conducted through 2023 at the sites listed in Table 2.

Table 2 – Montana DEQ 2023 O_3 Monitoring Sites

Station Name	AQS Code
Broadus	30-075-0001
Lewistown	30-027-0006
Malta	30-071-0010
Miles City	30-017-0005
Missoula	30-063-0024
NCore	30-049-0004
Sidney	30-083-0002

Appendix A of this Plan provides a map displaying the locations of these sites and a table listing their physical and GPS locations.

Table 3 summarizes the 8-hour rolling average O_3 values measured at the monitoring sites operated by DEQ during the federally designated 2023 ozone season (April through September for Montana). Table 4 summarizes the 8-hour O_3 values measured at monitoring sites operated by DEQ during the entire 2023 calendar year.

Table 3 – 8-Hour Rolling Monitored O_3 Values for the 2023 Ozone Season (1)

Station	Concentrations (ppm)			NAAQS Design Values (ppm) (2)		NAAQS
	Minimum	Maximum	Average	2023 (3)	2021 – 2023	
Broadus	0.009	0.061	0.038	0.060	0.062	0.070
Lewistown	0.010	0.062	0.038	0.059	0.063	
Malta	0.008	0.059	0.035	0.059	0.058	
Miles City (4)	0.003	0.068	0.034	0.059	0.058 (4)	
Missoula	0.003	0.058	0.030	0.055	0.058	
NCore	0.007	0.067	0.038	0.061	0.061	
Sidney	0.008	0.069	0.036	0.065	0.063	

(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 2023 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 complete 3-year design value is not yet available.

Table 4 – 8-Hour Rolling Monitored O_3 2023 Annual Values

Station	Concentrations (ppm)		
	Minimum	Maximum	Average
Broadus	0.007	0.061	0.035
Lewistown	0.010	0.062	0.037
Malta	0.007	0.065	0.033
Miles City	0.001	0.068	0.029
Missoula	0.000	0.058	0.023
NCore	0.007	0.067	0.036
Sidney	0.005	0.069	0.034

As demonstrated in Tables 3 and 4, relatively 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. However, increasing numbers, duration, and severity of wildfires both inside and outside state boundaries appear to be increasing measured O_3 concentrations.

Changes to O_3 Monitoring

The network analysis documented in DEQ's 2023 Annual Monitoring Plan determined that the monitoring objectives of two of the sites listed in Tables 2 through 4 were complete. Therefore, DEQ proposed, and received EPA approval, to discontinue O_3 monitoring at the Broadus and Malta sites at the end of 2023. O_3 monitoring at both of these sites was completed at midnight on December 31, 2023.

DEQ's Annual Network Plan for 2022 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 installed at the existing Lockwood monitoring site (30-111-0087) during calendar year 2023 to begin reporting data to the EPA AQS database on January 1, 2024.

The overall population of Montana is increasing, with notable growth in communities outside the three designated MSAs. These population changes were reflected in the OMB/Census Bureau modifications to CBSA designations in Montana published on July 21, 2023, which resulted in the assignment of new MSAs surrounding Helena and Bozeman, and modification of the Missoula MSA. DEQ believes that corresponding modifications to its O_3 monitoring network are warranted, though not required. A discussion of proposed O_3 monitoring changes in 2024 is contained in Section II.D.

O_3 Related PAMS Monitoring

The monitoring directives in 40 CFR Appendix D, Section 5 contain specific requirements for the operation of Photochemical Assessment Monitoring Stations (PAMS) for ozone precursor monitoring at NCore sites located in CBSAs with a population of one million or more people. In addition, the CFR requirements call for each state with O_3 nonattainment areas classified as moderate or above and states in the Ozone Transport Region to develop and implement an Enhanced Monitoring Plan (EMP) for O_3. Montana does not meet any of these criteria, therefore neither PAMS monitoring nor an EMP is required within the state, and no PAMS monitoring is conducted in the DEQ network.

B. CO Monitoring

Required CO Monitoring

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 5 summarizes the number of required CO monitoring sites.

Table 5 – 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 5, 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.

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 of this Plan describes NCore monitoring requirements and efforts. Table 6 summarizes the CO values measured at the NCore monitoring site during 2023.

Table 6 –Monitored CO Values for 2023 at NCore

Station	Concentrations (ppm)			NAAQS
	Min	Max	Average	
NCore 1-hour averages	0.018	1.011	0.131	35
NCore 8-hour averages	0.021	0.697	0.131	9

Changes to CO Monitoring

No modifications to DEQ's CO monitoring network are proposed for 2024.

C. NO_2 Monitoring

Required NO_2 Monitoring

The minimum number of NO_2 monitoring sites required by 40 CFR 58 Appendix D Section 4.3 is summarized in Table 7.

Table 7 – 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 40 CFR Part 58, 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 to this Plan, no Montana communities meet any of the population criteria listed in Table 7, 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.

Additional NO_2 Monitoring

In an effort to determine NO_2 background concentrations, potential air quality impacts associated with the oil and gas industry in the eastern part of the state, and impacts of nitrogen oxides on ambient ozone concentrations, DEQ conducted NO_2 monitoring through 2023 at the sites listed in Table 8.

Table 8 – Montana DEQ 2023 O_3 Monitoring Sites

Station Name	AQS Code
Broadus	30-075-0001
Lewistown	30-027-0006
Malta	30-071-0010
Miles City	30-017-0005
Sidney	30-083-0002

Table 9 summarizes the 1-hour NO_2 values measured at monitoring sites operated by the DEQ during 2023.

Table 9 – 1-Hour Monitored NO_2 Values for 2023

Site	Concentrations (ppb)			NAAQS Design Values (ppb) [(1)]		NAAQS
	Min	Max	Average	2023[(2)]	2021 – 2023	
Broadus	0	18.0	1.02	14.0	11	100
Lewistown	0	19.0	0.63	10.0	9	
Miles City	0	35.0	3.56	24.0	--[(3)]	
Malta	0	12.0	0.93	9.0	12	
Sidney	0	22.0	1.85	12.0	12	

(1) Design Values are calculated by the USEPA AQS database except for Broadus and Malta.
(2) The 2023 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.

NOy Monitoring

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 10 summarizes the 1-hour NO and NO_y values measured at the DEQ NCore station in calendar year 2023.

Table 10 – 1-Hour Monitored NO and NO_y Values at NCore for 2023, in ppb.

Pollutant	Min	Max	Average
NO	0	9.1	0.055
NO_y	0	25.6	1.38

Changes to NO_2 Monitoring

The network analysis documented in DEQ's 2023 Annual Monitoring Plan determined that the monitoring objectives of two of the sites listed in Table 8 were complete. Therefore, DEQ proposed, and received EPA approval, to discontinue NO_2 monitoring at the Broadus and Malta sites at the end of 2023. NO_2 monitoring at both of these sites was completed at midnight on December 31, 2023.

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 installed at the existing Lockwood monitoring site (30-111-0087) during calendar year 2023 to begin reporting data to the EPA AQS database beginning on January 1, 2024.

The overall population of Montana is increasing, with notable growth in communities outside of the three existing MSAs. These population changes were reflected in the OMB/Census Bureau modifications to CBSA designations in Montana published on July 21, 2023, which resulted in the assignment of new MSAs surrounding Helena and Bozeman, and modification of the Missoula MSA. DEQ believes that corresponding modifications to its NO_2 monitoring network are warranted, but not required. A discussion of proposed NO_2 monitoring changes in 2024 is contained in Section II.C.

D. SO_2 Monitoring

Required SO_2 Monitoring

The minimum number of SO_2 monitoring sites required by Section 4.4 of Appendix D to 40 CFR 58 is summarized in Table 11.

Table 11 – 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
	≥100,000 - <1,000,000	2
	≥5,000 - <100,000	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. The Billings CBSA has both the highest population and the highest total SO_2 emissions of the CBSAs in the state of Montana. It is therefore the only CBSA where SO_2 monitoring could potentially be required based on these metrics. Table 12 summarizes the current PWEI for the Billings CBSA using the latest published (2020) NEI values and most recent US Census Bureau population estimates.

Table 12 – Billings CBSA PWEI Calculation

Population [(1)] (a)	Reported Emissions [(2)] (b)	PWEI [(3)] (c)
191,435	4,295	822.21

(1) US Census Bureau *Population Estimate* as of July 1, 2023.
(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.

Additional SO_2 Monitoring

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 operated one SO_2 monitor at the Sidney site (30-083-0002) from May 1, 2017, through 2023 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 requirements in more detail.

Table 13 summarizes the 1-hour values measured at the SO_2 monitoring sites operated by DEQ during calendar year 2023.

Table 13 – 1-Hour Monitored SO_2 Values for 2023

Site	Concentrations (ppb)			NAAQS Design Values (ppb) [1]		NAAQS
	Min	Max	Average	2023[2]	2021 - 2023	
Billings - Coburn Road	0.0	56.3	1.5	19.1	22	75
NCore - Sieben's Flat	0.0	1.6	0.7	1.5	1	
Sidney	0.0	12.4	1.1	7.2	6	

(1) Design Values are calculated by the USEPA AQS database.
(2) The 2023 design value is the 99th percentile value for the year.

Changes to SO_2 Monitoring

DEQ's network analysis in 2023 determined that the SO_2 monitoring objective of the Sidney site was complete. Therefore, DEQ proposed and received EPA approval to discontinue SO_2 monitoring at the Sidney site at the end of 2023. SO_2 monitoring at this site was completed at midnight on December 31, 2023.

No modifications to DEQ's SO_2 monitoring network are proposed for 2024.

E. Pb Monitoring

Required Pb Monitoring

The minimum number of Pb monitoring sites required by 40 CFR 58 Appendix D Section 4.5 is summarized in Table 14.

Table 14 – 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 Section 4.5(a) of Appendix D to 40 CFR Part 58 specify that Pb 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 one non-airport source in the state of Montana reported Pb emissions in excess of the 0.50 ton/year threshold, triggering the monitoring requirement. Montana Resources, LLP, operates an open pit copper and molybdenum mine and associated processing facilities in Butte, Montana. Montana Resources reported estimated Pb emissions of 0.82 tons to the 2020 NEI.

As communicated in the 2023 Monitoring Network Plan, in July 2023 DEQ engaged Montana Resources in an attempt to clearly define the most appropriate path forward to address their reported Pb emissions and the related source-oriented monitoring requirement. The EPA Region 8 response to the DEQ 2023 Monitoring Network Plan received on October 6, 2023, appropriately summarizes this matter:

> "Every year Montana Resources estimates their total annual lead emissions and reports this value to the Toxics Release Inventory (TRI). The TRI data are then ingested and reported in the NEI when the NEI is updated. Montana Resources has been using a contractor to estimate their Pb emissions with published emission factors, but the reported values in the TRI have been relatively inconsistent since 2016. Subsequent to submitting the 2023 AMNP, MTDEQ investigated the emission calculations to see if the reported values were reasonable and reproducible. This exercise revealed calculation errors that resulted in the overestimation of the Pb emissions. EPA Region 8 and MTDEQ confirmed this information with Montana Resources. Although Region 8 and MTDEQ have not obtained the revised emission calculations, it is our understanding the new values will be well below the 0.50 tpy threshold. As a result, Montana Resources will be correcting the TRI emissions back to 2017, and the NEI should eventually reflect these lower values upon the next update."

Subsequently, on October 9, 2023, Montana Resources submitted a 37-page technical review of its lead emissions to EPA and DEQ, covering the years from 2017 through 2022. The corrected Pb emissions results were summarized in a table, reproduced here as Table 15:

Table 15 – Montana Resources, LLC, Updated Pb Emission Releases

Reporting Year	Combined Lead Emissions (Stack + Fugitive)	
	lb/yr	tons/yr
2017	134.24	0.067
2018	140.08	0.070
2019	123.17	0.062
2020	138.96	0.069
2021	140.52	0.070
2022	121.94	0.061

DEQ reviewed and confirmed Montana Resources' analysis and their corrected annual Pb emission totals. In addition, the corrected emission values are well-aligned with the results of independent ambient Pb monitoring conducted by an independent contractor (as described in the DEQ 2023 Monitoring Network Plan). Because all the reported emissions are less than the 0.50 ton/year threshold, no Pb monitoring is required near this facility or any non-airport facility in Montana.

The most recent NEI (from 2020) also indicates that no airports in Montana reported emissions more than the 1.0 tons per year of Pb threshold; thus, no airport source requires Pb monitoring in the state of Montana.

Changes to Pb Monitoring

No establishment of Pb monitors in Montana is proposed by DEQ for 2024.

F. PM$_{10}$ Monitoring

Required PM$_{10}$ Monitoring

The approximate minimum number of permanent PM$_{10}$ monitoring sites required by Section 4.6 of Appendix D to 40 CFR 58 is shown in Table 16.

Table 16 - Minimum PM$_{10}$ Monitoring Requirements [1]

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

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

Currently, all designated MSAs in Montana are within the lowest population category and have historically and consistently demonstrated measured PM$_{10}$ concentrations in either the low or medium concentration categories in Table 16. Therefore, the present PM$_{10}$ network, as described in Tables 17 through 19, 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$_{10}$ maintenance plans for those areas which have been re-designated to a NAAQS attainment status. Table 17 provides a list of those sites:

Table 17 – Montana DEQ 2023 PM$_{10}$ Maintenance Plan Monitoring Sites

Station Name	AQS Code
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
Whitefish	30-029-0009

Additional PM$_{10}$ Monitoring

Beyond the CFR and Maintenance Plan required monitoring, DEQ also operated PM$_{10}$ monitors at five additional sites through 2023 to define and track background concentrations and spatial distribution of this pollutant within the state of Montana. These sites are listed in Table 18:

Table 18 – Montana DEQ 2023 Additional PM_{10} Monitoring Sites

Station Name	AQS Code
Broadus	30-075-0001
Malta	30-071-0010
Miles City	30-017-0005
Lewistown	30-027-0006
Sidney	30-083-0002

Table 19 summarizes the 24-hour average values measured at all PM_{10} monitoring sites operated by DEQ in 2023.

Table 19 – 24-Hour Average Monitored PM_{10} Values for 2023[1]

Site	Concentration ($\mu g/m^3$)			NAAQS Comparison			NAAQS
	Min	Max	Average	AQS Estimated Exceedances [2]		3-Year DV Est. Concentration [3]	
				2023	3-Year		
Broadus [4]	1	137	22	--	--	--	150 $\mu g/m^3$ (80% = 120)
Butte	2	79	18	0	0	105	
Columbia Falls	0	66	13	0	0	66	
Kalispell	2	102	23	0	0	93	
Lewistown	0	90	9	0	0	77	
Libby	1	113	17	0	0	96	
Malta	0	153	11	0	0.3	141	
Miles City	1	214	12	1	0.3	79 [5]	
Missoula	3	58	16	0	0	93	
Sidney	1	172	13	1	0.3	84	
Thompson Falls	11	125	21	0	0.7	125	
Whitefish	1	107	21	0	0	99	

[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 two years (2022-2023) thus this value represents the 4th-high 24-hr average for that period rather than for a true 3-year design value period.

Changes to PM_{10} Monitoring

DEQ has a long-term dataset of measured PM_{10} values across the state. When higher values are measured, they are normally found to result from vehicle travel down dirt roads, nearby agricultural tillage, or wildfire smoke. In January of 2024, DEQ proposed to reduce the number of PM_{10} monitors in the state. This was done in an effort to continue appropriate and representative PM_{10} monitoring while adjusting limited monitoring resources to focus more specifically on other criteria pollutants whose concentrations and impacts are not adequately characterized across the state, such as $PM_{2.5}$ and ozone. The DEQ proposal focused on ending PM_{10} monitoring at Broadus, Miles City, and Malta at the end of 2023. EPA Region 8 concurred with this proposal and communicated approval on January 9, 2024. Monitoring at these sites was completed at midnight on December 31, 2023.

No modifications to DEQ's PM_{10} monitoring network are proposed for 2024.

G. $PM_{2.5}$ Monitoring

Required $PM_{2.5}$ Monitoring

The minimum number of $PM_{2.5}$ monitoring sites required by 40 CFR 58 Appendix D Section 4.7 is shown in Table 20.

Table 20 – 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 introduced in the Background section above, and in Appendix B of this Plan, Montana had three federally designated MSAs (Billings, Missoula, and Great Falls) through most of 2023, and all three of those MSAs fall within the 50,000 to 500,000 population range listed in Table 20. Through calendar year 2023, the 3-year 24-hour 98th percentile and the 3-year average annual mean NAAQS for $PM_{2.5}$ were 35 and 12.0 µg/m^3 respectively; and the 85% thresholds (per Table 20) for those limits are 29.75 and 10.2 µg/m^3. For the 3-year design period of 2020 through 2022, the Missoula MSA exceeded the 85% threshold for the 24-hour NAAQS, thus one $PM_{2.5}$ monitor was required in Missoula in 2023. The continuous $PM_{2.5}$ monitor operating at Boyd Park in Missoula (30-063-0024) fulfilled this requirement.

In addition, DEQ conducts required $PM_{2.5}$ monitoring at its NCore site (30-049-0004, see Section I.H.) per the requirements of 40 CFR 58 Appendix D Section 4.7.1(a). Further, DEQ operates a $PM_{2.5}$ monitor in the community of Libby (30-053-0018) 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.

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

First, Section 4.7.2 of 40 CFR 58 Appendix D requires that states operate *continuous analyzers* in at least one-half of the *required* $PM_{2.5}$ monitoring sites (per Table 20, 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 was required by federal Monitoring Network Design Criteria to be operated in any Montana community in 2023. 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 3.2.3.1-2.

$PM_{2.5}$ 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 of its continuous $PM_{2.5}$ monitoring network.

Second, Section 4.7.3 of 40 CFR 58 Appendix D 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 transport*. 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 will continue to fulfill the regional and transport site criteria for 2024.

Third, Section 4.7.4 of 40 CFR 58 Appendix D 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 to this Plan contains a list of the chemical components for which analysis is performed on filters collected at these stations.

Additional $PM_{2.5}$ Monitoring

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 summarized in Table 20. DEQ, sometimes in partnership with county air quality programs, operated $PM_{2.5}$ monitors in a number of locations statewide in 2023 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. These sites are listed in Table 21:

Table 21 – Montana DEQ 2023 Additional $PM_{2.5}$ Monitoring Sites

Station Name	AQS Code	Station Name	AQS Code
Billings-Lockwood	30-111-0087	Great Falls	30-013-0001
Bozeman	30-031-0019	Hamilton	30-081-0007
Broadus	30-075-0001	Havre	30-041-0002
Butte	30-093-0005	Helena	30-049-0026
Choteau*	30-099-0005	Lewistown	30-027-0006
Columbia Falls	30-029-0049	Malta	30-071-0010
Cut Bank	30-35-0022	Miles City	30-017-0005
Dillon	30-001-0003	Seeley Lake	30-063-0038
Frenchtown	30-063-0037	Sidney	30-083-0002
Glendive*	30-021-0005	Thompson Falls	30-089-0007

*These sites began operating late in 2023 and did not begin reporting to AQS until January 1, 2024.

Table 22 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 2023.

Table 22 – 24-Hour Average Monitored $PM_{2.5}$ Values for 2023[1]

Site	2023 Concentration (µg/m³)			NAAQS Design Values (µg/m³)			NAAQS through CY 2023
	Min	Max	Average	2023 98th Percentile	2021 - 2023 24-hour	2021 - 2023 Annual	
Billings–Lockwood	0.3	112.2	6.6	28.9	29	7.8	
Bozeman [2]	0.6	34.3	5.3	--	--	--	
Broadus	0.9	118.9	9.3	54.0	38	8.3	
Butte	0	44.6	7.3	24.8	38	8.3	
Choteau [5]	--	--	--	--	--	--	
Columbia Falls	0	68.1	9.4	39.9	36	8.6	
Cut Bank	0	76.7	4.2	31.9	32	4.2	**24-hour** 35 µg/m³ (85% = 29.75)
Dillon	0	45	2.9	10.9	11	2.9	
Frenchtown	2.4	42.2	9.8	25.0	37	10.5	
Glendive [5]	--	--	--	--	--	--	
Great Falls [2]	3	82.6	10.9	--	--	--	
Hamilton	0	39.3	5.7	21.0	46	7.8	
Havre [4]	0.1	139.7	8.6	--	--	--	
Helena	1.2	74.9	8.4	30.4	36	8.7	
Lewistown	0	71	5	32.0	31	5.4	**Annual** 12.0 µg/m³ (85% = 10.2)
Libby	1.6	109	12	28.8	38	12.8	
Malta	0	123.8	7.4	50.0	32	6.0	
Miles City [3]	0.3	185	8.1	47.9	31	6.7	
Missoula	0	37.1	5.3	20.0	32	6.5	
NCore	0	60.5	4.1	24.4	30	4.8	
Seeley Lake [2]	1.3	48.7	10.7	--	--	--	
Sidney	0	143.9	7.5	42.1	29	6.2	
Thompson Falls [2]	1.7	99	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 two years. These values represent only measurements conducted in 2022 through 2023 and not the 3-year averages specified in the NAAQS.
(4) The Havre site operated for only seven months in 2023. Design values cannot yet be calculated.
(5) These sites only operated for a few months in 2023, thus data summaries are not representative of the entire year and no design values can be calculated.

DEQ's $PM_{2.5}$ monitors are intentionally located, established and operated to address any or all three of the program monitoring objectives defined in the Background section of this Plan. For the *additional* $PM_{2.5}$ monitoring described above, DEQ employs different *methods* of continuous $PM_{2.5}$ monitoring and assigns different geographical *spatial scales* that sites are designed to represent depending on the monitoring objectives for each site.

$PM_{2.5}$ Monitoring Methods

$PM_{2.5}$ monitors federally designated as "FRM" or "FEM" generate data suitable for determining compliance with the $PM_{2.5}$ NAAQS. $PM_{2.5}$ monitors designated as "non-FEM" provide reliable general information but cannot be used for NAAQS compliance purposes. The network description table in Appendix C of this Plan indicates a notation of the monitor method classification for all $PM_{2.5}$ monitors operated by DEQ in the column labeled "PM".

$PM_{2.5}$ Spatial Scales

DEQ's continuous $PM_{2.5}$ monitors are sited to represent broad regional or sub-regional geographic areas as established in Section 4.7.1(c) of Appendix D to 40 CFR 58. Data from $PM_{2.5}$ monitoring sites with spatial scales designated as smaller than "neighborhood" are 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 Great Falls station (30-013-0001) which is designated a “middle” range spatial scale remaining from historical CO monitoring purposes.

Changes to $PM_{2.5}$ Monitoring

DEQ’s 2023 network analysis determined that the $PM_{2.5}$ NAAQS monitoring objective at the Broadus site was complete, based on a long-term dataset that demonstrates that measured concentrations were not in exceedance of any NAAQS limit. However, DEQ finds value in continuing to measure $PM_{2.5}$ concentrations in the Broadus area to represent the southeast corner of the state and to inform the public of any related health impacts. Therefore, DEQ proposed, and received EPA approval, to discontinue FEM $PM_{2.5}$ monitoring at the Broadus site at the end of 2023. In its place, DEQ will operate a $PM_{2.5}$ sensor at the site. The result is the acquisition of representative data at a much lower investment of resources which can be shifted to other needed areas of monitoring around the state. FEM $PM_{2.5}$ monitoring at Broadus was completed at midnight on December 31, 2023.

As listed in Table 22, DEQ completed the installation of FEM $PM_{2.5}$ monitors at Choteau and Glendive in 2023, and these monitors began reporting to AQS on January 1, 2024. These installations were completed using funding from the “American Rescue Plan Direct Award for Enhancing Continuous Monitoring of $PM_{2.5}$ and Other NAAQS Air Pollutants” grant.

Significantly, EPA updated the $PM_{2.5}$ NAAQS in early 2024, lowering the annual primary standard from 12.0 to 9.0 $\mu g/m^3$. The new NAAQS limit became effective on May 6, 2024. DEQ does not foresee or propose any monitoring network *additions* resulting from this change. However, the 3-year design values from the $PM_{2.5}$ monitors in the Billings and Great Falls MSAs, as well as in the newly designated MSAs of Helena and Bozeman, are all believed to be greater than 85% of the new, lowered NAAQS. Therefore, per the criteria summarized in Table 20, FEM $PM_{2.5}$ monitoring is *required* in the Billings, Bozeman, Great Falls, and Helena MSAs after May 6, 2024.

For 2024, DEQ is proposing the initiation of several equipment changes to its FEM $PM_{2.5}$ monitoring network. These proposals are detailed in Section II.B. of this Plan.

In addition, DEQ will continue to place particular emphasis on sensor-based community and local-scale monitoring in Montana’s historically underserved and at-risk populations. DEQ is continuing to expand its $PM_{2.5}$ sensor-based monitoring capabilities in 2024 and in the foreseeable future to provide more local-based $PM_{2.5}$ information to Montana’s population. Section II.E discusses sensor network changes planned for 2024 in implementation of this initiative.

H. NCore Monitoring

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 pollutant sources. Montana’s NCore site (Sieben’s Flat (a.k.a. Sleeping Giant), 30-049-0004) was established in late 2010. Data is continuously being acquired from all required monitors. Previous sections of this Plan include summaries of pollutant data monitored at NCore.

In addition to criteria pollutants, 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. Table 23 summarizes the $PM_{10-2.5}$ data collected at the DEQ NCore site during 2023.

Table 23 – 1-Hour Monitored $PM_{10-2.5}$ Values at NCore for 2023, in µg/m^3.

Pollutant	Min	Max	Average
$PM_{10-2.5}$	0	70	2.63

I. General Monitoring Network Design Considerations

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

First, the Hamilton $PM_{2.5}$ site (30-081-0007) is located within 15 meters of paved city streets, but is operated as a neighborhood-scale site and not established as a "traffic corridor" monitor as discussed in 40 CFR 58 Appendix E Section 6.3. The roads receive low traffic counts, and EPA has approved (granted a waiver) for the continued operation of this site as a neighborhood-scale site in response to previous Annual Network Plan documents submitted by DEQ.

Second, the PM_{10} monitor located in eastern Montana at the Broadus monitoring site (30-075-0001), 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 logistical 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 PM_{10} concentrations on a "regional scale" as was intended when the site was established. As described in Section I.F. above, DEQ proposed to end PM_{10} monitoring at Broadus at the end of 2023. EPA Region 8 concurred with this proposal and communicated approval on January 9, 2024. PM_{10} monitoring at this site was complete at midnight on December 31, 2023, and the monitor has been shut down.

Third, the Great Falls $PM_{2.5}$ site (Overlook Park, 30-013-0001) does not meet siting requirements for distance from obstructing trees. As discussed in Section II.B.3, DEQ intends to initiate a project to move the Great Falls $PM_{2.5}$ monitoring site.

B. 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. As projected in its 2023 Annual Monitoring Plan, DEQ completed a required 5-year update of its QAPP on June 15, 2023. The document was submitted to EPA Region 8 and posted for public access on the DEQ website. DEQ intends to perform an annual review of this QAPP in 2024.

II. 2024 Proposed Changes to the Monitoring Network

A. Overview

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 each year, 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 to the Network Plan, DEQ completes periodic (every 5 years) 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 programmatic 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; with resulting network modification proposals following within an appropriate time window.

Montana DEQ anticipates the following potential changes to its air monitoring network for the 2024 planning period. The proposals are listed by pollutant.

B. $PM_{2.5}$ Changes

1. **Glasgow**
   As referenced in DEQ's 2023 Network Plan, 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). In continuing implementation of those grant funds, and as approved in the 2023 Plan, DEQ anticipates the establishment of a new FEM $PM_{2.5}$ monitoring site in Glasgow in 2024. DEQ plans to make data from this new FEM instrument available publicly on EPA's *AirNow*, and Montana's *Today's Air* websites by August 1, 2024. DEQ will begin uploading the monitor's data to AQS starting January 1, 2025.

2. **Seeley Lake**
   DEQ continues to be concerned that the current $PM_{2.5}$ monitoring site is inappropriately influenced by woodsmoke emitted from a single residence located across the street from the monitor; and is not representative of air quality in the Seeley Lake community or airshed. Therefore, DEQ is proposing to initiate efforts in 2024 to move this monitor. DEQ intends to partner with the Missoula County Health Department to identify a suitable, representative site for the monitor, and establish approvals or contractual arrangements for its long-term use. This project will likely extend into CY 2025.

3. **Great Falls**
   Because of the siting concerns described in Section I.I.A., and because of the deteriorating condition of the shelter at this site, DEQ is proposing to initiate efforts in 2024 to move this monitor. As in Seeley Lake above, initial efforts will be focused on identifying a suitable, representative site for the monitor, and establishing approvals or contractual arrangements for

its long-term use. Because this monitor is likely now required in this MSA (see Section I.G), DEQ will install a continuous FEM instrument in this location once a new site is identified and established.

4. Bozeman

DEQ believes that the $PM_{2.5}$ monitor in this newly designated MSA is now a required FEM per the criteria in 40 CFR 58 Appendix D Section 4.7 (see Section I.G). Therefore, DEQ anticipates installing a continuous FEM instrument in this location in conjunction with the changes discussed in Sections II.C.1 and II.D.1 below.

C. NO_2 Changes

1. Bozeman

As noted in Sections I.A. and I.C., population growth in Bozeman has led to the OMB/Census Bureau modification of the Bozeman CBSA designation from a Micropolitan Statistical Area to an MSA. Gallatin County (containing Bozeman) is now the second highest populated county in Montana (see Appendix B to this Plan), and growth there is expected to continue. DEQ believes that additional and upgraded ambient air monitoring is warranted to evaluate the air quality impacts of this population growth, and to determine if long-term monitoring will be required. Therefore, DEQ is proposing to add a climate-controlled monitoring shelter at the existing High School monitoring site (30-031-0019), and the installation and operation of new $NO_2/NO/NO_X$, O_3 (see Section II.D.1) and $PM_{2.5}$ (see Section II.B.5) monitors within it. This effort would be initiated in 2024, with the goal of having the new instrumentation operational and reporting to AQS by January 1, 2025. However, given the complexity of this project, DEQ is aware that it could extend further into CY 2025.

2. Missoula

As noted in Sections I.A., O_3 monitoring has been continuously conducted at the Missoula Boyd Park Site (30-063-0024) since June 1, 2020. Typically, wherever DEQ conducts O_3 monitoring it also operates a corresponding $NO_2/NO/NO_X$ monitor to contribute to the understanding of O_3 formation and destruction at that location. However, this effort was never pursued in Missoula. Therefore, DEQ is proposing the installation and operation of a $NO_2/NO/NO_X$ monitor in the Missoula-Boyd Park station in 2024, with anticipated data reporting to AQS by January 1, 2025.

D. O_3 Changes

1. Bozeman

Per the discussion in Section II.C.1. above, DEQ is proposing the installation and operation of a new O_3 monitor in Bozeman in 2024, with a goal of data reporting to AQS by January 1, 2025.

E. $PM_{2.5}$ Sensor Network Changes

Statewide

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" (ARP) 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. The anticipated installation of a new FEM $PM_{2.5}$ monitor in Glasgow in 2024 (see Section II.B.1) is funded through the ARP grant.

In addition, DEQ has applied for and received 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. In application and receipt of this grant, DEQ developed a tiered approach to $PM_{2.5}$ monitoring in the state of Montana:

- Tier 1 – SLAMS/FEM continuous $PM_{2.5}$ Monitors,
- Tier 2 – Intermediate monitors such as EBAMs and higher technology sensors, and
- Tier 3 – Personal sensors such as PurpleAir devices

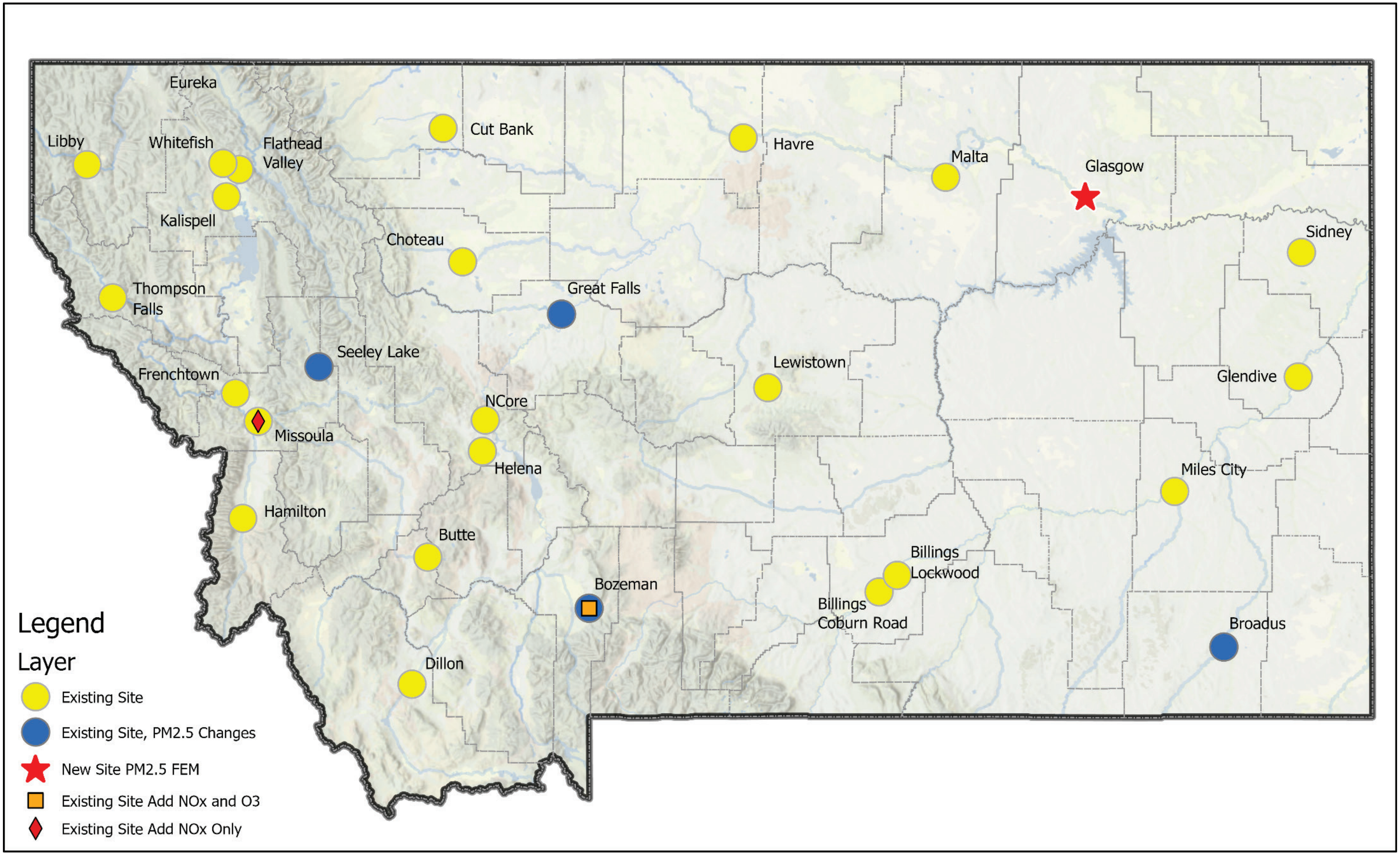
DEQ's application for this grant included proposals for six additional FEM (Tier 1) monitors, 13 non-FEM E-BAM (Tier 2) monitors, and 164 personal $PM_{2.5}$ sensors (Tier 3). Due to the greatly increased price of FEM monitors and E-BAMS and the availability of new sensor technology, DEQ requested and received approval to substitute mid-range (Tier 2) sensors for the proposed FEM and E-BAM monitors in the project plan for this grant. The purchase and installation of Tier 2 sensors is anticipated to begin in 2024. The purchase and installation of personal sensors (Tier 3) under this grant was initiated in 2023 and will continue in stages through the life of the grant and beyond. Appendix A to this plan provides maps of proposed $PM_{2.5}$ sensor installations and progress to date.

DEQ's application proposal for the Community Monitoring grant 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 diverse communities in this expansive state through the described tiered monitoring and quality assurance approach. 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.

III. Appendices

Appendix A -- Monitoring Site Locations

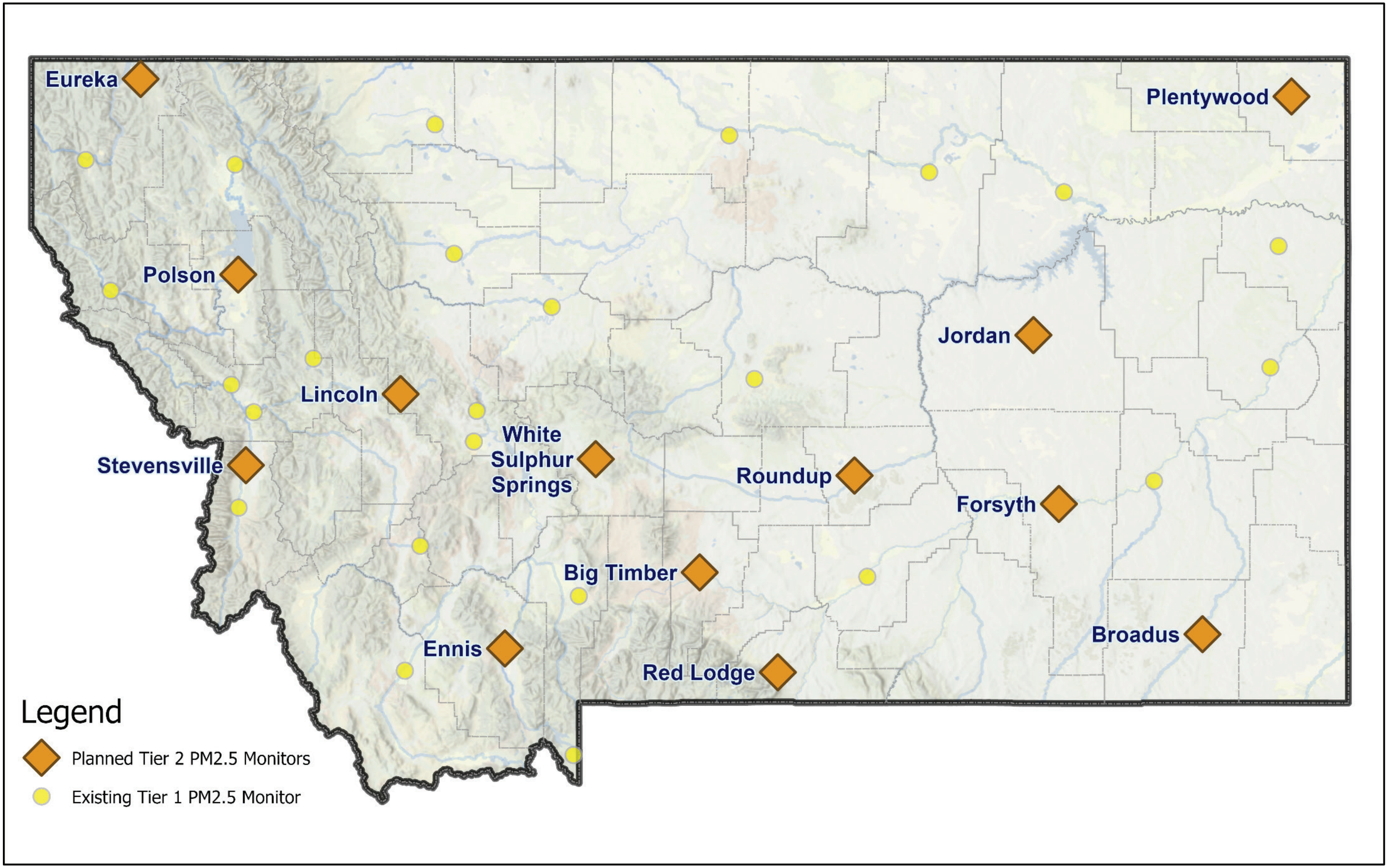
Montana Ambient Air Monitoring Sites, 2024 Plan



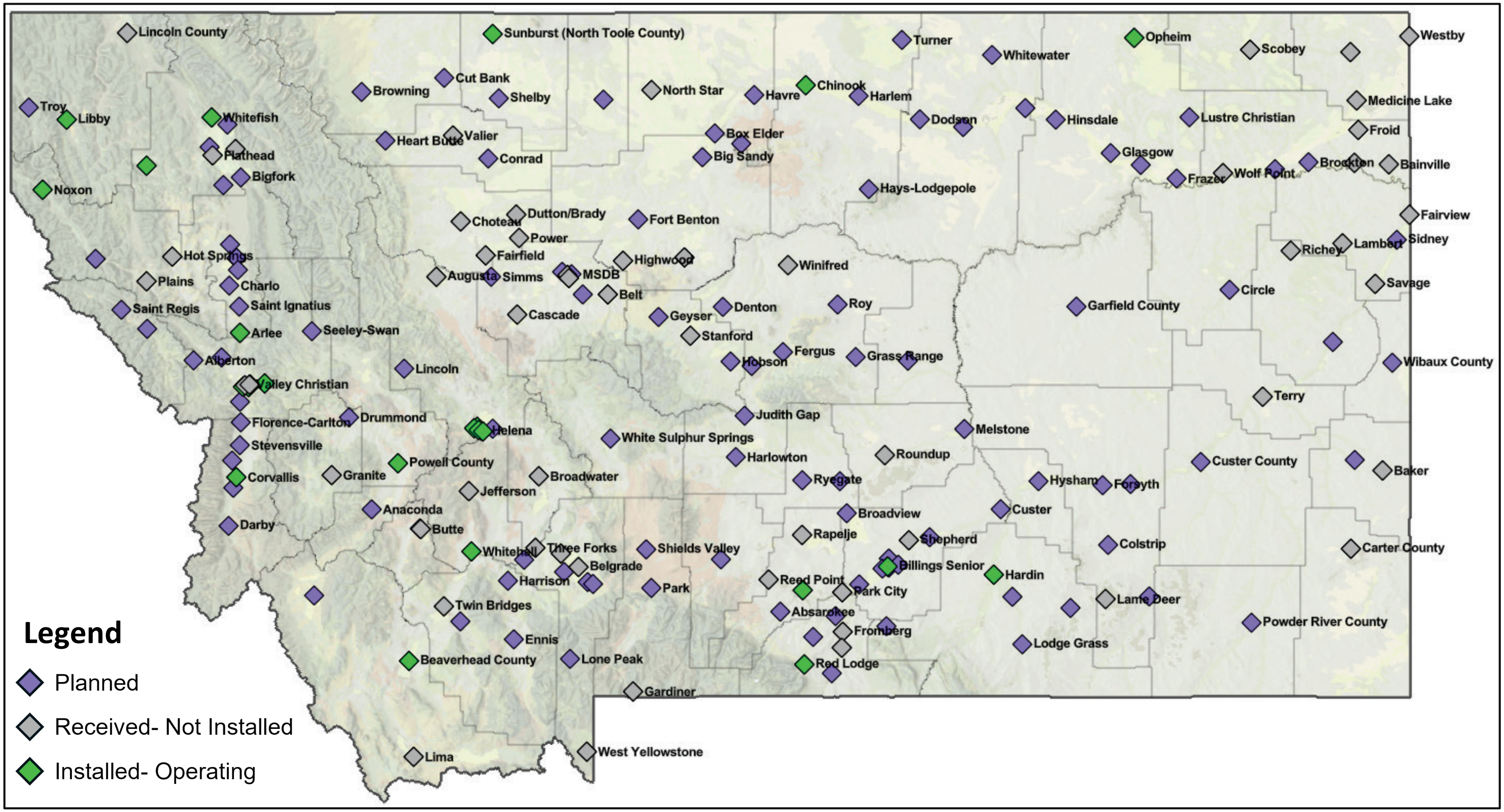
Montana Ambient Air Monitoring Site Location Summary

AQS No.	City - Site Name	Site Extended Name	Montana Address	Longitude	Latitude	CBSA Designation	CBSA Name and ID #
30-111-0066	Billings	Coburn Road	624 Coburn Rd.	-108.4588265	45.7865892	Metro	Billings, MT, 13740
30-111-0087	Billings	Lockwood	2320 Old Hardin Road	-108.4259948	45.8063193	Metro	Billings, MT, 13740
30-031-0019	Bozeman	High School	N 15th Avenue, H.S. Parking Lot	-111.0563273	45.6837732	Metro	Bozeman, MT, 14580
30-075-0001	Broadus	Powder River	Big Powder River Road East	-105.3702829	45.440296	--	--
30-093-0005	Butte	Greeley School	Alley Btwn N. Park Pl. and S. Park Pl.	-112.5012714	46.0025949	Micro	Butte-Silver Bow, MT, 15580
30-099-0005	Chouteau		1098 10th St NW	-112.193629	47.82031	--	--
30-035-0022	Cut Bank		Cut Bank Airport, 2705 Valier Hwy	-112.3670368	48.6065497	--	--
30-001-0003	Dillon		State Hwy 91 S. and Barrett St.	-112.6425161	45.2064423	--	--
30-029-0049	Columbia Falls	Flathead Valley	610 13th St West	-114.1892571	48.3637028	Micro	Kalispell, MT, 28060
30-063-0037	Frenchtown	Beckwith	16134 Beckwith Street	-114.2242651	47.0129068	Metro	Missoula, MT, 33540
Planned	Glasgow		5470 U.S. Rt 2	-106.641417	48.211779	--	--
30-021-0005	Glendive		Corner of 8th St. and B Ave.	-104.7515959	47.1205989	--	--
30-013-0001	Great Falls	Overlook Park	10th Ave. S. and 2nd St. E.	-111.3033456	47.4943197	Metro	Great Falls, MT, 24500
30-081-0007	Hamilton	PS#46	Madison and 3rd St. S.	-114.1588734	46.2436362	--	--
30-041-0002	Havre		Btwn 13th Street and College Rd, MSUN	-109.684505	48.540334	--	--
30-049-0026	Helena	Rossiter Pump House	1497 Sierra Rd. East	-112.0130838	46.6587565	Metro	Helena, MT, 25740
30-029-0047	Kalispell	Flathead Electric	E Center St. and Woodland Ave.	-114.3054439	48.2004933	Micro	Kalispell, MT, 28060
30-027-0006	Lewistown		303 East Aztec Drive	-109.4553425	47.048515	--	--
30-053-0018	Libby	Courthouse Annex	418 Mineral Ave.	-115.552457	48.3917035	--	--
30-071-0010	Malta		2309 Short Oil Road	-107.8622736	48.3175183	--	--
30-017-0005	Miles City	Pine Hills	3636 Leighton Blvd.	-105.8127117	46.4114565	--	--
30-063-0024	Missoula	Boyd Park	3100 Washburn Rd.	-114.0205593	46.842296	Metro	Missoula, MT, 33540
30-049-0004	NCore	Sieben's Flat	I-15 Exit 209, then Sperry Dr.	-111.9871778	46.8505192	Metro	Helena, MT, 25740
30-063-0038	Seeley Lake	Elementary School	School Lane	-113.476182	47.1756297	Metro	Missoula, MT, 33540
30-083-0002	Sidney	201	Intersection of Hwy 201 and Cnty R 326	-104.6769911	47.8679845	Micro	Helena, MT, 25740
30-089-0007	Thompson Falls	High School	Golf St and Haley Ave	-115.3237609	47.594403	--	--
30-029-0009	Whitefish	Dead End	End of 10th St.	-114.335976	48.4005325	Micro	Kalispell, MT, 28060

$PM_{2.5}$ Tier 2 Planned Sensor Sites, 2024-2027



PM$_{2.5}$ Tier 3 PurpleAir Sensor Sites, 2024-2007

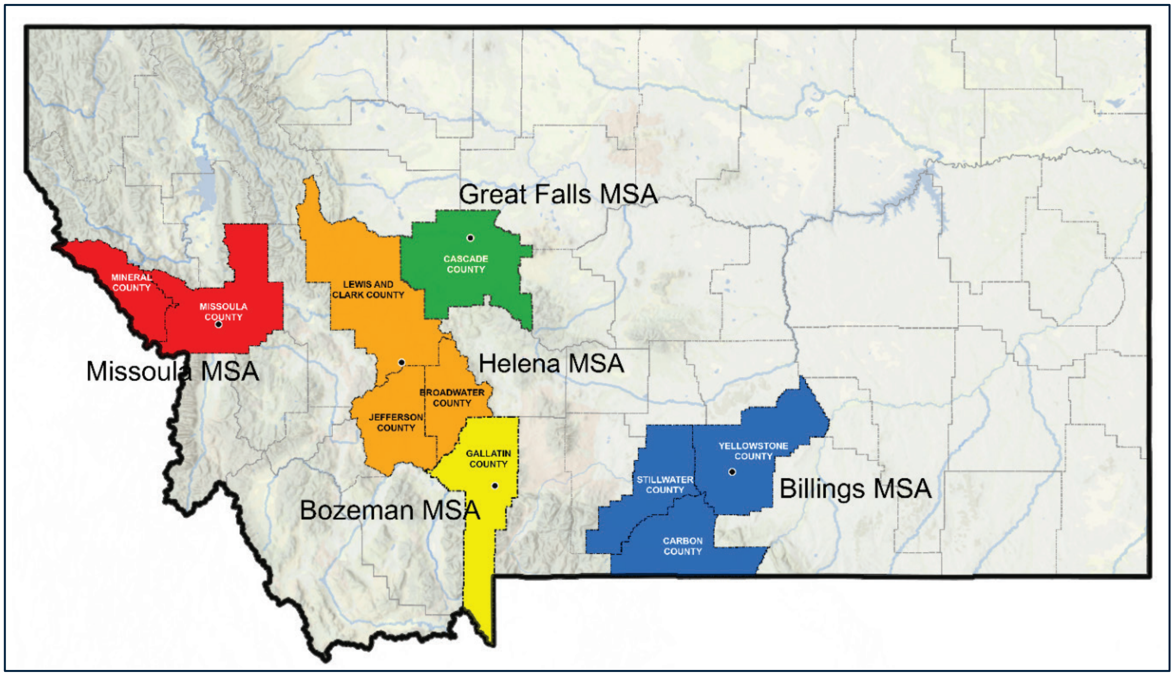


Appendix B -- Montana Core Based Statistical Areas (CBSAs)

Definition of CBSA

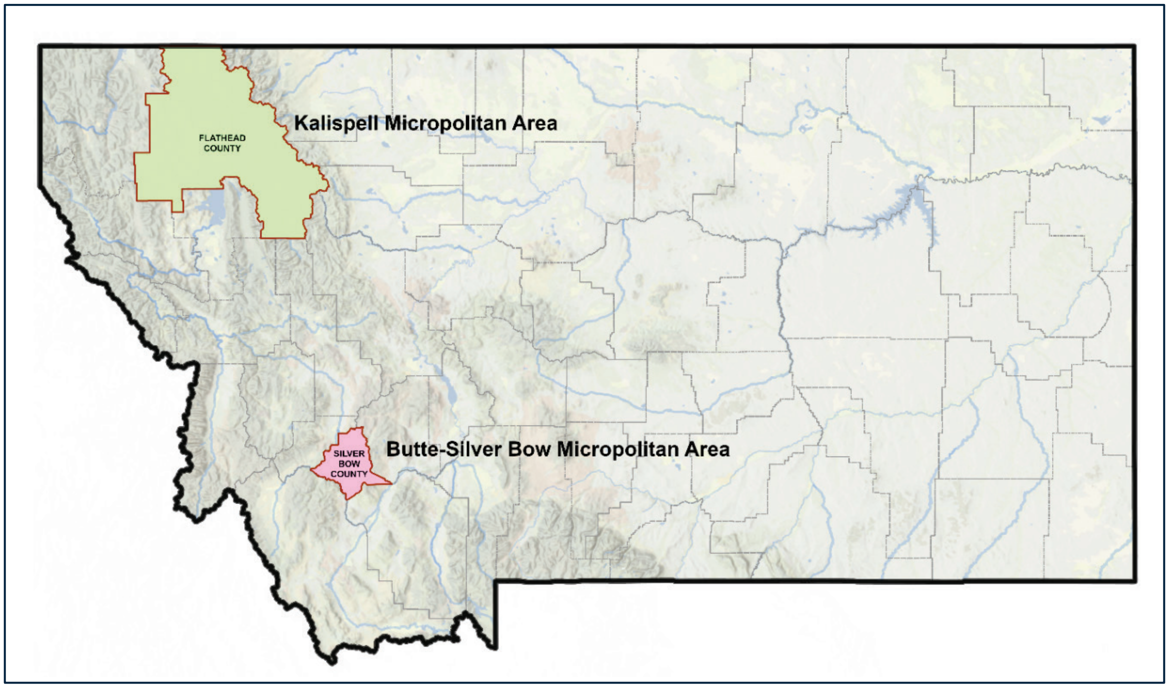
40 CFR 58.1: "*Core-based statistical area (CBSA)* is defined by the U.S. Office of Management and Budget as a statistical geographic entity consisting of the county or counties associated with at least one urbanized area/urban cluster of at least 10,000 population, plus adjacent counties having a high 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 Metropolitan Statistical Areas (MSAs) as of July 21, 2023



CBSA Number	Map Color Code	State-County #	Name	Description	Population Estimate 2023
13740			**Billings, MT**	**Metropolitan Statistical Area**	**191,435**
		30-009	Carbon County, MT	County or equivalent	11,419
		30-095	Stillwater County, MT	County or equivalent	9,173
		30-111	Yellowstone County, MT	County or equivalent	170,843
14580			**Bozeman, MT**	**Metropolitan Statistical Area**	**126,409**
		30-031	Gallatin County, MT	County or equivalent	126,409
33540			**Missoula, MT**	**Metropolitan Statistical Area**	**126,939**
		30-061	Mineral County, MT	County or equivalent	5,090
		30-063	Missoula County, MT	County or equivalent	121,849
24500			**Great Falls, MT**	**Metropolitan Statistical Area**	**84,900**
		30-013	Cascade County, MT	County or equivalent	84,900
25740			**Helena, MT**	**Metropolitan Statistical Area**	**96,091**
		30-007	Broadwater County, MT	County or equivalent	8,032
		30-043	Jefferson County, MT	County or equivalent	13,048
		30-049	Lewis and Clark County, MT	County or equivalent	75,011

Montana Micropolitan Statistical Areas as of July 21, 2023



CBSA Number	Map Color Code	State-County #	Name	Description	Population Estimate 2023
28060			**Kalispell, MT**	**Micropolitan Statistical Area**	**113,679**
		30-029	Flathead County, MT	County or equivalent	113,679
15580			**Butte-Silver Bow, MT**	**Micropolitan Statistical Area**	**36,360**
		30-093	Silver Bow County, MT	County or equivalent	36,360

Appendix C -- Monitoring Network Parameter and Equipment Summary

Site Abr.	Site Name	AQS Number	Pollutant	Parameter-POC	Method Code	Method Note[2]	Method PM[3]	Operating Schedule[4]	Type[5]	Monitoring Objective[6]	Spatial Scale	2024 Change ?
CB	**Billings-Coburn**	30-111-0066	SO_2	42401-1	600	37		Continuous	SLAMS	H,S	Neigh.	
			SO_2 - 5 min	42406-1	600	37		Continuous	SLAMS	H,S	Neigh.	
LW	**Billings-Lockwood**	30-111-0087	$PM_{2.5}$	88101-3	170	3	FEM	Continuous	SPM	P	Neigh.	
			NO	42601-1	256	31		Continuous	SLAMS	P	Neigh.	
			NO2	42602-1	256	31		Continuous	SLAMS	P	Neigh.	
			NOX	42603-1	256	31		Continuous	SLAMS	P	Neigh.	
			O3	44201-1	87	35		Continuous	SLAMS	P	Neigh.	
BH	**Bozeman**	30-031-0019	NO	Planned								✓
			NO_2	Planned								✓
			NO_X	Planned								✓
			O_3	Planned								✓
			$PM_{2.5}$	88502-3	731	4	**Non**	Continuous	SPM (NR)	P	Neigh.	✓
BD	**Broadus**	30-075-0001	$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SPM	B	Regional	✓
BN	**Butte**	30-093-0005	PM_{10}	81102-4	122	2	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-3	209	8	FEM	Continuous	SLAMS	H,P, QA Coll-2	Neigh.	
			$PM_{2.5}$	88101-2	116	1	FRM	1 in 6 Coll	SLAMS	H,P QA Coll	Neigh.	
			$PM_{2.5}$ Spc'n	Various		7		1 in 6	SLAMS CSN	H,P	Neigh.	
CH	**Choteau**	30-099-0005	$PM_{2.5}$	88101-3	209	8	FEM	Continuous	SLAMS	P	Neigh.	
CK	**Cut Bank**	30-035-0022	$PM_{2.5}$	88101-3	209	8	FEM	Continuous	SLAMS	P	Neigh.	
DN	**Dillon**	30-001-0003	$PM_{2.5}$	88101-3	209	8	FEM	Continuous	SLAMS	P	Neigh.	
FV	**Flathead Valley**	30-029-0049	PM_{10}	81102-1	122	2	FEM	Continuous	SLAMS	P	Neigh	
			$PM_{2.5}$	88101-3	170	3	FEM	Continuous	SLAMS	P	Neigh	
FT	**Frenchtown**	30-063-0037	$PM_{2.5}$	88101-3	170	3	FEM	Continuous	SLAMS	P	Neigh.	
	Glasgow	*Planned*	*$PM_{2.5}$*	*88101-3*	*209*	*8*	*FEM*	*Continuous*	*SLAMS*	*P*	*Neigh.*	✓
GL	**Glendive**	30-021-0005	$PM_{2.5}$	88101-3	209	8	FEM	Continuous	SLAMS	P	Neigh.	
OP	**Great Falls**	30-013-0001	$PM_{2.5}$	88502-3	731	4	**Non**	Continuous	SPM (NR)	P	Middle	✓
PS	**Hamilton**	30-081-0007	$PM_{2.5}$	88101-3	170	3	FEM	Continuous	SLAMS	H,P	Neigh.	
HV	**Havre**	30-041-0002	$PM_{2.5}$	88101-1	209	8	FEM	Continuous	SLAMS	P	Neigh.	
RP	**Helena**	30-049-0026	$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SLAMS	H,P, QA Coll-3	Neigh.	
			$PM_{2.5}$	88101-4	170	3	FEM	Continuous	SPM	H,P QA Cont-Col	Neigh.	
			$PM_{2.5}$	88101-2	116	1	FRM	1 in 6 Coll	SLAMS	H,P QA Coll	Neigh.	
FE	**Kalispell**	30-029-0047	PM_{10}	81102-1	122	2	FEM	Continuous	SLAMS	H,P	Neigh.	
LB	**Libby**	30-053-0018	PM_{10}	81102-1	150	9	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SLAMS	H,P	Neigh.	
LT	**Lewistown**	30-027-0006	NO	42601-1	599	32		Continuous	SPM	B	Regional	
			NO_2	42602-1	599	32		Continuous	SPM	B	Regional	
			NO_X	42603-1	599	32		Continuous	SPM	B	Regional	
			O_3	44201-1	47	36		Continuous	SPM	B	Regional	
			PM_{10}	81102-1	150	9	FEM	Continuous	SPM	B	Neigh.	
			$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SPM	B	Regional	
ML	**Malta**	30-071-0010	$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SPM	B	Regional	
MC	**Miles City**	30-017-0005	NO	42601-1	599	32		Continuous	SLAMS	B	Regional	
			NO_2	42602-1	599	32		Continuous	SLAMS	B	Regional	
			NO_X	42603-1	599	32		Continuous	SLAMS	B	Regional	
			O_3	44201-1	87	35		Continuous	SLAMS	B	Regional	
			$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SLAMS	B	Regional	
MS	**Missoula**	30-063-0024	NO	Planned								✓
			NO_2	Planned								✓
			NO_X	Planned								✓
			O_3	44201-1	47	36		Continuous	SLAMS	P	Urban	
			PM_{10}	81102-6	122	2	FEM	Continuous	SLAMS	H,P	Neigh.	
			$PM_{2.5}$	88101-3	170	3	FEM	Continuous	SLAMS	H,P	Neigh.	
NC	**NCore**	30-049-0004	CO	42101-1	554	30		Continuous	SLAMS	B	Region	
			NO	42601-1	674	34		Continuous	SLAMS	B	Region	
			NOy	42600-1	674	34		Continuous	SLAMS	B	Region	
			NO_{diff}	42600-1	674	34		Continuous	SLAMS	B	Region	
			O_3	44201-1	47	36		Continuous	SLAMS	B	Region	
			SO_2	42401-1	600	37		Continuous	SLAMS	B	Region	
			SO_2 - 5 min	42406-1	600	37		Continuous	SLAMS	B	Region	
			$PM_{2.5}$	88101-3	170	3	FEM	Continuous	SLAMS	B, QA Coll-1	Region	
			$PM_{2.5}$	88101-1	116	1	FRM	1 in 6 / 3	SLAMS	B, QA Coll	Region	
			$PM_{2.5}$	88101-2	116	1	FRM	1 in 6 / 3	SLAMS	B, QA Coll	Region	
			$PM_{2.5}$ Spc'n	Various		7		1 in 3	SLAMS CSN	B	Region	
			$PM_{10-2.5}$	86101-1	185	6	FEM	Continuous	SLAMS	B	Region	
SE	**Seeley Lake**	30-063-0038	$PM_{2.5}$	88502-3	731	4	**Non**	Continuous	SPM (NR)	P	Neigh.	✓
SD	**Sidney 201**	30-083-0002	NO	42601-1	599	32		Continuous	SLAMS	S	Neigh.	
			NO_2	42602-1	599	32		Continuous	SLAMS	S	Neigh.	
			NO_X	42603-1	599	32		Continuous	SLAMS	S	Neigh.	
			O_3	44201-1	47	36		Continuous	SLAMS	S	Neigh.	
			PM_{10}	81102-1	150	9	FEM	Continuous	SLAMS	S	Neigh.	
			$PM_{2.5}$	88101-3	183	10	FEM	Continuous	SLAMS	S	Neigh.	
TF	**Thompson Falls**	30-089-0007	PM_{10}	81102-3	122	2	FEM	Continuous	SLAMS	P	Neigh.	
			$PM_{2.5}$	88502-3	731	4	**Non**	Continuous	SPM (NR)	P	Neigh.	
DE	**Whitefish**	30-029-0009	PM_{10}	81102-1	122	2	FEM	Continuous	SLAMS	P	Neigh.	

See notes next page…

Footnotes

Method

(2) Note

1	PM	BGI-PQ200 with very sharp cut cyclone (FRM)
2	PM	Met One BAM 1020 Beta Attenuation Monitor (PM10 FEM)
3	PM	Met One FEM BAM 1020 Beta Attenuation Monitor with PM2.5 very sharp cut cyclone (PM2.5 FEM ***regulatory***)
4	PM	Met One BAM 1020 Beta Attenuation Monitor with PM2.5 sharp cut cyclone (SCC) ("FRM-like," ***non-regulatory***)
5	PM	Met One E-BAM Beta Attenuation Monitor with PM2.5 sharp cut (SCC) or very sharp cut cyclone (VSCC)
6	PM	Met One BAM1020 PM10-2.5 measurement system -- Paired beta attenuation monitors (FEM)
7	PM	Met One SASS / URG Speciation Air Sampling System
8	PM	Met One 1022 FEM E-BAM Beta Attenuation Monitor with PM2.5 very sharp cut cyclone (VSCC)
9	PM	Thermo Scientific 5014i Beta Attenuation Monitor for PM10 (FEM)
10	PM	Thermo Scientific, 5014i Beta Attenuation Monitor for PM2.5 (FEM)
30	CO	Thermo Model 48i-TLE Enhanced **Trace Level** CO analyzer
31	NOx	Teledyne API Model N500 **Trace Level** Cavity-Attenuated Phase-Shift (CAPS) spectroscopy NO2
32	NOx	Teledyne API Model T200U **Trace Level** Chemiluminescence analyzer NO/NOx/NO2 (FRM)
33	NOx	Thermo Model 42i TL **Trace Level** Chemiluminescence NO/NOx/NO2 analyzer (FRM)
34	NOy	Thermo Model 42i-Y. NO-DIF-NOy chemiluminescent specialty **Trace Level** gas analyzer
35	O_3	Teledyne API Model T400 UV Photometric O3 analyzer (FEM)
36	O_3	Thermo Model 49i UV Photometric O3 analyzer (FEM)
37	SO_2	Teledyne API Model T100U **Trace Level** Ultraviolet SO2 fluorescence (FEM)

(3) PM — **Particulate Matter Monitor Type:**

FRM	Federal Reference Method,
FEM	Federal Equivalent Method
Non	Public Info Only - Not FEM or FRM method (not usable for NAAQS comparisons)

(4) 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 6 / 3	One of a pair of FRM samplers. Each collects a sample every 6 days, but the pair are staggered by three days.
1 in 6 Coll	Collects a 24-hour sample every 6 days as a collocated monitor comparison
1 in 3	Collects a 24-hour sample every 3 days

(5) Type — Monitor Site Type:

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

(6) Monitoring Objective Descriptions

B	Background
H	Highest Concentration
P	Population Exposure
S	Source Impact
QA Coll	FRM of a FEM / FRM Collocation
QA Coll-1	BAM 1020 for an FRM Collocation
QA Coll-2	BAM 1022 for an FRM Collocation
QA Coll-3	Thermo 5014i for an FRM Collocation
QA Cont-Coll	Continuous Thermo 5014i / Continuous BAM 1020 Collocation

<u>Appendix D</u> -- Ambient Air Quality Network 2023 Raw Data Summary

Montana DEQ Ambient Air Monitoring Network Summary

Summary for Period: 1/1/2023 through 12/31/2023 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	56.3	1.5	98	0	0	75
Billings Lockwood	NO2	ppb	0	45	8	10	0	0	100
Billings Lockwood	OZONE	ppm	0	0.059	0.023	99	0	1	0.07
Billings Lockwood	PM25	$\mu g/m^3$	0.3	112.2	6.6	98	4	7	35
Bozeman	PM25	$\mu g/m^3$	0.6	34.3	5.3	97	0	2	35
Broadus	NO2	ppb	0	18	1	89	0	0	100
Broadus	OZONE	ppm	0.002	0.133	0.035	96	2	68	0.07
Broadus	PM10	$\mu g/m^3$	1	137	22	86	0	2	150
Broadus	PM25	$\mu g/m^3$	0.9	118.9	9.3	91	10	14	35
Butte	PM10	$\mu g/m^3$	2	79	18	95	0	0	150
Butte	PM25	$\mu g/m^3$	-0.3	44.6	7.3	99	2	2	35
Choteau	PM25	$\mu g/m^3$	0	70.5	3.4	33	1	2	35
Cut Bank	PM25	$\mu g/m^3$	-1.6	76.7	4.2	97	6	8	35
Dillon	PM25	$\mu g/m^3$	-1.1	45	2.9	98	2	2	35
Columbia Falls	PM10	$\mu g/m^3$	0	66	13	92	0	0	150
Columbia Falls	PM25	$\mu g/m^3$	-0.4	68.1	9.4	100	8	12	35
Frenchtown	PM25	$\mu g/m^3$	2.4	42.2	9.8	100	1	5	35
Glendive	PM25	$\mu g/m^3$	-2.1	6.1	1.7	20	0	0	35
Great Falls	PM25	$\mu g/m^3$	3	82.6	10.9	96	7	10	35
Hamilton	PM25	$\mu g/m^3$	-1	39.3	5.7	99	1	2	35
Havre	PM25	$\mu g/m^3$	0.1	139.7	8.6	66	9	12	35
Helena	PM25	$\mu g/m^3$	1.2	74.9	8.4	100	3	8	35
Helena	PM25 Col.	$\mu g/m^3$	0.2	71.1	7.3	99	2	5	35
Kalispel	PM10	$\mu g/m^3$	2	102	23	100	0	0	150
Lewistown	NO2	ppb	0	19	1	97	0	0	100
Lewistown	OZONE	ppm	0.008	0.07	0.037	97	1	35	0.07
Lewistown	PM10	$\mu g/m^3$	0	90	9	100	0	0	150
Lewistown	PM25	$\mu g/m^3$	-0.2	71	5	99	5	7	35
Libby	PM10	$\mu g/m^3$	1	113	17	99	0	0	150
Libby	PM25	$\mu g/m^3$	1.6	109	12	100	4	7	35
Malta	NO2	ppb	0	12	1	97	0	0	100
Malta	OZONE	ppm	0.005	0.101	0.033	98	1	48	0.07
Malta	PM10	$\mu g/m^3$	0	153	11	100	1	3	150
Malta	PM25	$\mu g/m^3$	-0.9	123.8	7.4	100	11	14	35
Miles City	NO2	ppb	0	35	4	98	0	0	100
Miles City	OZONE	ppm	0.001	0.076	0.029	98	5	51	0.07
Miles City	PM10	$\mu g/m^3$	1	214	12	84	1	1	150
Miles City	PM25	$\mu g/m^3$	0.3	185	8.1	100	10	11	35
Missoula	OZONE	ppm	0	0.092	0.023	98	1	14	0.07
Missoula	PM10	$\mu g/m^3$	3	58	16	99	0	0	150
Missoula	PM25	$\mu g/m^3$	-0.8	37.1	5.3	99	1	2	35
NCore - Sieben's Flat	CO TRACE	ppb	18	1011	131	81	0	0	35000
NCore - Sieben's Flat	NOy	ppb	0	25.6	1.38	74	--	--	--
NCore - Sieben's Flat	OZONE	ppm	0.003	0.164	0.036	92	2	67	0.07
NCore - Sieben's Flat	PM10	$\mu g/m^3$	-1	80	5	84	0	0	150
NCore - Sieben's Flat	PM25	$\mu g/m^3$	-2.9	60.5	4.1	85	4	5	35
NCore - Sieben's Flat	PM_{COARSE}	$\mu g/m^3$	-2	18	1	82	--	--	--
NCore - Sieben's Flat	SO2	ppb	0	1.6	0.7	89	0	0	75
Seeley Lake	PM25	$\mu g/m^3$	1.3	48.7	10.7	100	8	12	35
Sidney	NO2	ppb	0	22	2	98	0	0	100
Sidney	OZONE	ppm	0.003	0.076	0.034	98	12	124	0.07
Sidney	PM10	$\mu g/m^3$	1	172	13	100	1	1	150
Sidney	PM25	$\mu g/m^3$	-0.1	143.9	7.5	96	10	12	35
Sidney	SO2	ppb	0	12.4	1	94	0	0	75
Thompson Falls	PM10	$\mu g/m^3$	11	125	21	94	0	0	150
Thompson Falls	PM25	$\mu g/m^3$	1.7	99	8.1	99	5	5	35
Whitefish	PM10	$\mu g/m^3$	1	107	21	98	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

<u>Appendix E</u> -- $PM_{2.5}$ 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

<u>Appendix F</u> -- National and Montana Ambient Air Quality Standards

National Ambient Air Quality Standards					Montana Ambient Air Quality Standards *
Pollutant	**Primary/ Secondary**	**Averaging Time**	**Level**	**Form**	
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_X Oxides of Nitrogen with **NO_2** as the Indicator	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	40 CFR 50.11 **53 ppb** (2)	Annual Mean	*0.05 ppm*
O_3 **Ozone**	primary and secondary	8-hour (Average Foreward)	**0.070 ppm** (3) 40 CFR 50.19	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/m³** (1)	Not to be exceeded	--
	primary	*Quarterly Average*	***1.5 μg/m³*** (1)	*Remains in effect only in E. Helena N.A. Area*	*1.5 μg/m³*
$PM_{2.5}$	primary	Annual	**9.0 μg/m³** (5) 40 CFR 50.20	annual mean, averaged over 3 years	--
	secondary	Annual	**15.0 μg/m³** 40 CFR 50.13	annual mean, averaged over 3 years	--
Particulate Matter	primary and secondary	24-hour	**35 μg/m³** 40 CFR 50.18	98th percentile, averaged over 3 years	--
PM_{10}	primary and secondary	24-hour	**150 μg/m³**	Not to be exceeded more than once per year on average over 3 years	*150 μg/m³*
					Annual 50 μg/m³

*** 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/m²

(**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

(**5**) Changed from 12.0µg/m3 on Feb 7, 2024.

<u>Appendix G</u> -- 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) for the 2010 SO_2 NAAQS.

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 2023 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)				2023 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	2,487.93	11%
Unit 4	2,257.88	942.34	2,303.83	1,834.68	2,487.99	35%
Colstrip Total	**9,204.35**	**12,474.86**	**10,222.18**	**10,633.79**	**4,975.92**	**-53%**

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 24, 2024. No comments or questions were received.