Draft 2025 Air Monitoring Network Plan for Minnesota

Appendix B

Minimum Monitoring Requirements and
2024 Monitor Classifications in Air Quality System (AQS)

Summary

The U.S. Environmental Protection Agency (EPA) establishes the minimum number of monitoring sites required to meet national ambient monitoring objectives. The minimum monitoring requirements are codified in Appendix D of 40 CFR Part 58. Minimum monitoring requirements are specific to each individual pollutant (e.g. ozone, $PM_{2.5}$) or objective-based monitoring network (e.g. NCore, PAMs). Minimum monitoring requirements typically rely on population and/or air pollution emissions data. Minnesota currently meets all minimum air monitoring requirements. This Appendix provides a detailed description of these requirements. It also provides tables that describe each monitor's scale, objective, method, and collocation, where required.

Federal Regulation

40 CFR § 58.10 Annual monitoring network plan and periodic network assessment.
(a)(1) Beginning July 1, 2007, the state, or where applicable local, agency shall submit to the Regional Administrator an annual monitoring network plan which shall provide for the documentation of the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM, FEM, and ARM monitors that are part of SLAMS, NCore, CSN, PAMS, and SPM stations. The plan shall include a statement of whether the operation of each monitor meets the requirements of appendices A, B, C, D, and E of this part, where applicable. The Regional Administrator may require additional information in support of this statement. The annual monitoring network plan must be made available for public inspection and comment for at least 30 days prior to submission to the EPA and the submitted plan shall include and address, as appropriate, any received comments.

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$PM_{2.5}$

Fine particulate ($PM_{2.5}$) monitoring requirements

The minimum monitoring requirements for $PM_{2.5}$ are established in Appendix D of 40 CFR Part 58, section 4.7.1(a) (Table B1). In addition to these population-based requirements, $PM_{2.5}$ monitoring is required at NCore and near-road air monitoring sites, as established in section 3(b) and section 4.7.1(b)(2) of Appendix D, respectively. NCore site also fulfills the continuous $PM_{2.5}$ and $PM_{2.5}$ chemical speciation network (CSN) site requirements, as established in section 4.7.2 and section 4.7.4 of the appendix, respectively. Each state is also required to operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor for regional transport, as established in section 4.7.3 of the appendix.

Table B1. National minimum monitoring requirements for $PM_{2.5}$

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

[1] Minimum monitoring requirement applies to the Metropolitan statistical area (MSA).
[2] Population based on latest available census figures.
[3] The $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) levels and forms are defined in 40 CFR Part 50.
[4] These minimum monitoring requirements apply in the absence of a design value.
[5] Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population

Table B2. Minnesota monitoring requirements for $PM_{2.5}$ as compared to national standards

Metropolitan Area	Counties included	2023 Population Estimate	Maximum 2023 Annual DV as % of NAAQS (12 µg/m³)	Maximum 2023 Daily DV as % of NAAQS (35 µg/m³)	Minimum Requirement	2024 Sites with FRM or FEM monitor
Minneapolis-St. Paul-Bloomington, MN-WI[1]	16 county area including the Twin Cities[1]	3,712,020	75%	83%	2	11
Duluth, MN-WI	Carlton (MN), St. Louis (MN), Douglas (WI)	281,603	50%	69%	0	4
Fargo, ND-MN	Clay (MN), Cass (ND)	262,620	77%	108%	1	1 (ND)
Rochester, MN	Dodge (MN), Olmsted (MN), Wabasha (MN)	229,077	60%	69%	0	1
St. Cloud, MN	Benton (MN), Stearns (MN)	202,577	77%	68%	0	1
La Crosse-Onalaska, WI-MN	Houston (MN), La Crosse (WI)	170,238	65%	74%	0	1 (WI)
Mankato-North Mankato, MN	Blue Earth (MN), Nicollet (MN)	104,248	Monitor installed 2024		0	1
Grand Forks, ND-MN	Polk (MN), Grand Forks (ND)	103,120	Unmonitored		0	0
NCore (Blaine)		Not a population-based requirement			1	1
Near-road Minneapolis		Not a population-based requirement			1	1
Near-road Lakeville		Not a population-based requirement			1	1
Regional background (Ely)		Not a population-based requirement			1	1
Regional transport (Marshall)		Not a population-based requirement			1	1

[1] Counties include: Anoka (MN), Carver (MN), Chisago (MN), Dakota (MN), Hennepin (MN), Isanti (MN), Le Sueur (MN), Mille Lacs (MN), Ramsey (MN), Scott (MN), Sherburne (MN), Sibley (MN), Washington (MN), Wright (MN), Pierce (WI), St. Croix (WI)

Minnesota currently meets all $PM_{2.5}$ monitoring requirements (Table B2), based on current monitoring objectives and methods (Tables B3-B4).

Table B3. Scales and objectives of MPCA and Tribal $PM_{2.5}$ monitors

MPCA Site ID	AQS Monitor ID	Monitor Type	Parameter Description	Measurement Scale	Monitor Objective Type
1002	27-003-1002-88101-1	SLAMS	$PM_{2.5}$ – Local Conditions	Urban Scale	Population Exposure
	27-003-1002-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Urban Scale	Population Exposure
2013	27-005-2013-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Urban Scale	Population Exposure
2304	27-007-2304-88101-3	TRIBAL	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
5510	27-013-5510-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
7417	27-017-7417-88101-3	TRIBAL	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
3410	27-021-3410-88101-3	TRIBAL	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
7810	27-031-7810-88101-3	TRIBAL	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
3204	27-035-3204-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Urban Scale	Population Exposure
0470	27-037-0470-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
0480	27-037-0480-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Middle Scale	Source Oriented
0962	27-053-0962-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Middle Scale	Source Oriented
0963	27-053-0963-88101-1	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
	27-053-0963-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
1904	27-053-1904-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
2006	27-053-2006-88101-1	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
	27-053-2006-88101-2	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
0005	27-075-0005-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Regional	General / Background
4210	27-083-4210-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Urban Scale	Population Exposure/ Regional Transport
5008	27-109-5008-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
3061	27-115-3061-88101-3	TRIBAL	$PM_{2.5}$ – Local Conditions	Regional	Regional Transport
0868	27-123-0868-88101-1	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
0871	27-123-0871-88101-1	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
	27-123-0871-88101-2	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
	27-123-0871-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
	27-123-0871-88101-4	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
7001	27-137-7001-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
7550	27-137-7550-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
7554	27-137-7554-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
0505	27-139-0505-88101-1	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
3052	27-145-3052-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure
3201	27-171-3201-88101-3	SLAMS	$PM_{2.5}$ – Local Conditions	Neighborhood	Population Exposure

Table B4. Methods, frequency, duration, and collocation of MPCA and Tribal $PM_{2.5}$ monitors in 2024

MPCA Site ID	AQS Monitor ID	Monitor Type	Method Code*	Sample Analysis Description	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor (m)
1002	27-003-1002-88101-1	SLAMS	145	Gravimetric	24 hours	Every 3rd Day	N	1
	27-003-1002-88101-3	SLAMS	638	Broadband spectroscopy	1 hour	Every Day	Y	0
2013	27-005-2013-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
2304	27-007-2304-88101-3	TRIBAL	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
2305	27-007-2305-88101-3	TRIBAL	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
7417	27-017-7417-88101-3	TRIBAL	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
3410	27-021-3410-88101-3	TRIBAL	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
7810	27-031-7810-88101-3	TRIBAL	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
3204	27-035-3204-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
0470	27-037-0470-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	Y	0
	27-037-0470-88101-4	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	N	1.5
0480	27-037-0480-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
0910	27-053-0910-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
0962	27-053-0962-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
0963	27-053-0963-88101-1	SLAMS	145	Gravimetric	24 hours	Every 3rd Day	N	1
	27-053-0963-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	Y	0
1904	27-053-1904-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	Y	0
2006	27-053-2006-88101-1	SLAMS	145	Gravimetric	24 hours	Every 3rd Day	Y	0
	27-053-2006-88101-2	SLAMS	145	Gravimetric	24 hours	Every 12th Day	N	1
0005	27-075-0005-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
4210	27-083-4210-88101-3	SLAMS	638	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
5008	27-109-5008-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
3061	27-115-3061-88101-3	TRIBAL	636	Broadband spectroscopy	1 hour	Every Day	Y	0
0868	27-123-0868-88101-1	SLAMS	145	Gravimetric	24 hours	Every 3rd Day	n/a	n/a
0871	27-123-0871-88101-1	SLAMS	145	Gravimetric	24 hours	Every 3rd Day	N	1.5
	27-123-0871-88101-2	SLAMS	145	Gravimetric	24 hours	Every 12th Day	N	1.5
	27-123-0871-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
7001	27-137-7001-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
7550	27-137-7550-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
7554	27-137-7554-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
0505	27-139-0505-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
3052	27-145-3052-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
3201	27-171-3201-88101-3	SLAMS	636	Broadband spectroscopy	1 hour	Every Day	n/a	n/a

* Method 636 uses Teledyne T640 at 5.0 LPM; method 638 uses Teledyne T640X at 16.67 LPM.

PM_{10}

PM_{10} monitoring requirements

The minimum monitoring requirements for PM_{10} are established in Appendix D of 40 CFR Part 58, section 4.6 (Table B5). In addition to these population-based requirements, PM_{10} monitoring is required at NCore sites as established in section 3(b) of Appendix D.

Minnesota currently meets all PM_{10} monitoring requirements (Table B6), based on current monitoring objectives and methods (Tables B7-B8).

Table B5. National minimum monitoring requirements for PM_{10}

Population category	MSA[1]		
	High concentration[2]	Medium concentration[3]	Low concentration[4,5]
>1 million	6-10	4-8	2-4
500,000 – 1 million	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]Selection of urban areas and actual numbers of stations per area within the ranges shown in this table will be jointly determined by EPA and the State Agency.
[2]High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10} NAAQS by 20% or more.
[3]Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80% of the PM_{10} NAAQS.
[4]Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80% of the PM_{10} NAAQS.
[5]These minimum monitoring requirements apply in the absence of a design value.

Table B6. Minnesota monitoring requirements for PM_{10} as compared to national standards

Metropolitan Area	2023 Population Estimate	Expected days greater than 80% of the NAAQS (120 µg/m^3) based on 2023 data	Minimum Requirement	2024 Sites
Minneapolis-St. Paul-Bloomington, MN-WI	3,712,020	2	4-8	7
Duluth, MN-WI	281,603	1	3-4	2
Fargo, ND-MN	262,620	Unmonitored	0	0
Rochester, MN	229,077	Unmonitored	0	0
St. Cloud, MN	202,577	Unmonitored	0	0
La Crosse-Onalaska, WI-MN	170,238	Unmonitored	0	0
Mankato-North Mankato, MN	104,248	Unmonitored	0	0
Grand Forks, ND-MN	103,120	Unmonitored	0	0
NCore (Blaine)	Not a population based requirement		1	1

Table B7. Scales and objectives of MPCA PM_{10} monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1002	SLAMS	27-003-1002-81102-3	PM_{10} Total 0-10 µm Stp	Urban Scale	Population Exposure
0909	SLAMS	27-053-0909-81102-3	PM_{10} Total 0-10 µm Stp	Middle Scale	Source Oriented
0910	SLAMS	27-053-0910-81102-3	PM_{10} Total 0-10 µm Stp	Middle Scale	Source Oriented
0966	SLAMS	27-053-0966-81102-1	PM_{10} Total 0-10 µm Stp	Neighborhood	Population Exposure
0866	SLAMS	27-123-0866-81102-1	PM_{10} Total 0-10 µm Stp	Middle Scale	Highest Concentration
	SLAMS	27-123-0866-81102-2	PM_{10} Total 0-10 µm Stp	Middle Scale	Highest Concentration
0868	SLAMS	27-123-0868-81102-3	PM_{10} Total 0-10 µm Stp	Neighborhood	Population Exposure
0032	SLAMS	27-137-0032-81102-1	PM_{10} Total 0-10 µm Stp	Middle Scale	Source Oriented
	SLAMS	27-137-0032-81102-2	PM_{10} Total 0-10 µm Stp	Middle Scale	Source Oriented
7001	SLAMS	27-137-7001-81102-1	PM_{10} Total 0-10 µm Stp	Neighborhood	Population Exposure
1909	SPM	27-053-1909-88101-3	PM_{10} Total 0-10 µm Stp	Neighborhood	Population Exposure

Table B8. Methods and collocation of MPCA PM_{10} monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Method Code	Sample Analysis Description	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor (m)
1002	SLAMS	27-003-1002-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
0909	SLAMS	27-053-0909-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
0910*	SLAMS	27-053-0910-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
0966	SLAMS	27-053-0966-81102-1	063	Gravimetric	24 hours	Every 6th Day	n/a	n/a
4210	SLAMS	27-083-4210-81102-3	239	Broadband spectroscopy	1 hour	Every Day	n/a	n/a
0866	SLAMS	27-123-0866-81102-1	063	Gravimetric	24 hours	Every 6th Day	Y	0
		27-123-0866-81102-2	063	Gravimetric	24 hours	Every 12th Day	N	1.5
0868	SLAMS	27-123-0868-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
0032	SLAMS	27-137-0032-81102-1	063	Gravimetric	24 hours	Every 6th Day	Y	0
		27-137-0032-81102-2	063	Gravimetric	24 hours	Every 6th Day	N	1.5
7001	SLAMS	27-137-7001-81102-1	063	Gravimetric	24 hours	Every 6th Day	n/a	n/a
1909	SPM	27-053-1909-88101-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a

* These sites will change to method 239 (Teledyne T640X at 16.67 LPM) in 2023

Total suspended particulate matter (TSP)

TSP monitoring requirements

The TSP NAAQS was replaced in 1987 by the PM_{10} standard. There are currently no federal requirements to monitor TSP. Minnesota rule administered by the Minnesota Pollution Control Agency requires the monitoring of TSP and the enforcement of state TSP standards. The TSP standards are detailed in Minn.R.7009.0080.

Scales and objectives of TSP monitors in Minnesota are listed in Table B9. Methods and collocation of TSP monitors are listed in Table B10.

Table B9. Scales and objectives of MPCA TSP monitors

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1002	SLAMS	27-003-1002-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
6021	SLAMS	27-003-6021-11101-1	Suspended particulate (TSP)	Neighborhood	Source Oriented
0020	SLAMS	27-037-0020-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
		27-037-0020-11101-2	Suspended particulate (TSP)	Middle Scale	Source Oriented
0423	SLAMS	27-037-0423-11101-2	Suspended particulate (TSP)	Middle Scale	Source Oriented
0465	SLAMS	27-037-0465-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
		27-037-0465-11101-2	Suspended particulate (TSP)	Middle Scale	Source Oriented
0470	SLAMS	27-037-0470-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
0909	SLAMS	27-053-0909-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
0910	SLAMS	27-053-0910-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
0962	SLAMS	27-053-0962-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
0963	SLAMS	27-053-0963-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
0966	SLAMS	27-053-0966-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
1007	SLAMS	27-053-1007-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
1904	SLAMS	27-053-1904-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
1909	SPM	27-053-1909-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
0871	SLAMS	27-123-0871-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
0875	SLAMS	27-123-0875-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
0890	SLAMS	27-123-0875-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
7001	SLAMS	27-137-7001-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
7549	SLAMS	27-137-7549-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
7555	SLAMS	27-137-7555-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
		27-137-7555-11101-2	Suspended particulate (TSP)	Neighborhood	Population Exposure
0446	SLAMS	27-163-0446-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented

Table B10. Methods and collocation of MPCA TSP monitors

MPCA Site ID	AQS Monitor ID	Method Code	Sample Analysis Description	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor (m)
1002	27-003-1002-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
6021	27-003-6021-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0020	27-037-0020-11101-1	091	Gravimetric	24 hours	Every 6th Day	Y	0
	27-037-0020-11101-2	091	Gravimetric	24 hours	Every 6th Day	N	2.5
0423	27-037-0423-11101-2	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0465	27-037-0465-11101-1	091	Gravimetric	24 hours	Every 6th Day	Y	0
	27-037-0465-11101-2	091	Gravimetric	24 hours	Every 12th Day	N	2.5
0470	27-037-0470-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0909	27-053-0909-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0910	27-053-0910-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0962	27-053-0962-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0963	27-053-0963-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0966	27-053-0966-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
1007	27-053-1007-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
1904	27-053-1904-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
1909	27-053-1909-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0871	27-123-0871-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0875	27-123-0875-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0890	27-123-0890-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
7001	27-137-7001-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
7549	27-137-7549-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
7555	27-137-7555-11101-1	091	Gravimetric	24 hours	Every 6th Day	Y	0
	27-137-7555-11101-2	091	Gravimetric	24 hours	Every 12th Day	N	3
0438	27-163-0438-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a
0446	27-163-0446-11101-1	091	Gravimetric	24 hours	Every 6th Day	n/a	n/a

Lead

Lead monitoring requirements

The minimum monitoring requirements for lead are established in Appendix D of 40 CFR Part 58, section 4.5. Lead monitoring requirements are based on annual emissions. This source-oriented network requires lead monitoring for non-airport sources which emit 0.50 tons or more lead per year (TPY) and from each airport

which emits 1.0 or more TPY, based on either the most recent National Emission Inventory (NEI) or other scientifically justifiable methods and data. The EPA Regional Administrator may waive the lead monitoring requirement near lead sources if the State or, where appropriate, the local agency can demonstrate the lead source will not contribute to a maximum lead concentration in ambient air in excess of 50% of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be re-evaluated once every five years as part of the network assessment. Table B11 shows all facilities with annual Pb emissions greater than 0.5 tons per year and facilities where maximum 3-month rolling average lead concentrations are greater than 50% of the lead NAAQS.

Table B11. 2018 to 2022 annual lead emissions for facilities of interest

Facility Name	City	County	2018 Lead Emissions (TPY)	2019 Lead Emissions (TPY)	2020 Lead Emissions (TPY)	2021 Lead Emissions (TPY)	2022 Lead Emissions (TPY)
Federal Ammunition Co.	Anoka, MN	Anoka	0.141	2.02*	2.07	2.12	2.10
Gopher Resource LLC	Eagan, MN	Dakota	0.325	0.170	0.135	0.135	0.496**
US Steel Corp – Minntac	Mountain Iron, MN	St. Louis	0.552	0.501	0.486	0.559	0.439

*Due to production and stack test emission factor

**Due to stack test emission factor update

Federal Ammunition

Federal Ammunition was identified above the 0.5 tons Lead on their annually emission inventory for 2019 - 2022. The MPCA placed a lead monitoring site at Federal Ammunition, Anoka MN, to meet the requirement of Appendix D of 40 CFR Part 58, section 4.5. This requirement identifies there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year.

Gopher Resource LLC

In addition to the emissions-based lead monitoring requirements, the EPA Regional Administrator can require additional monitoring beyond the minimum monitoring requirements where the “likelihood of lead air quality violations is significant”, or where the emissions density, topography, or population locations are complex and varied. The Minnesota Pollution Control Agency (MPCA) interprets the “likelihood of lead air quality violations is significant” to include locations where ambient monitoring or modeling indicate that ambient lead concentrations may be greater than 50% of the lead NAAQS. Based on monitoring conducted from 2019-2021, one ambient lead monitoring site measured maximum 3-month rolling average lead concentrations greater than 50% of the lead NAAQS (Table B17). At a minimum, the MPCA intends to continue monitoring for lead at this site for as long as the maximum 3-month rolling average lead concentration is greater than 50% of the lead NAAQS.

Table B12. Minnesota lead monitoring sites with maximum 3-month rolling average lead concentrations greater than 50% of the NAAQS

Site Name	AQS Monitor ID	Maximum 3-month Rolling Average (2020-2022)	Percent of NAAQS
Eagan – Gopher Resources	27-037-0465-14129-1	0.14 µg/m^3	93%
Anoka – Federal Ammunition	27-003-6021-14129-1	0.46 µg/m^3	306%

US Steel Corp – Minntac

In 2009, the MPCA conducted modeling to assess ambient lead concentrations near U.S. Steel Corp – Minntac. The results of this modeling predicted that maximum ambient lead concentrations near the facility were less than 50% of the lead NAAQS. The MPCA received a lead monitoring waiver for U.S. Steel Corp-Minntac in December 2011.

The 2011 monitoring waiver was re-evaluated and results were published in the January 2017 Lead Monitoring Waiver Renewal for U.S. Steel Corp – Minntac. Results of the 2017 modeling reassessment are similar to those conducted in 2009 and 2011. Modeled ambient lead concentrations are well below the monitoring threshold of 50% of the lead NAAQS. Using a background ambient lead concentration of 0.01 $\mu g/m^3$, the total facility impact is estimated at 0.010244 $\mu g/m^3$, which is approximately 14% of the threshold to require ambient fence-line monitoring. The MPCA received approval from EPA for the 2017 lead monitoring waiver for U.S. Steel Corp-Minntac.

In 2023 the monitoring waiver was reevaluated, and results and request letter are published in Appendix C – Lead Monitoring Waiver Renewal US Steel Corp - Minntac. Results of the 2023 modeling reassessment are similar to those conducted in 2009, 2011 and 2017. Modeled ambient lead concentrations are well below the monitoring threshold of 50% of the lead NAAQS. Using a background ambient lead concentration of 0.01 $\mu g/m^3$, the total facility impact is estimated at 0.010580 $\mu g/m^3$, which is approximately 14% of the threshold to require ambient fence-line monitoring. Based on these results, the EPA has guided MPCA's lead monitoring waiver request to be included in this monitoring plan for approval, see Appendix C.

Table B13. Scales and objectives of MPCA lead monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1002	SLAMS	27-003-1002-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
6021	SLAMS	27-003-6021-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
0020	SLAMS	27-037-0020-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
	SLAMS	27-037-0020-14129-2	Lead (Tsp) LC	Middle Scale	Source Oriented
0423	SLAMS	27-037-0423-14129-2	Lead (Tsp) LC	Middle Scale	Source Oriented
0465	SLAMS	27-037-0465-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
	SLAMS	27-037-0465-14129-2	Lead (Tsp) LC	Middle Scale	Source Oriented
0470	SLAMS	27-037-0470-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
0909	SLAMS	27-053-0909-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
0910	SLAMS	27-053-0910-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
0962	SLAMS	27-053-0962-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
0963	SLAMS	27-053-0963-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
0966	SLAMS	27-053-0966-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
1007	SLAMS	27-053-1007-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
1904	SLAMS	27-053-1904-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
1909	SPM	27-053-1909-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
0871	SLAMS	27-123-0871-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
0875	SLAMS	27-123-0875-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
0890	SLAMS	27-123-0890-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
7001	SLAMS	27-137-7001-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
7549	SLAMS	27-137-7549-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
7555	SLAMS	27-137-7555-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
	SLAMS	27-137-7555-14129-2	Lead (Tsp) LC	Neighborhood	Population Exposure
0446	SLAMS	27-163-0446-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented

Scales and objectives of TSP monitors in Minnesota are listed in Table B13. Methods and collocation of TSP monitors are listed in Table B14.

Table B14. Methods and collocation of MPCA lead monitors

MPCA Site ID	AQS Monitor ID	Monitor Type	Method Code*	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor (m)
1002	27-003-1002-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
6021	27-003-6021-14129-1	SPM	192	24 hours	Every 6th Day	n/a	n/a
0020	27-037-0020-14129-1	SLAMS	192	24 hours	Every 6th Day	Y	0
	27-037-0020-14129-2	SLAMS	192	24 hours	Every 6th Day	N	2.5
0423	27-037-0423-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0465	27-037-0465-14129-1	SLAMS	192	24 hours	Every 6th Day	Y	0
	27-037-0465-14129-2	SLAMS	192	24 hours	Every 12th Day	N	2.5
0470	27-037-0470-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0909	27-053-0909-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0910	27-053-0910-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0962	27-053-0962-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0963	27-053-0963-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0966	27-053-0966-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
1007	27-053-1007-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
1904	27-053-1904-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
1909	27-053-1909-14129-1	SPM	192	24 hours	Every 6th Day	n/a	n/a
0871	27-123-0871-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0875	27-123-0875-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
0890	27-123-0890-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
7001	27-137-7001-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
7549	27-137-7549-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a
7555	27-137-7555-14129-1	SLAMS	192	24 hours	Every 6th Day	Y	0
	27-137-7555-14129-2	SLAMS	192	24 hours	Every 12th Day	N	3
0446	27-163-0446-14129-1	SLAMS	192	24 hours	Every 6th Day	n/a	n/a

*Method 192 is Inductively Coupled Plasma-Mass Spectrometry Acid filter extract with hot nitric acid

Carbon monoxide

Carbon monoxide (CO) monitoring requirements

The minimum monitoring requirements for CO are established in Appendix D of 40 CFR Part 58, section 4.2. These requirements include monitoring CO at NCore sites and at two near-road air monitoring sites in Core Base Statistical Areas (CBSAs) having a population of 1,000,000 or more persons, as established in section 3(b) and section 4.2.1(a) of Appendix D, respectively. (Table B15). In addition to these minimum requirements, the Regional Administrator may require additional monitors in situations where data or other information suggests that CO concentrations may be approaching or exceeding the NAAQS. Minnesota currently meets the minimum CO monitoring requirements, according to monitoring objectives and methods (Tables B16 and B17).

Table B15. Minnesota carbon monoxide monitoring requirements

Location Requirement	Required Sites	2024 Sites
Near-road CO for CBSAs > 1 million (Minneapolis – St. Paul-Bloomington, MN-WI)	1	2
NCore (Blaine)	1	1

Table B16. Scales and objectives of MPCA carbon monoxide monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1002	SLAMS	27-003-1002-42101-1	Carbon Monoxide	Urban Scale	Population Exposure
0020	SLAMS	27-037-0020-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
0423	SLAMS	27-037-0423-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
0480	SLAMS	27-037-0480-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
0954	SLAMS	27-053-0954-42101-1	Carbon Monoxide	Microscale	Highest Concentration
0962	SLAMS	27-053-0962-42101-1	Carbon Monoxide	Middle Scale	Source Oriented

Table B17. Methods of MPCA carbon monoxide monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Method Code	Sample Analysis Description
1002	SLAMS	27-003-1002-42101-1	593	Gas Filter Correlation Teledyne API 300 EU
0020	SLAMS	27-037-0020-42101-1	093	Gas Filter Correlation CO Analyzer
0423	SLAMS	27-037-0423-42101-1	093	Gas Filter Correlation CO Analyzer
0480	SLAMS	27-037-0480-42101-1	093	Gas Filter Correlation CO Analyzer
0954	SLAMS	27-053-0954-42101-1	093	Gas Filter Correlation CO Analyzer
0962	SLAMS	27-053-0962-42101-1	093	Gas Filter Correlation CO Analyzer

Ozone

Ozone (O_3) monitoring requirements

The minimum monitoring requirements for ozone are established in Section 4.1 of Appendix D of 40 CFR Part 58, section 4.1 (Table B18). In addition to these population-based requirements, ozone monitoring is required at NCore sites as established in section 3(b) of Appendix D.

Minnesota currently meets all ozone monitoring requirements (Table B19), based on current monitoring objectives and methods (Tables B20 and B21).

Table B18. National minimum monitoring requirements for ozone

MSA Population[1,2]	Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]	Most recent 3-year design value concentration <85% of any O_3 NAAQS[3,4]
>10 million	4	2
4-10 million	3	1
350,000 - <4 million	2	1
50,000 - <350,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2]Population based on latest available census figures.
[3]The ozone (O_3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Table B19. Minnesota monitoring requirements for ozone as compared to national standards

Metropolitan Area	2023 Population Estimate	Maximum 2023 8-Hour DV as % of NAAQS (70 ppb)	Minimum Requirement	2024 Sites
Minneapolis-St. Paul-Bloomington, MN-WI	3,712,020	96%	2	6
Duluth, MN-WI	281,603	84%	1	2
Fargo, ND-MN	262,620	89%	1	1 (ND)
Rochester, MN	229,077	94%	1	1
St. Cloud, MN*	202,577	Unmonitored	0	0
La Crosse-Onalaska, WI-MN	170,238	91%	1	1 (WI)
Mankato-North Mankato, MN	104,248	Monitor installed 2024	0	0
Grand Forks, ND-MN	103,120	Unmonitored	0	0
NCore (Blaine)	Not a population based requirement		1	1

*AQS Site 27-145-3052 may represent the St. Cloud air mass, and is within St. Cloud city limits, but its actual location in Sherburne County means that it is outside the boundary of the St. Cloud MSA. Thus, Site 3052 does not meet the monitoring requirements for the St. Cloud MSA. Sherburne County is part of the Minneapolis-St. Paul-Bloomington, MN-WI MSA.

Table B20. Scales and objectives of MPCA and Tribal ozone monitors

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1001	SLAMS	27-003-1001-44201-1	Ozone	Neighborhood	Highest Concentration
1002	SLAMS	27-003-1002-44201-1	Ozone	Neighborhood	Highest Concentration
2013	SLAMS	27-005-2013-44201-1	Ozone	Urban Scale	Regional Transport
2305	TRIBAL	27-007-2305-44201-1	Ozone	Urban Scale	Population Exposure
5510	SLAMS	27-013-5510-44201-1	Ozone	Urban Scale	Population Exposure
7417	TRIBAL	27-017-7417-44201-1	Ozone	Neighborhood	Population Exposure
3204	SLAMS	27-035-3204-44201-1	Ozone	Urban Scale	Population Exposure
5302	SLAMS	27-049-5302-44201-1	Ozone	Neighborhood	Population Exposure
0962	SLAMS	27-053-0962-44201-1	Ozone	Middle Scale	Source Oriented
0005	SLAMS	27-075-0005-44201-1	Ozone	Regional	General / Background
4210	SLAMS	27-083-4210-44201-1	Ozone	Urban Scale	Regional Transport
3051	TRIBAL	27-095-3051-44201-1	Ozone	Regional	General / Background
5008	SLAMS	27-109-5008-44201-1	Ozone	Neighborhood	Population Exposure
7550	SLAMS	27-137-7550-44201-1	Ozone	Neighborhood	Population Exposure
0505	SLAMS	27-139-0505-44201-1	Ozone	Neighborhood	Population Exposure
3052	SLAMS	27-145-3052-44201-1	Ozone	Neighborhood	Population Exposure
6016	SLAMS	27-163-6016-44201-1	Ozone	Neighborhood	Highest Concentration
3201	SLAMS	27-171-3201-44201-1	Ozone	Neighborhood	Highest Concentration

Table B21. Methods of MPCA and Tribal ozone monitors

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Method Code	Sample Analysis Description
1001	SLAMS	27-003-1001-44201-1	Ozone	087	Ultraviolet Absorption
1002	SLAMS	27-003-1002-44201-1	Ozone	087	Ultraviolet Absorption
2013	SLAMS	27-005-2013-44201-1	Ozone	087	Ultraviolet Absorption
2305	TRIBAL	27-007-2305-44201-1	Ozone	087	Ultraviolet Absorption
5510	SLAMS	27-013-5510-44201-1	Ozone	087	Ultraviolet Absorption
7417	TRIBAL	27-017-7417-44201-1	Ozone	087	Ultraviolet Absorption
3204	SLAMS	27-035-3204-44201-1	Ozone	087	Ultraviolet Absorption
5302	SLAMS	27-049-5302-44201-1	Ozone	087	Ultraviolet Absorption
0962	SLAMS	27-053-0962-44201-1	Ozone	087	Ultraviolet Absorption
0005	SLAMS	27-075-0005-44201-1	Ozone	087	Ultraviolet Absorption
4210	SLAMS	27-083-4210-44201-1	Ozone	087	Ultraviolet Absorption
3051	TRIBAL	27-095-3051-44201-1	Ozone	087	Ultraviolet Absorption
5008	SLAMS	27-109-5008-44201-1	Ozone	087	Ultraviolet Absorption
7550	SLAMS	27-137-7550-44201-1	Ozone	087	Ultraviolet Absorption
0505	SLAMS	27-139-0505-44201-1	Ozone	087	Ultraviolet Absorption
3052	SLAMS	27-145-3052-44201-1	Ozone	087	Ultraviolet Absorption
6016	SLAMS	27-163-6016-44201-1	Ozone	087	Ultraviolet Absorption
3201	SLAMS	27-171-3201-44201-1	Ozone	087	Ultraviolet Absorption

Nitrogen dioxide

Nitrogen dioxide (NO_2) monitoring requirements

The minimum monitoring requirements for NO_2 are established in Appendix D of 40 CFR Part 58, section 4.3. There are two primary monitoring objectives for NO_2, including monitoring near roads and in neighborhoods (area-wide), as established in section 3(b) and section 4.2.1(a) of Appendix D, respectively (Table B22). In addition to these minimum requirements, the Regional Administrator may require additional monitoring in areas where NO_2 is expected to be near the level of the NAAQS. To date, the Regional Administrator has not required any additional NO_2 monitors in Minnesota.

Minnesota currently meets all NO_2 monitoring requirements (Table B23), based on current monitoring objectives (Table B24) and methods (Table B25).

Table B22. National minimum monitoring requirements for nitrogen dioxide

MSA Population	Near-Road Monitors	Area-wide Monitors
500,000	1-2[1]	0
1,000,000	1	1
2,500,000	2	1

[1]A second near-road site is required for any CBSA with a population of 500,000 or more persons that has one or more roadway segments with Annual Average Daily Traffic (AADT) greater than 250,000.

Table B23. Minnesota monitoring requirements for nitrogen dioxide

Metropolitan Area	2023 Population Estimate	Required Near-Road	2024 Near-Road	Required Area-Wide	2024 Area-Wide
Minneapolis-St. Paul-Bloomington, MN-WI	3,712,020	2	2	1	3
Duluth, MN-WI	281,603	0	0	0	1
Fargo, ND-MN	262,620	0	0	0	1 (ND)
Rochester, MN	229,077	0	0	0	0
St. Cloud, MN	202,577	0	0	0	0
La Crosse-Onalaska, WI-MN	170,238	0	0	0	0
Mankato-North Mankato, MN	104,248	0	0	0	0
Grand Forks, ND-MN	103,120	0	0	0	0

Table B24. Scales and objectives of MPCA nitrogen dioxide monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1002*	SLAMS	27-003-1002-42602-1	Nitrogen Dioxide	Urban Scale	General / Background
0020	SLAMS	27-037-0020-42602-1	Nitrogen Dioxide	Middle Scale	Source Oriented
0423	SLAMS	27-037-0423-42602-1	Nitrogen Dioxide	Middle Scale	Source Oriented
0480	SLAMS	27-037-0480-42602-1	Nitrogen Dioxide	Middle Scale	Source Oriented
0962	SLAMS	27-053-0962-42602-1	Nitrogen Dioxide	Middle Scale	Source Oriented / Highest Concentration
7001	SPM	27-137-7001-42602-1	Nitrogen Dioxide	Regional Scale	General / Background

*The NO_2 monitor at NCore (1002) satisfies the area-wide requirement for the Minneapolis-St. Paul-Bloomington, MN-WI CBSA.

Table B25. Methods of MPCA NO_2 monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Method Code	Sample Analysis Description
1002	SLAMS	27-003-1002-42602-1	Nitrogen Dioxide	099	Gas Phase Chemiluminescence
0020	SLAMS	27-037-0020-42602-1	Nitrogen Dioxide	099	Gas Phase Chemiluminescence
0423	SLAMS	27-037-0423-42602-1	Nitrogen Dioxide	099	Gas Phase Chemiluminescence
0480	SLAMS	27-037-0480-42602-1	Nitrogen Dioxide	099	Gas Phase Chemiluminescence
0962	SLAMS	27-053-0962-42602-1	Nitrogen Dioxide	099	Gas Phase Chemiluminescence
7001	SPM	27-137-7001-42602-1	Nitrogen Dioxide	099	Gas Phase Chemiluminescence

Sulfur dioxide

Sulfur dioxide (SO_2) monitoring requirements

The minimum monitoring requirements for SO_2 are established in Appendix D of 40 CFR Part 58, section 4.4. The SO_2 monitoring requirement is based on the Population Weighted Emissions Index (PWEI) for all CBSAs (Table B26). The PWEI is calculated by multiplying the population of each CBSA, using the most recent census data or estimates, and the total amount of SO_2 in TPY emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting value is divided by one million, providing a PWEI value, the units of which are million person-tons per year (Table B27). In addition to these population-based requirements, SO_2 monitoring is required at NCore sites as established in section 3(b) of Appendix D.

The MPCA currently monitors SO_2 at seven locations in the state (Tables B28 and B29).

Table B26. National minimum monitoring requirements for sulfur dioxide

PWEI for CBSA	Required Sites
≥1 million	3
100,000 to < 1 million	2
5,000 to < 100,000	1

Table B27. Minnesota monitoring requirements for sulfur dioxide as compared to national standards

Metropolitan Area	2023 Population Estimate	2020 NEI SO_2 (tons/year)	PWEI	Minimum requirement	2024 Sites
Minneapolis-St. Paul-Bloomington, MN-WI	3,712,020	1,161	4,312	1	6
Duluth, MN-WI	281,603	201	57	0	0
Fargo, ND-MN	262,620	7,136	1,874	0	1 (ND)
Rochester, MN	229,077	147	34	0	0
St. Cloud, MN	202,577	124	25	0	0
La Crosse-Onalaska, WI-MN	170,238	59	10	0	0
Mankato-North Mankato, MN	104,248	31	3	0	0
Grand Forks, ND-MN	103,120	2,665	275	0	0
NCore (Blaine)	Not a population-based requirement			1	1

Table B28. Scales and objectives of MPCA sulfur dioxide monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
1002	SLAMS	27-003-1002-42401-1	Sulfur Dioxide	Urban Scale	Population Exposure
	SLAMS	27-003-1002-42401-2	Sulfur Dioxide	Urban Scale	Population Exposure
0020	SLAMS	27-037-0020-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
0423	SLAMS	27-037-0423-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
0443	SLAMS	27-037-0443-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
0954	SLAMS	27-053-0954-42401-1	Sulfur Dioxide	Microscale	Population Exposure
7001	SPM	27-137-7001-42401-1	Sulfur Dioxide	Regional Scale	General / Background
0436	SLAMS	27-163-0436-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented

Table B29. Methods of MPCA sulfur dioxide monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Method Code	Sample Analysis Description
1002	SLAMS	27-003-1002-42401-1	600	Ultraviolet Fluorescence API 100 EU
	SLAMS	27-003-1002-42401-2	600	Ultraviolet Fluorescence API 100 EU
0020	SLAMS	27-037-0020-42401-1	100	Ultraviolet Fluorescence
0423	SLAMS	27-037-0423-42401-1	100	Ultraviolet Fluorescence
0443	SLAMS	27-037-0443-42401-1	100	Ultraviolet Fluorescence
0954	SLAMS	27-053-0954-42401-1	100	Ultraviolet Fluorescence
7001	SPM	27-137-7001-42401-1	100	Ultraviolet Fluorescence
0436	SLAMS	27-163-0436-42401-1	100	Ultraviolet Fluorescence