

Appendix B:

Minimum Monitoring Requirements and 2016 Monitor Classifications in AQS

Summary

The 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 (e.g. NCore, PAMs) monitoring network. 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, and method; collocation where required.

Federal Regulation

40 CFR § 58.10(a) (1) Annual monitoring network plan and periodic network assessment
Beginning July 1, 2007, the State, or where applicable local, agency shall adopt and submit to the Regional Administrator an annual monitoring network plan which shall provide for the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, STN stations, State speciation stations, SPM stations, and/or, in serious, severe and extreme ozone nonattainment areas, PAMS stations, and SPM monitoring stations. The plan shall include a statement of purposes for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of this part, where applicable. The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA.

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www.pca.state.mn.us/air/monitoringnetwork.html

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PM_{2.5}

Fine particle (PM_{2.5}) monitoring requirements

The minimum monitoring requirements for PM_{2.5} are established in Appendix D of 40 CFR Part 58 and are summarized in Table 1. In addition to these population based requirements, PM_{2.5} monitoring is required at NCore and near-road air monitoring sites. Minnesota currently meets all PM_{2.5} monitoring requirements (see Table 2).

Table 1. PM_{2.5} minimum monitoring requirements

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 - <500,0005	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 Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population

Table 2. Minnesota PM_{2.5} monitoring requirements

Metropolitan Area	2015 Population Estimate	Maximum 2015 Annual DV as % of Standard (12 µg/m ³)	Maximum 2015 Daily DV as % of Standard (35 µg/m ³)	Minimum Requirement	2017 Sites with FRM or FEM monitor
Minneapolis - St. Paul - Bloomington, MN-WI	3,524,583	78%	66%	2	7
Duluth, MN-WI	279,601	49%	49%	0	2
Fargo, ND-MN	233,836	51%	53%	0	1 (ND)
Rochester, MN	213,873	61%	54%	0	1
St. Cloud, MN	194,418	51%	54%	0	1
La Crosse-Onalaska, WI-MN	136,985	57%	67%	0	1 (WI)
Grand Forks, ND-MN	102,449	unmonitored		0	0
Mankato-North Mankato, MN	99,134	unmonitored		0	0
Non-population based requirements					
NCore (Blaine)				1	1
Near-road phase 1 (Minneapolis)				1	1
Near-road phase 2 (Lakeville)				1	1

Table 3. 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
250	27-053-2006-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
470	27-037-0470-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-037-0470-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
480	27-037-0480-88101-3	SLAMS	Pm2.5 - Local Conditions	Middle Scale	Source Oriented
505	27-139-0505-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
868	27-123-0868-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
871	27-123-0871-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-123-0871-88101-2	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-123-0871-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-123-0871-88101-4	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
962	27-053-0962-88101-3	SLAMS	Pm2.5 - Local Conditions	Middle Scale	Source Oriented
963	27-053-0963-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-053-0963-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
1300	27-137-7001-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
1908	27-123-1908-88101-3	SPM	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
2013	27-005-2013-88101-3	SLAMS	Pm2.5 - Local Conditions	Urban Scale	Population Exposure
2304	27-007-2304-88101-3	TRIBAL	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
3052	27-145-3052-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
3201	27-171-3201-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
3204	27-035-3204-88101-3	SLAMS	Pm2.5 - Local Conditions	Urban Scale	Population Exposure
4210	27-083-4210-88101-3	SLAMS	Pm2.5 - Local Conditions	Urban Scale	Population Exposure
5008	27-109-5008-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-109-5008-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
6010	27-003-1002-88101-1	SLAMS	Pm2.5 - Local Conditions	Urban Scale	Population Exposure
	27-003-1002-88101-3	SLAMS	Pm2.5 - Local Conditions	Urban Scale	Population Exposure
7001	27-075-0005-88101-3	SLAMS	Pm2.5 - Local Conditions	Regional	General / Background
7417	27-017-7417-88101-3	TRIBAL	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
7550	27-137-7550-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-137-7550-88101-2	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
7554	27-137-7554-88101-1	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
	27-137-7554-88101-3	SLAMS	Pm2.5 - Local Conditions	Neighborhood	Population Exposure
7810	27-031-7810-88101-3	TRIBAL	Pm2.5 - Local Conditions	Neighborhood	Population Exposure

Table 4. Scales and Objectives of Industrial PM_{2.5} monitors in AQS

MPCA Site ID	AQS Monitor ID	Monitor Type	Parameter Description	Measurement Scale	Monitor Objective Type
(none)	27-163-0447-88101-3	Industrial	Pm2.5 - Local Conditions	Middle Scale	Source Oriented
(none)	27-163-0448-88101-1	Industrial	Pm2.5 - Local Conditions	Middle Scale	Source Oriented
	27-163-0448-88101-3	Industrial	Pm2.5 - Local Conditions	Middle Scale	Source Oriented

Table 5. Sampling frequency, duration, and collocation of MPCA and Tribal PM_{2.5} monitors

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
250	27-053-2006-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
470	27-037-0470-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	Y	0
	27-037-0470-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	N	1
480	27-037-0480-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
505	27-139-0505-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
868	27-123-0868-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
871	27-123-0871-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	Y	0
	27-123-0871-88101-4	SLAMS	170	Beta Attenuation	1 hour	Every Day	N	1.5
	27-123-0871-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	N	1.5
	27-123-0871-88101-2	SLAMS	145	Gravimetric	24 hours	Every 12 th Day	N	1.5
962	27-053-0962-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
963	27-053-0963-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	Y	0
	27-053-0963-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	N	1
1300	27-137-7001-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
1908	27-123-1908-88101-3	SPM	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
2013	27-005-2013-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
2304	27-007-2304-88101-3	TRIBAL	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
3052	27-145-3052-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
3201	27-171-3201-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
3204	27-035-3204-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
4210	27-083-4210-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
5008	27-109-5008-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	Y	0
	27-109-5008-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	N	1
6010	27-003-1002-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	Y	0
	27-003-1002-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	N	1
7001	27-075-0005-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
7417	27-017-7417-88101-3	TRIBAL	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
7550	27-137-7550-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	Y	0
	27-137-7550-88101-2	SLAMS	145	Gravimetric	24 hours	Every 12 th Day	N	1.5
7554	27-137-7554-88101-3	SLAMS	170	Beta Attenuation	1 hour	Every Day	Y	0
	27-137-7554-88101-1	SLAMS	145	Gravimetric	24 hours	Every 6 th Day	N	1
7810	27-031-7810-88101-3	TRIBAL	170	Beta Attenuation	1 hour	Every Day	n/a	n/a

Table 6. Methods and collocation of Industrial PM_{2.5} monitors in AQS

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
(none)	27-163-0447-88101-3	Industrial	170	Beta Attenuation	1 hour	Every Day	n/a	n/a
(none)	27-163-0448-88101-1	Industrial	142	Gravimetric	24 hours	Every 12 th Day	Y	0
	27-163-0448-88101-3	Industrial	170	Beta Attenuation	1 hour	Every Day	N	2

PM₁₀

PM₁₀ monitoring requirements

The minimum monitoring requirements for PM₁₀ are established in Appendix D of 40 CFR Part 58 and are summarized in Table 7. In addition to these population based requirements, PM₁₀ monitoring is required at NCore. Minnesota currently meets all PM₁₀ monitoring requirements (see Table 8).

Table 7. PM₁₀ minimum monitoring requirements (number of stations per MSA)¹

Population category	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

¹Selection 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.

²High concentration areas are those for which ambient PM₁₀ data show ambient concentrations exceeding the PM₁₀ NAAQS by 20 percent or more.

³Medium concentration areas are those for which ambient PM₁₀ data show ambient concentrations exceeding 80 percent of the PM₁₀ NAAQS.

⁴Low concentration areas are those for which ambient PM₁₀ data show ambient concentrations less than 80 percent of the PM₁₀ NAAQS.

⁵These minimum monitoring requirements apply in the absence of a design value.

Table 8. Minnesota PM₁₀ monitoring requirements

Metropolitan Area	2015 Population Estimate	Expected days greater than 80% of the NAAQS (125 µg/m ³)	Minimum Requirement	2017 Sites
Minneapolis-St. Paul-Bloomington, MN-WI	3,524,583	0 ¹	2-4	4
Duluth, MN-WI	279,601	0	0-1	1
Fargo, ND-MN	233,836	0	0	1 (ND)
Rochester, MN	213,873	unmonitored	0	0
St. Cloud, MN	194,418	unmonitored	0	0
La Crosse-Onalaska, WI-MN	136,985	unmonitored	0	0
Grand Forks, ND-MN	102,449	unmonitored	0	0
Mankato-North Mankato, MN	99,134	unmonitored	0	0
Non-population based requirements				
NCore (Blaine)			1	1

¹ This calculation excludes PM₁₀ monitoring results from an industrial area of North Minneapolis (27-053-0909 and 27-053-0910)

Table 9. Scales and Objectives of MPCA PM₁₀ monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
866	SLAMS	27-123-0866-81102-1	Pm10 Total 0-10um Stp	Middle Scale	Highest Concentration
	SLAMS	27-123-0866-81102-2	Pm10 Total 0-10um Stp	Middle Scale	Highest Concentration
868	SLAMS	27-123-0868-81102-3	Pm10 Total 0-10um Stp	Neighborhood	Population Exposure
909	SPM	27-053-0909-81102-3	Pm10 Total 0-10um Stp	Middle Scale	Source Oriented
910	SPM	27-053-0910-81102-3	Pm10 Total 0-10um Stp	Middle Scale	Source Oriented
966	SLAMS	27-053-0966-81102-1	Pm10 Total 0-10um Stp	Neighborhood	Population Exposure
1300	SLAMS	27-137-7001-81102-1	Pm10 Total 0-10um Stp	Neighborhood	Population Exposure
6010	SLAMS	27-003-1002-81102-3	Pm10 Total 0-10um Stp	Urban Scale	Population Exposure
7545	SLAMS	27-137-0032-81102-1	Pm10 Total 0-10um Stp	Middle Scale	Source Oriented
	SLAMS	27-123-0866-81102-2	Pm10 Total 0-10um Stp	Middle Scale	Source Oriented

Table 10. Scales and Objectives of Industrial PM₁₀ monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
(none)	Industrial	27-075-1009-81102-1	Pm10 Total 0-10um Stp	Neighborhood	Source Oriented
(none)	Industrial	27-075-7632-81102-1	Pm10 Total 0-10um Stp	Neighborhood	Source Oriented
		27-075-7632-81102-2	Pm10 Total 0-10um Stp	Neighborhood	Source Oriented
(none)	Industrial	27-075-7640-81102-1	Pm10 Total 0-10um Stp	Neighborhood	Source Oriented
		27-075-7640-81102-2	Pm10 Total 0-10um Stp	Neighborhood	Source Oriented
		27-075-7640-81102-3	Pm10 Total 0-10um Stp	Neighborhood	Source Oriented
(none)	Industrial	27-163-0447-81102-3	Pm10 Total 0-10um Stp	Middle Scale	Source Oriented
(none)	Industrial	27-163-0448-81102-3	Pm10 Total 0-10um Stp	Middle Scale	Source Oriented

Table 11. Methods and collocation of MPCA PM₁₀ 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
866	SLAMS	27-123-0866-81102-1	062	Gravimetric	24 hours	Every 6 th Day	Y	0
		27-123-0866-81102-2	062	Gravimetric	24 hours	Every 12 th Day	N	1.5
868	SLAMS	27-123-0868-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
909	SPM	27-053-0909-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
910	SPM	27-053-0910-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
966	SLAMS	27-053-0966-81102-1	062	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
1300	SLAMS	27-137-7001-81102-1	062	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
6010	SLAMS	27-003-1002-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
7545	SLAMS	27-137-0032-81102-1	062	Gravimetric	24 hours	Every 6 th Day	Y	0
		27-137-0032-81102-2	062	Gravimetric	24 hours	Every 6 th Day	N	1.5

Table 12. Methods and collocation of Industrial PM₁₀ monitors in AQ5

Site ID	Monitor Type	AQS Monitor ID	Method Code	Sample Analysis Description	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor
1009	Industrial	27-075-1009-81102-1	062	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
7632	Industrial	27-075-7632-81102-1	062	Gravimetric	24 hours	Every 6 th Day	Y	1
		27-075-7632-81102-2	062	Gravimetric	24 hours	Every 12 th Day	n/a	n/a
7640	Industrial	27-075-7640-81102-1	062	Gravimetric	24 hours	Every 6 th Day	Y	0
		27-075-7640-81102-2	062	Gravimetric	24 hours	Every 12 th Day	N	1
		27-075-7640-81102-3	122	Beta Attenuation	1 hour	Every Day	N	1
447	Industrial	27-163-0447-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a
448	Industrial	27-163-0448-81102-3	122	Beta Attenuation	1 hour	Every Day	n/a	n/a

TSP

TSP monitoring requirements

TSP was one of the original NAAQS; however, it was replaced in 1987 by the PM₁₀ standard at the national level. There are currently no federal requirements to monitor TSP.

Table 13. Scales and Objectives of MPCA TSP monitors

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
420	SLAMS	27-037-0020-11101-1	Suspended particulate (TSP)	Middle Scale	Population Exposure
		27-037-0020-11101-2	Suspended particulate (TSP)	Middle Scale	Population Exposure
438	SLAMS	27-163-0438-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
446	SLAMS	27-163-0446-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
465	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
470	SLAMS	27-037-0470-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
818	SPM	27-123-0818-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
871	SLAMS	27-123-0871-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
907	SLAMS	27-053-1007-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
909	SPM	27-053-0909-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
910	SPM	27-053-0910-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
962	SLAMS	27-053-0962-11101-1	Suspended particulate (TSP)	Middle Scale	Source Oriented
963	SLAMS	27-053-0963-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
966	SLAMS	27-053-0966-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
1300	SLAMS	27-137-7001-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
1908	SPM	27-123-1908-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
7555	SLAMS	27-137-7555-11101-1	Suspended particulate (TSP)	Neighborhood	Population Exposure
		27-137-7555-11101-2	Suspended particulate (TSP)	Neighborhood	Population Exposure

Table 14. 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
420	27-037-0020-11101-1	091	Gravimetric	24 hours	Every 6 th Day	Y	0
	27-037-0020-11101-2	091	Gravimetric	24 hours	Every 6 th Day	N	2.5 m
438	27-163-0438-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
446	27-163-0446-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
465	27-037-0465-11101-1	091	Gravimetric	24 hours	Every 6 th Day	Y	0
	27-037-0465-11101-2	091	Gravimetric	24 hours	Every 12 th Day	N	2.5 m
470	27-037-0470-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
818	27-123-0818-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
871	27-123-0871-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
907	27-053-1007-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
909	27-053-0909-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
910	27-053-0910-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
962	27-053-0962-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
963	27-053-0963-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
966	27-053-0966-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
1908	27-123-1908-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
6010	27-003-1002-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
1300	27-137-7001-11101-1	091	Gravimetric	24 hours	Every 6 th Day	n/a	n/a
7555	27-137-7555-11101-1	091	Gravimetric	24 hours	Every 6 th Day	Y	0
	27-137-7555-11101-2	091	Gravimetric	24 hours	Every 12 th Day	N	3 m

Lead

Lead monitoring requirements

The minimum monitoring requirements for lead are established in Appendix D of 40 CFR Part 58. The lead monitoring requirements are based on annual lead emissions. This source-oriented network requires lead monitoring for non-airport sources which emit 0.5 tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory or other scientifically justifiable methods and data. The Regional Administrator may waive the lead monitoring requirement near lead sources if the State or, where appropriate, 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 renewed once every 5 years as part of the network assessment.

Table 15 identifies Minnesota facilities with lead emissions greater than 0.5 TPY based on the 2014 MN Emission Inventory.

Table 15. Sources with annual lead emissions greater than 0.5 TPY, 2014 Emissions Inventory

Facility Name	City	County	2014 Lead Emissions (TPY)
Grede LLC – St. Cloud	St. Cloud, MN	Stearns	0.80
US Steel Corp – Minntac	Mountain Iron, MN	St. Louis	0.86

The MPCA conducted ambient lead monitoring at Grede LLC – St. Cloud (27-145-3053) from January 2010 – June 2013. The maximum 3-month rolling average lead concentration measured near the facility was 0.01 $\mu\text{g}/\text{m}^3$, which is less than 50% of the lead standard. The MPCA submitted a monitor closure request to the U.S. EPA Region 5 Administrator in April of 2013. The Regional Administrator approved the closure request in June 2013. Pending reassessment of conditions, the MPCA will be requesting a renewal of this waiver in 2018.

In 2009, the MPCA conducted modeling to assess ambient lead concentrations near US 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. See the 2011 Source-oriented Lead Monitoring Plan for Minnesota for a summary of these results, <https://www.pca.state.mn.us/sites/default/files/aq10-04.pdf>. The MPCA requested and was granted a monitoring waiver for US Steel Corp-Minntac. Pending reassessment of conditions, the MPCA will be requesting a renewal of this waiver in 2017.

In addition to the emissions based lead monitoring requirements, the EPA Regional Administrator may 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 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 2013-2015, four ambient lead monitoring sites measured maximum 3-month rolling average lead concentrations greater than 50% of the lead NAAQS. Table 16 identifies these monitoring sites. At a minimum, the MPCA intends to continue monitoring for lead at these sites for as long as the maximum 3-month rolling average lead concentration is greater than 50% of the lead NAAQS.

Table 16. 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 (2013-2015)	Percent of NAAQS
Eagan – Gopher Resources	27-037-0465-14129-1	0.13 µg/m ³	87%
Minneapolis – Lowry Avenue	27-053-0909-14129-1	0.12 µg/m ³	80%
St. Paul – Westside*	27-123-1903-14129-1	0.09 µg/m ³	60%
Minneapolis – Pacific Street	27-053-0910-14129-1	0.08 µg/m ³	53%

*Note: St. Paul –Westside operated from April – June 2014 as part of a short-term monitoring study. It was not feasible to continue monitoring at this site. In January 2016, the MPCA began operating a new lead monitoring site (27-123-0818) in the area to assess ambient lead concentrations.

In 2016, the EPA rescinded the lead monitoring requirement for NCore sites. As a result of this change, the MPCA intends discontinue regulatory based lead monitoring at the NCore site in Blaine. Lead will continue to be monitored at the site as part of the MPCA Air Toxics Monitoring program. This change will reduce the quality assurance requirements for the lead monitor at Blaine.

Table 17. Scales and Objectives of regulatory* lead monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
465	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
6010	SLAMS	27-003-1002-14129-1	Lead (Tsp) Lc	Neighborhood	Population Exposure

Table 18. Methods and collocation of regulatory* lead monitors in AQS

MPCA Site ID	AQS Monitor ID	Parameter Description	Method Code**	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor
465	27-037-0465-14129-1	Lead (Tsp) Lc	196	24 hours	Every 6th Day	Y	0
	27-037-0465-14129-2	Lead (Tsp) Lc	196	24 hours	Every 12th Day	N	2.5
6010	27-003-1002-14129-1	Lead (Tsp) Lc	196	24 hours	Every 6th Day	n/a	n/a

*The MPCA monitors lead at one source-oriented monitoring site in Eagan (465) and at one population-oriented NCore site in Blaine (6010). Additionally, as part of our Air Toxics Program, the MPCA also monitors heavy metals at 10 other TSP sites. Lead is part of our analytical metal scan, which includes 12 other metals. These Air Toxics Program sites are non-regulatory and as such, do not meet the same rigorous EPA mandated quality assurance protocols, which includes quarterly flow audits and monthly flow verifications that are required for the regulatory source-oriented monitoring site in Eagan.

**Method 196 is heated ultrasonic HNO₃/HCl extraction with ICP-AES

Table 19. Scales and Objectives of non-regulatory* lead monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
420	SLAMS	27-037-0020-14129-1	Lead (Tsp) LC	Middle Scale	Population Exposure
	SLAMS	27-037-0020-14129-2	Lead (Tsp) LC	Middle Scale	Population Exposure
438	SLAMS	27-163-0438-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
446	SLAMS	27-163-0446-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
470	SLAMS	27-037-0470-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
818	SPM	27-123-0818-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
871	SLAMS	27-123-0871-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
907	SLAMS	27-053-1007-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
909	SPM	27-053-0909-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
910	SPM	27-053-0910-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
962	SLAMS	27-053-0962-14129-1	Lead (Tsp) LC	Middle Scale	Source Oriented
963	SLAMS	27-053-0963-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
966	SLAMS	27-053-0966-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
1300	SLAMS	27-137-7001-14129-1	Lead (Tsp) LC	Neighborhood	Population Exposure
1908	SPM	27-123-1908-14129-1	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

Table 20. Methods and collocation of non-regulatory* lead monitors in AQS

MPCA Site ID	AQS Monitor ID	Monitor Type	Method Code**	Sample Duration	Collection Frequency	Collocation Primary Monitor Indicator	Distance from Primary Monitor
420	27-037-0020-14129-1	SLAMS	196	24 hours	Every 6 th Day	Y	0
	27-037-0020-14129-2	SLAMS	196	24 hours	Every 6 th Day	N	2.5
438	27-163-0438-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
446	27-163-0446-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
470	27-037-0470-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
871	27-123-0871-14129-1	SPM	196	24 hours	Every 6 th Day	n/a	n/a
907	27-053-1007-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
909	27-053-0909-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
910	27-053-0910-14129-1	SPM	196	24 hours	Every 6 th Day	n/a	n/a
962	27-053-0962-14129-1	SPM	196	24 hours	Every 6 th Day	n/a	n/a
963	27-053-0963-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
966	27-053-0966-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
1300	27-137-7001-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
1908	27-123-1908-14129-1	SLAMS	196	24 hours	Every 6 th Day	n/a	n/a
7555	27-137-7555-14129-1	SPM	196	24 hours	Every 6 th Day	Y	0
	27-137-7555-14129-2	SLAMS	196	24 hours	Every 12 th Day	N	3

*see note on page 11

**Method 196 is heated ultrasonic HNO₃/HCl extraction with ICP-AES

Ozone

Ozone monitoring requirements

The minimum monitoring requirements for ozone are established in Section 4.1 of Appendix D of 40 CFR part 58 and are summarized in Table 21. In addition to these population based requirements, ozone monitoring is required at NCore. Minnesota currently meets all ozone monitoring requirements (see Table 22).

Table 21. Ozone minimum monitoring requirements

MSA Population ^{1,2}	Most recent 3-year design value concentrations $\geq 85\%$ 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

1Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

2Population based on latest available census figures.

3The ozone (O₃) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

4These minimum monitoring requirements apply in the absence of a design value.

5Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Table 22. Minnesota ozone monitoring requirements

Metropolitan Area	2015 Population Estimate	Maximum 2015 8-Hour DV as % of Standard (70 ppb)	Minimum Requirement	2017 Sites
Minneapolis-St. Paul-Bloomington, MN-WI	3,524,583	93%	2	6
Duluth, MN-WI	279,601	74%	0	1
Fargo, ND-MN	233,836	83%	0	1 (ND)
Rochester, MN	213,873	87%	1	1
St. Cloud, MN	194,418	87%	1	1
La Crosse-Onalaska, WI-MN	136,985	87%	1	1 (WI)
Grand Forks, ND-MN	102,449	unmonitored	0	0
Mankato-North Mankato, MN	99,134	unmonitored	0	0
Non-population based requirements				
NCore (Blaine)			1	1

Table 23. Scales and Objectives of MPCA and Tribal ozone monitors

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
505	SLAMS	27-139-0505-44201-1	Ozone	Neighborhood	Population Exposure
962	SLAMS	27-053-0962-44201-1	Ozone	Middle Scale	Source Oriented
2013	SLAMS	27-005-2013-44201-1	Ozone	Urban Scale	Regional Transport
3051	TRIBAL	27-095-3051-44201-1	Ozone	Urban Scale	Population Exposure
3052	SLAMS	27-145-3052-44201-1	Ozone	Neighborhood	Population Exposure
3201	SLAMS	27-171-3201-44201-1	Ozone	Neighborhood	Highest Concentration
3204	SLAMS	27-035-3204-44201-1	Ozone	Urban Scale	Population Exposure
4210	SLAMS	27-083-4210-44201-1	Ozone	Urban Scale	Regional Transport
5008	SLAMS	27-109-5008-44201-1	Ozone	Neighborhood	Population Exposure
5302	SLAMS	27-049-5302-44201-1	Ozone	Neighborhood	Population Exposure
6010	SLAMS	27-003-1002-44201-1	Ozone	Neighborhood	Highest Concentration
6012	SLAMS	27-003-1001-44201-1	Ozone	Neighborhood	Highest Concentration
6016	SLAMS	27-163-6016-44201-1	Ozone	Neighborhood	Highest Concentration
7001	SLAMS	27-075-0005-44201-1	Ozone	Regional	General / Background
7417	TRIBAL	27-017-7417-44201-1	Ozone	Neighborhood	Population Exposure
7550	SLAMS	27-137-7550-44201-1	Ozone	Neighborhood	Population Exposure

Table 24. Methods of MPCA and Tribal ozone monitors

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Method Code	Sample Analysis Description
505	SLAMS	27-139-0505-44201-1	Ozone	087	Ultraviolet Absorption
962	SLAMS	27-053-0962-44201-1	Ozone	087	Ultraviolet Absorption
2013	SLAMS	27-005-2013-44201-1	Ozone	087	Ultraviolet Absorption
3051	TRIBAL	27-095-3051-44201-1	Ozone	087	Ultraviolet Absorption
3052	SLAMS	27-145-3052-44201-1	Ozone	087	Ultraviolet Absorption
3201	SLAMS	27-171-3201-44201-1	Ozone	087	Ultraviolet Absorption
3204	SLAMS	27-035-3204-44201-1	Ozone	087	Ultraviolet Absorption
4210	SLAMS	27-083-4210-44201-1	Ozone	087	Ultraviolet Absorption
5008	SLAMS	27-109-5008-44201-1	Ozone	087	Ultraviolet Absorption
5302	SLAMS	27-049-5302-44201-1	Ozone	087	Ultraviolet Absorption
6010	SLAMS	27-003-1002-44201-1	Ozone	087	Ultraviolet Absorption
6012	SLAMS	27-003-1001-44201-1	Ozone	087	Ultraviolet Absorption
6016	SLAMS	27-163-6016-44201-1	Ozone	087	Ultraviolet Absorption
7001	SLAMS	27-075-0005-44201-1	Ozone	087	Ultraviolet Absorption
7417	TRIBAL	27-017-7417-44201-1	Ozone	087	Ultraviolet Absorption
7550	SLAMS	27-137-7550-44201-1	Ozone	087	Ultraviolet Absorption

Carbon Monoxide

Carbon monoxide monitoring requirements

The minimum monitoring requirements for CO are established in Appendix D of 40 CFR Part 58. These requirements include monitoring CO at NCore sites and at one near-road air monitoring site in CBSAs having a population of 1,000,000 or more persons. 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. Currently, CO monitoring is required in St. Paul through 2019 as part of the area's CO maintenance SIP. Minnesota currently meets the minimum CO monitoring requirements (see Table 34).

Table 25. Minnesota carbon monoxide monitoring requirements

Requirement	Required Sites	2017 Sites
Near-road CO for CBSAs > 1 million (Minneapolis – St. Paul- Bloomington, MN-WI)	1	2
NCore (Blaine)	1	1
St. Paul Maintenance Area	1	1

Table 26. Scales and Objectives of MPCA and Industrial CO monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
420	SLAMS	27-037-0020-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
423	Industrial	27-037-0423-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
480	SLAMS	27-037-0480-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
861	SLAMS	27-123-0050-42101-1	Carbon Monoxide	Microscale	Highest Concentration
954	SLAMS	27-053-0954-42101-1	Carbon Monoxide	Microscale	Highest Concentration
962	SLAMS	27-053-0962-42101-1	Carbon Monoxide	Middle Scale	Source Oriented
6010	SLAMS	27-003-1002-42101-1	Carbon Monoxide	Urban Scale	Population Exposure

Table 27. Methods and collocation of MPCA and Industrial CO monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Method Code	Sample Analysis Description
420	SLAMS	27-037-0020-42101-1	093	Gas Filter Correlation CO Analyzer
423	Industrial	27-037-0423-42101-1	093	Gas Filter Correlation CO Analyzer
480	SLAMS	27-037-0480-42101-1	093	Gas Filter Correlation CO Analyzer
861	SLAMS	27-123-0050-42101-1	093	Gas Filter Correlation CO Analyzer
954	SLAMS	27-053-0954-42101-1	093	Gas Filter Correlation CO Analyzer
962	SLAMS	27-053-0962-42101-1	093	Gas Filter Correlation CO Analyzer
6010	SLAMS	27-003-1002-42101-1	593	Gas Filter Correlation Teledyne API 300 EU

Nitrogen Dioxide

Nitrogen dioxide monitoring requirements

The minimum monitoring requirements for NO₂ are established in Appendix D of 40 CFR Part 58. There are two primary monitoring objectives for nitrogen dioxide, including monitoring near roads and in neighborhoods (area-wide). Table 25 summarizes the minimum monitoring requirements for NO₂. In addition to these minimum requirements, the Regional Administrator may require additional monitoring in areas where NO₂ is expected to be near the level of the NAAQS. To date, the Regional Administrator has not required any additional NO₂ monitors in Minnesota. Minnesota currently meets all NO₂ monitoring requirements (see Table 26).

Table 28. Nitrogen dioxide minimum monitoring requirements

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

¹A 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 29. Minnesota nitrogen dioxide monitoring requirements

Metropolitan Area	2015 Population Estimate	Required Near-Road	2017 Near-Road	Required Area-Wide	2017 Area-Wide
Minneapolis-St. Paul-Bloomington, MN-WI	3,524,583	2	2	1	1
Duluth, MN-WI	279,601	0	0	0	0
Fargo, ND-MN	233,836	0	0	0	1 (ND)
Rochester, MN	213,873	0	0	0	0
St. Cloud, MN	194,418	0	0	0	0
La Crosse-Onalaska, WI-MN	136,985	0	0	0	0
Grand Forks, ND-MN	102,449	0	0	0	0
Mankato-North Mankato, MN	99,134	0	0	0	0

Table 30. Scales and Objectives of MPCA NO₂ monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
420	SLAMS	27-037-0020-42602-1	Nitrogen Dioxide (NO ₂)	Neighborhood	Source Oriented
423	SLAMS	27-037-0423-42602-1	Nitrogen Dioxide (NO ₂)	Neighborhood	Source Oriented
480	SLAMS	27-037-0480-42602-1	Nitrogen Dioxide (NO ₂)	Middle Scale	Source Oriented
962	SLAMS	27-053-0962-42602-1	Nitrogen Dioxide (NO ₂)	Middle Scale	Source Oriented
6010	SLAMS	27-003-1002-42602-1	Nitrogen Dioxide (NO ₂)	Urban Scale	Population Exposure

Table 31. Methods of MPCA NO₂ monitors in AQ5

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Method Code	Sample Analysis Description
420	SLAMS	27-037-0020-42602-1	Nitrogen Dioxide (NO ₂)	099	Gas Phase Chemiluminescence
423	SLAMS	27-037-0423-42602-1	Nitrogen Dioxide (NO ₂)	099	Gas Phase Chemiluminescence
480	SLAMS	27-037-0480-42602-1	Nitrogen Dioxide (NO ₂)	099	Gas Phase Chemiluminescence
962	SLAMS	27-053-0962-42602-1	Nitrogen Dioxide (NO ₂)	099	Gas Phase Chemiluminescence
6010	SLAMS	27-003-1002-42602-1	Nitrogen Dioxide (NO ₂)	099	Gas Phase Chemiluminescence

Sulfur Dioxide

Sulfur dioxide monitoring requirements

The minimum monitoring requirements for SO₂ are established in Appendix D of 40 CFR Part 58. The SO₂ monitoring requirement is based on the Population Weighted Emissions Index (PWEI) for all CBSAs. The PWEI is calculated by multiplying the population of each CBSA, using the most recent census data or estimates, and the total amount of SO₂ in tons per year 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. The minimum monitoring requirements based on PWEI are summarized in Table 29.

Table 32. Sulfur dioxide minimum monitoring requirements

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

Table 33. Minnesota sulfur dioxide monitoring requirements

Metropolitan Area	2015 Population Estimate	2011 NEI SO ₂ (tons/year)	PWEI	Minimum requirement	2017 Sites
Minneapolis-St. Paul-Bloomington, MN-WI ¹	3,524,583	32,844	115,760	2	2
Duluth, MN-WI ²	279,601	8,244	2,305	0	0
Fargo, ND-MN ³	233,836	1,627	380	0	1 (ND)
Rochester, MN ⁴	213,873	735	157	0	0
St. Cloud, MN ⁵	194,418	1,129	221	0	0
La Crosse-Onalaska, WI-MN ⁶	136,985	252	35	0	0
Grand Forks, ND-MN ⁷	102,449	2,625	269	0	0
Mankato-North Mankato, MN ⁸	99,134	337	33	0	0
Non-population based requirement					
NCore (Blaine)				1	1

In addition to these minimum monitoring requirements, On August 10, 2015, the U.S. EPA finalized requirements for air agencies to monitor or model ambient SO₂ levels in areas with large sources of SO₂ emissions to help implement the 1-hour SO₂ NAAQS. By July 1, 2016, each air agency is required to identify, for each affected source area, the approach (ambient monitoring or air quality modeling) it will use to characterize air quality. In lieu of characterizing areas around sources with annual emissions greater than or equal to 2,000 tpy, air agencies may indicate by July 1, 2016 that they will adopt enforceable emissions limitations that will limit those sources' emissions to below 2,000 TPY. Table 31 describes sources with annual SO₂ emissions greater than or equal to 2,000 TPY based on the 2014 Minnesota Emissions Inventory and identifies the approach chosen to characterize air quality in the impacted area.

Table 34. 2014 SO₂ emissions greater than 2,000 tons

Facility Name	City	County	2014 SO ₂ Emissions (tons)	Approach
Xcel Energy – Sherburne Generating Plant	Becker, MN	Sherburne	11,459	Model
Minnesota Power – Boswell Energy Center	Cohasset, MN	Itasca	4,576	Model
Xcel Energy – Black Dog	Burnsville, MN	Dakota	3,228	Emissions limit
Minnesota Power – Taconite Harbor Energy Center	Schroeder, MN	Cook	2,994	Model
Otter Tail Power Co – Hoot Lake Plant	Fergus Falls, MN	Otter Tail	2,422	Model
Northshore Mining – Silver Bay	Silver Bay, MN	Lake	2,369	Emissions limit

Table 35. Scales and Objectives of MPCA and Industrial SO₂ monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Parameter Description	Measurement Scale	Monitor Objective Type
420	SLAMS	27-037-0020-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
423	Industrial	27-037-0423-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
436	SLAMS	27-163-0436-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
443	Industrial	27-037-0443-42401-1	Sulfur Dioxide	Middle Scale	Source Oriented
954	SLAMS	27-053-0954-42401-1	Sulfur Dioxide	Middle Scale	Population Exposure
5008	SLAMS	27-109-5008-42401-1	Sulfur Dioxide	Neighborhood	General / Background
6010	SLAMS	27-003-1002-42401-1	Sulfur Dioxide	Urban Scale	Population Exposure

Table 36. Methods of MPCA and Industrial SO₂ monitors in AQS

MPCA Site ID	Monitor Type	AQS Monitor ID	Method Code	Sample Analysis Description
420	SLAMS	27-037-0020-42401-1	100	Ultraviolet Fluorescence
423	Industrial	27-037-0423-42401-1	100	Ultraviolet Fluorescence
436	SLAMS	27-163-0436-42401-1	100	Ultraviolet Fluorescence
443	Industrial	27-037-0443-42401-1	100	Ultraviolet Fluorescence
954	SLAMS	27-053-0954-42401-1	100	Ultraviolet Fluorescence
5008	SLAMS	27-109-5008-42401-1	100	Ultraviolet Fluorescence
6010	SLAMS	27-003-1002-42401-1	600	Ultraviolet Fluorescence API 100 EU