Air Quality

May 2026

Draft Wildfire impacts fine particulate in Minnesota's ambient air

Discover why health measures, as design values, exceed the $PM_{2.5}$ National Ambient Air Quality Standards in 2025

MINNESOTA POLLUTION CONTROL AGENCY

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Executive summary

For the first time in over a decade, fine particulate concentration—also known as $PM_{2.5}$—exceeded the National Ambient Air Quality Standards at six sites across Minnesota in 2025. An exploration of the data and events occurring over recent years point to Canadian wildfires impacting air quality. Findings show air quality would achieve the $PM_{2.5}$ National Ambient Air Quality Standards if not for the wildfires.

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Acronyms and abbreviations

Acronym/Abbreviation	Description
AQI	Air Quality Index
AQS	Air Quality System: EPA's repository of ambient air quality data
CAA	Clean Air Act
CFR	Code of Federal Regulations
Design Value	A statistic that describes the air quality status of a given location relative to the level of the National Ambient Air Quality Standards (NAAQS)
EPA	U.S. Environmental Protection Agency
IF	AQS informational qualifier for fires originating in Canada (Fire - Canadian)
IT	AQS informational qualifier for wildfires originating in the United States (Wildfire-U. S.)
µm	Micrometers
$\mu m/m^3$	Micrograms per cubic meter
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standard
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter (fine particulate matter)
Primary standard	NAAQS set to protect public health
Secondary standard	NAAQS set to protect the environment and public welfare (i.e. visibility, crops, animals, vegetation and buildings

Key for site ID and site name

Network plan	Network plan - 2026 network overview & AQS database	
2025 data report	**Site ID**	**Site name**
Blaine (1002)	27-003-1002	Anoka County Airport
Detroit Lakes (2013)	27-005-2013	FWS Wetland Management District
Red Lake (2304)	27-007-2304	Red Lake Nation
Mankato (5510)	27-013-5510	Rosa Parks Elementary
Cloquet (7417)	27-017-7417	Fond du Lac Band
Cass Lake (3410)	27-021-3410	Leech Lake Nation
Grand Portage (7810)	27-031-7810	Grand Portage Band
Brainerd (3204)	27-035-3204	Brainerd Lakes Regional Airport
Apple Valley (0470)	27-037-0470	Apple Valley
Lakeville (0480)	27-037-0480	Near Road I-35
Minneapolis (0910)	27-053-0910	Pacific Street
Minneapolis (0962)	27-053-0962	Near Road I-35/I-94
Minneapolis (0963)	27-053-0963	Andersen School
Minneapolis (1904)	27-053-1904	East Phillips Community
Boundary Waters (0005)	27-075-0005	Boundary Waters
Marshall (4210)	27-083-4210	Southwest Minnesota Regional Airport
Rochester (5008)	27-109-5008	Ben Franklin School
St. Paul (0871)	27-123-0871	Harding High School
Virginia (7001)	27-137-7001	Virginia City Hall
Duluth (7550)	27-137-7550	U of M - Duluth
Duluth (7554)	27-137-7554	Laura MacArthur School
Shakopee (0505)	27-139-0505	B.F. Pearson School
St. Cloud (3052)	27-145-3052	Talahi School
St. Michael (3201)	27-171-3201	St. Michael Elementary School
St. Louis Park (2006)	27-053-2006	St. Louis Park City Hall
St. Paul (0868)	27-123-0868	Ramsey Health Center

Introduction

The 2027 Minnesota Air Monitoring Network Plan contains the most recent available data metrics in its 2025 Minnesota Air Monitoring Data Report. For the first time in over a decade, fine particulate ($PM_{2.5}$) concentrations exceed the National Ambient Air Quality Standards (NAAQS) at several sites.

The NAAQS limit concentrations of six criteria pollutants, of which $PM_{2.5}$ is one, with primary standards designed to protect human health. There are two forms of the $PM_{2.5}$ NAAQS, daily and annual, measured in micrograms per cubic meter ($\mu g/m^3$).[1] The daily standard was last strengthened in 2006 to 35 $\mu g/m^3$. The annual standard was last strengthened in 2024 to 9.0 $\mu g/m^3$. In November 2025, United States Environmental Protection Agency (EPA) requested the United States Court of Appeals for the D.C. Circuit vacate the former-leadership 2024 revision to the annual NAAQS.[2] Should the court issue a decision in favor of the vacatur, the annual standard will revert to the annual standard last strengthened in 2012 to 12.0 $\mu g/m^3$.

Exceeding the NAAQS does not necessarily trigger a federal designation of nonattainment for a geographical area. The 2025 exceedances, in and of themselves, will not change Minnesota's attainment status. Attainment designations are listed in the Code of Federal Regulations (CFR). Minnesota and Tribal land within Minnesota boundary designations for $PM_{2.5}$ are at 40 CFR §81.324.[3]

- Final attainment designations for the 2006 daily $PM_{2.5}$ standard revision relied on measured data from 2006-2008. Based on that data, the EPA issued a daily $PM_{2.5}$ standard designation of attainment/unclassifiable for the entire state of Minnesota that became effective in December 2009.
- Final attainment designations for the 2024 annual $PM_{2.5}$ standard revision were due in February 2026 and were to rely on measured data from 2022-2024. That data would support a continued annual $PM_{2.5}$ standard designation of attainment/unclassifiable for the entire state of Minnesota.

Three years of measured data are used to calculate a metric called a "design value" that determines NAAQS attainment status and allows for assessing air quality progress each subsequent year in comparison with the $PM_{2.5}$ NAAQS. Calculating the design value metric is defined in 40 CFR part 50, Appendix N "Interpretation of the Primary and Secondary National Ambient Air Quality Standards for $PM_{2.5}$".[4]

Figure 1 and Figure 2 show the daily and annual design values for 2025, calculated with data from 2023-2025, at air monitoring sites in Minnesota. Page iii contains a key that cross-references sites named in the bar charts, which are from the 2027 Network Plan Data Report, and this document. The sites contain air measurement instruments designed and approved for regulatory compliance with the $PM_{2.5}$ NAAQS.

[1] EPA. Timeline of Particulate Matter (PM) National Ambient Air Quality Standards (NAAQS). https://www.epa.gov/pm-pollution/timeline-particulate-matter-pm-national-ambient-air-quality-standards-naaqs#:~:text=1.,existing%201987%20standards%20in%20place.

[2] EPA motion for vacatur of 2024 $PM_{2.5}$ NAAQS *Kentucky et al., v. EPA et al.*, No. 24-01050 (D.C. Cir. Mar. 6, 2024). https://www.uschamber.com/assets/documents/DOJ-Motion-for-Vacatur-Chamber-v.-EPA-D.C.-Circuit.pdf

[3] 40 CFR §81.324. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-81/subpart-C/section-81.324

[4] 40 CFR part 50, Appendix N. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-50/appendix-Appendix%20N%20to%20Part%2050

Out of 23 sites throughout Minnesota, six have design values exceeding the daily standard and one of those also has a design value exceeding the annual standard, shown in orange in the charts. The six sites are Harding High School (27-123-0871), Andersen School (27-053-0963), Red Lake Nation (27-007-2304), Leech Lake Nation (27-021-3410), Virginia City Hall (27-137-7001) and Apple Valley (27-037-0470).

Three additional monitoring sites Rosa Parks Elementary (27-013-5510), East Phillips Community (27-053-1904) and Pacific Street (27-053-0910) are excluded from the design value charts in Figure 1 and Figure 2 because they were established in 2024 and 2025 and do not have three years of data needed for the design value calculation.

Figure 1. 2025 $PM_{2.5}$ daily design values at Minnesota sites compared with the primary and secondary NAAQS of 35 µg/m³

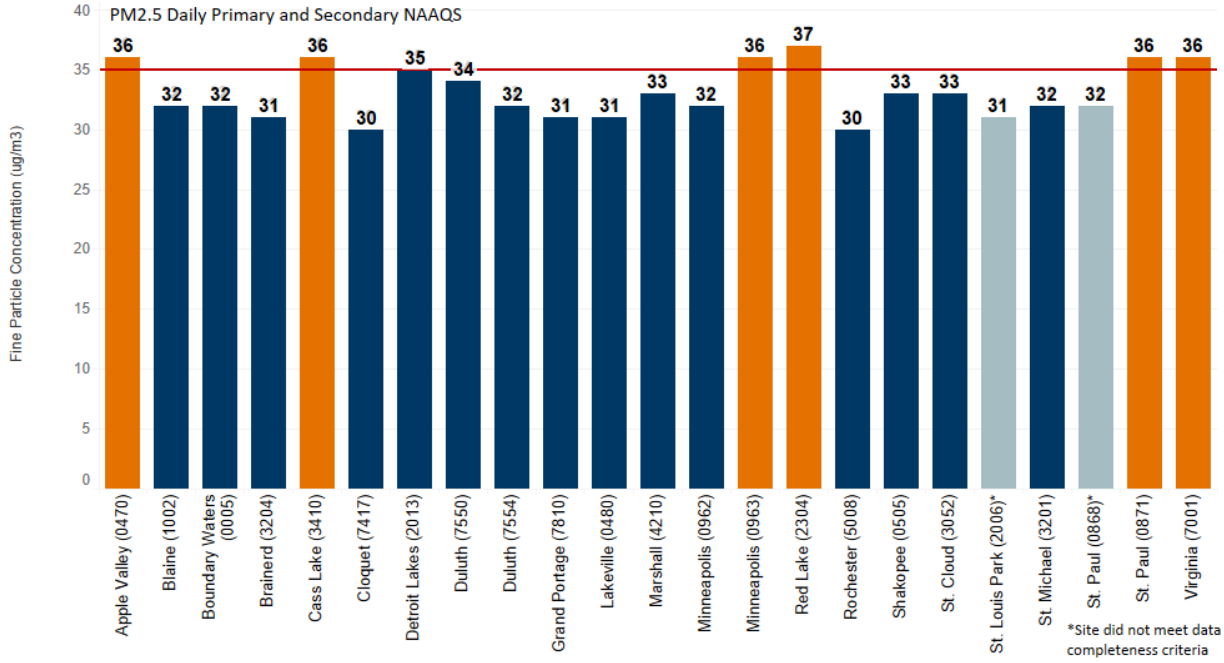


Figure 2. 2025 $PM_{2.5}$ annual design values at Minnesota sites compared with the primary NAAQS of 9.0 µg/m^3 and secondary NAAQS of 15.0 µg/m^3

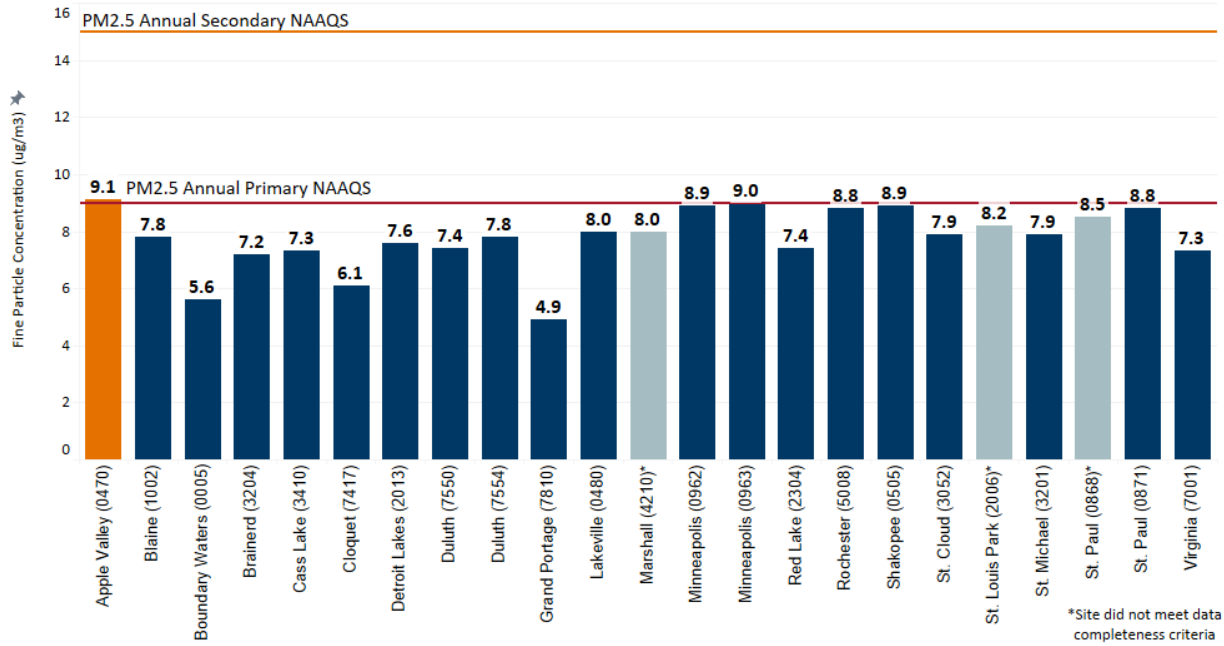
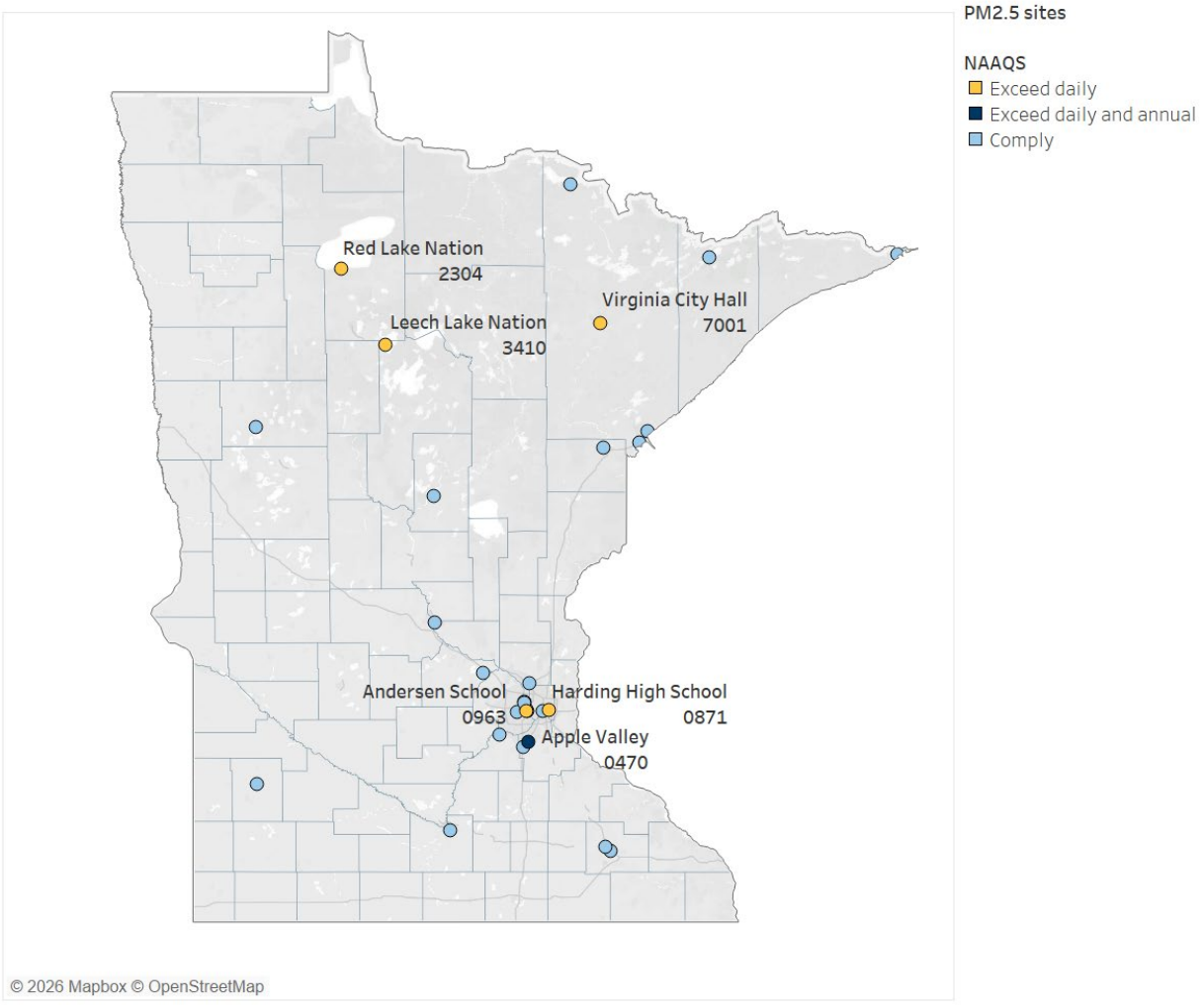


Figure 3 contains a map of the Minnesota sites that contain regulatory monitors used for comparison with the $PM_{2.5}$ NAAQS. Three sites—Harding High School (27-123-0871), Andersen School (27-053-0963) and Apple Valley (27-037-0470)—are located in the central Minnesota Twin Cities Metropolitan Area and three sites—Red Lake Nation (27-007-2304), Leech Lake Nation (27-021-3410), Virginia City Hall (27-137-7001)—are located in Northern Minnesota and Tribal lands.

Figure 3. Map of sites in Minnesota exceeding the $PM_{2.5}$ NAAQS in 2025

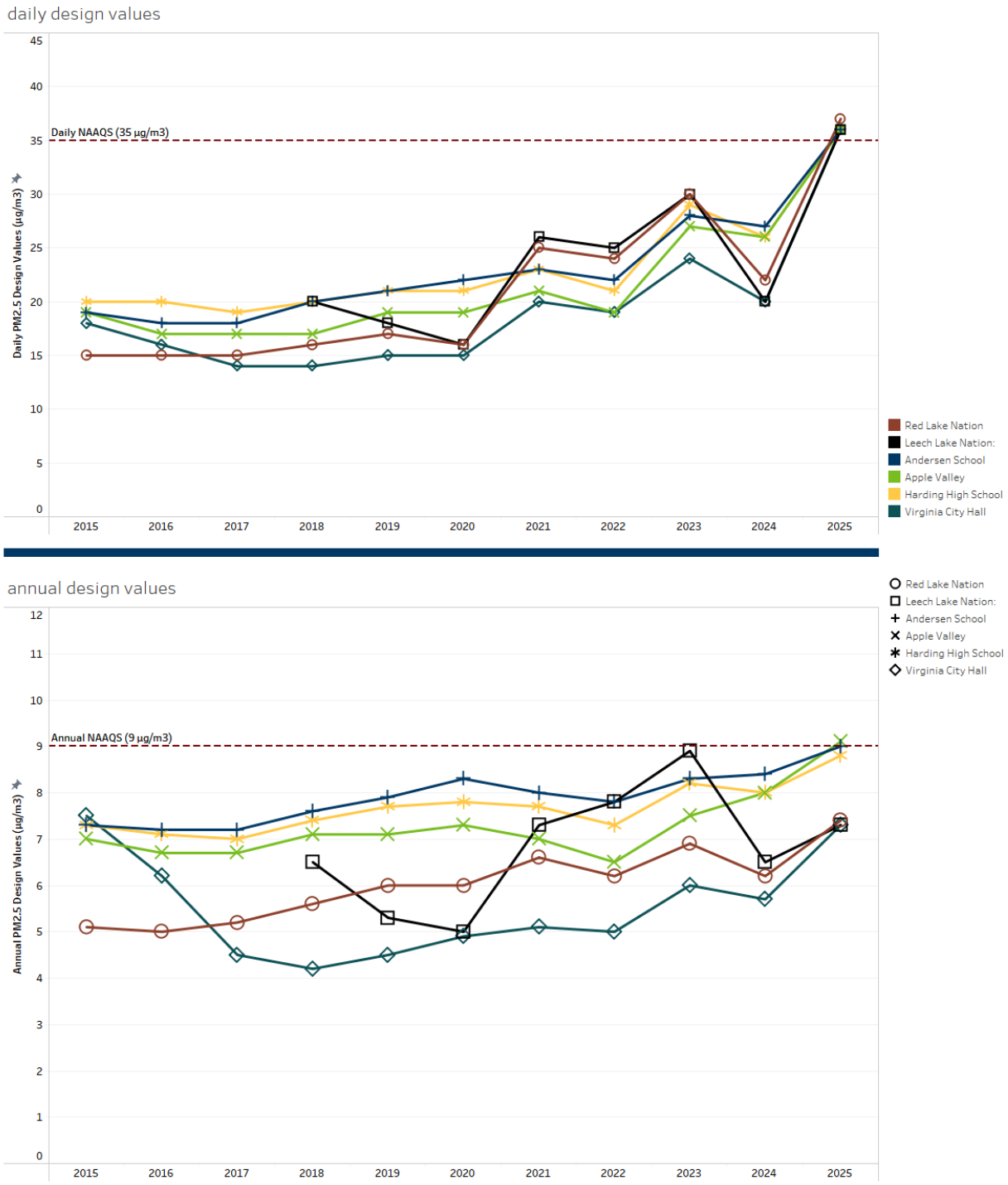


Further exploration of the data, described below, shows the $PM_{2.5}$ NAAQS exceedances in 2025 are due to increased wildfires in Canada. Adjusting for four days in 2025 where the six monitoring sites exceeding the $PM_{2.5}$ NAAQS are also impacted by Canadian wildfire smoke, all Minnesota sites show compliance with the standards.

1. Background

$PM_{2.5}$ design values at the six sites with $PM_{2.5}$ NAAQS exceedances in 2025 have been trending upward over the past decade as shown in Figure 4. This is especially evident in the daily design values in the top half of the figure owing to the form of the metric. A marked increase occurs with the 2021 design value at the three Northern Minnesota and Tribal sites: Red Lake Nation (27-007-2304), Leech Lake Nation (27-021-3410), Virginia City Hall (27-137-7001). A slight decrease occurs with the 2022 design value at all six sites. A marked increase occurs again with the 2023 design value, but at all sites. A marked decrease occurs with the 2024 design value at the three Northern Minnesota and Tribal sites. This all culminates in a very sharp increase with the 2025 design value at all six sites, exceeding the standard.

Figure 4. $PM_{2.5}$ design values over the last decade at sites exceeding the NAAQS in 2025 for either the daily or annual standard



2. Identification of days impacted by wildfire

Minnesota Pollution Control Agency (MPCA) meteorologists apply the Air Quality Index (AQI) and track in real-time anomalous events of all sort affecting air quality. They communicate to the public steps to take to minimize exposure to ozone and $PM_{2.5}$ pollution when there are significant levels of concern.

Informational qualifiers get applied to the air measurement data and submitted to the EPA Air Quality System (AQS) along with the measured concentrations for the anomalous events. The informational qualifiers are optional codes that explain the events impacting measurements, but do not request exclusion of the data from design value calculations. Exclusion of the data requires EPA concurrence and must be an "exceptional event" with regulatory significance, such as during the timeframe for determining attainment status for a geographical area after promulgation of a strengthened NAAQS.

The informational qualifier 'IF' denotes impacts on air measurements due to fires originating in Canada. The informational qualifier 'IT' denotes impacts on air measurements due to wildfires originating in the United States.

Upward shifts of the $PM_{2.5}$ design value correlate with the increasing number of days sites are impacted by wildfire smoke each year since 2021. Table 1 shows the number of days each year over the last decade each of 24 Minnesota monitoring sites collecting continuous $PM_{2.5}$ samples were impacted by wildfire smoke.

The first six years, 2015 to 2020, sites state-wide had from one to up to nine days impacted by wildfire, both the one and the nine days occurring in 2020. Daily design values state-wide calculated over that time period do not exceed 22 $\mu g/m^3$.[5] The year 2021, sites had 14 to 37 days impacted by wildfire. Leech Lake Nation (27-021-3410) had the 37 days and shows the most marked increase in design value that year in Figure 4. The year 2022, sites had only up to two days impacted by wildfire, which tempered the increase in design values calculated with data collected 2020 – 2022. The year 2023, sites had 14 to 54 days impacted by wildfire. Design values calculated with data collected 2021 – 2023 respond with a corresponding increase with the number of wildfire impacted days. The year 2024, sites had 6 to 17 days impacted by wildfire. Daily design values in Figure 4 show a marked decrease, exacerbated by the high wildfire year 2021 falling off for the 2022 – 2024 calculation. The year 2025, sites state-wide had 20 to 39 days impacted by wildfire. Daily design values for the six sites in Figure 4 shoot upward and exceed the $PM_{2.5}$ standard when calculated with data collected 2023 – 2025.

[5] MPCA criteria pollutant data explorer. https://data.pca.state.mn.us/views/Airmonitoring-Statewidecriteriapollutants/CriteriaPollutantDataExplorer?%3Aembed=y&%3AisGuestRedirectFromVizportal=y

Table 1. Number of days a year the last decade impacted by wildfire at $PM_{2.5}$ monitoring sites collecting continuous data in Minnesota

		Number of days impacted by wildfire by year										
Site ID	**Site name**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
27-003-1002	Anoka County Airport	5	5	5	5	5	3	25	1	14	6	22
27-005-2013	FWS Wetland Management District	3	3	3	3	3	1	34	2	35	14	30
27-007-2304	Red Lake Nation	4	4	4	4	4	2	30	1	54	17	31
27-013-5510	Rosa Parks Elementary	--	--	--	--	--	--	--	--	--	7	24
27-017-7417	Fond du Lac Band	3	3	3	3	3	--	19	1	29	11	29
27-021-3410	Leech Lake Nation	3	3	3	3	3	1	37	2	31	13	27
27-031-7810	Grand Portage Band	6	6	6	6	6	--	29	1	18	12	29
27-035-3204	Brainerd Lakes Regional Airport	6	6	6	6	6	1	29	2	25	9	26
27-037-0470	Apple Valley	6	6	6	6	6	9	19	1	38	9	23
27-037-0480	Near Road I-35	4	4	4	4	4	7	23	1	32	7	22
27-053-0910	Pacific Street	--	--	--	--	--	--	--	--	--	--	22
27-053-0962	Near Road I-35/I-94	5	5	5	5	5	4	23	1	29	7	22
27-053-0963	Andersen School	5	5	5	5	5	9	22	1	23	6	21
27-053-1904	Greenway Neighborhood	--	--	--	--	--	--	--	--	--	6	22
27-075-0005	Boundary Waters	5	5	5	5	5	--	33	2	31	12	37
27-083-4210	Southwest Minnesota Regional Airport	3	3	3	3	3	9	25	1	41	11	21
27-109-5008	Ben Franklin School	6	6	6	6	6	1	14	1	36	12	21
27-123-0871	Harding High School	5	5	5	5	5	4	22	1	29	6	20
27-137-7001	Virginia City Hall	4	4	4	4	4	--	29	1	30	16	39
27-137-7550	U of M - Duluth	4	4	4	4	4	2	17	--	31	13	33
27-137-7554	Laura MacArthur School	--	--	--	--	--	--	17	1	34	13	34
27-139-0505	B.F. Pearson School	5	5	5	5	5	5	13	1	35	10	20
27-145-3052	Talahi School	6	6	6	6	6	3	23	--	32	10	20
27-171-3201	St. Michael Elementary School	5	5	5	5	5	5	25	1	26	7	22

3. $PM_{2.5}$ design values considering wildfire impacts

Considering wildfire impact on $PM_{2.5}$ design values provides a more accurate picture of the air quality but for these uncontrollable or preventable events. Daily $PM_{2.5}$ design values are calculated using the 98th percentile daily $PM_{2.5}$ concentration each year and averaged over three years.

Table 3 contains the top 10 ranked $PM_{2.5}$ concentrations for the three years comprising the 2025 design value for the six sites exceeding the NAAQS. The letter 'T', for true, in the 98th percentile ranked value column indicates which of the top 10 samples on which date are included each of the three years. The 8th ranked value typically represents the 98th percentile. In 2023, at Andersen School (27-053-0963), the 6th ranked value represents the 98th percentile. In 2025, at Harding High School (27-123-0871), the 7th ranked value represents the 98th percentile. The number of creditable samples taken over the year determines the ranking used to represent the 98th percentile, shown in Table 2.

Table 2. 98th percentile ranked value based on number of creditable samples

Number of creditable samples	Ranked value as 98th percentile
1 – 50	1
51 – 100	2
101 – 150	3
151 – 200	4
201 – 250	5
251 – 300	6
301 – 350	7
351 – 366	8

All of the top 10 ranked values at the three sites—Red Lake Nation (27-007-2304), Leech Lake Nation (27-021-3410), Virginia City Hall (27-137-7001)—located in Northern Minnesota and Tribal lands have wildfire qualifier codes applied all three years. The three sites—Harding High School (27-123-0871), Andersen School (27-053-0963) and Apple Valley (27-037-0470)—located in the central Minnesota Twin Cities Metropolitan Area have wildfire qualifier codes applied at many of the top 10 ranked values, including all in 2025. The three metro area sites also have days in 2023 and 2024 that do not have any qualifier codes applied. The dates without qualifier codes ranked in the top 10 in 2023 and 2024 are nearly all in the wintertime when there is no wildfire activity. Harding High School (27-123-0871) and Andersen School (27-053-0963) each have a day July 4, 2024 ranked in the top 10, more than likely due to fireworks. $PM_{2.5}$ concentrations that day are 24.3 µg/m^3 and 23.1 µg/m^3, respectively, and didn't warrant an informational qualifier code.

Table 3. Top 10 ranked $PM_{2.5}$ data for the three years comprising the 2025 design value for the six sites exceeding the NAAQS

Site ID	Site name	Year	Sample date	Daily avrg $PM_{2.5}$ (µg/m^3)	Value rank	98th percentile ranked value	Wildfire qualifier codes
27-007-2304	Red Lake Nation	2023	2023-06-14	60.5	1	--	IT
			2023-05-18	51.1	2	--	IT
			2023-09-06	50.4	3	--	IT
			2023-07-23	46.1	4	--	IT
			2023-07-24	43.1	5	--	IT

Site ID	Site name	Year	Sample date	Daily avrg $PM_{2.5}$ ($\mu g/m^3$)	Value rank	98th percentile ranked value	Wildfire qualifier codes
			2023-06-13	34.4	6	--	IT
			2023-06-06	33.0	7	--	IT
			2023-08-04	30.8	8	T	IT
			2023-09-03	30.0	9	--	IT
			2023-07-25	29.6	10	--	IT
27-007-2304	Red Lake Nation	2024	2024-05-12	92.5	1	--	IF
			2024-09-02	36.7	2	--	IF
			2024-09-11	36.6	3	--	IF, IT
			2024-09-01	36.2	4	--	IF
			2024-08-18	35.2	5	--	IF
			2024-08-19	34.0	6	--	IF
			2024-07-29	27.4	7	--	IF, IT
			2024-07-21	23.7	8	T	IF
			2024-07-22	20.5	9	--	IF
			2024-07-26	20.5	10	--	IF
27-007-2304	Red Lake Nation	2025	2025-06-02	112.6	1	--	IF
			2025-07-12	92.1	2	--	IF
			2025-07-31	91.0	3	--	IF
			2025-07-11	87.8	4	--	IF
			2025-07-30	76.0	5	--	IF
			2025-07-20	70.3	6	--	IF
			2025-08-01	67.1	7	--	IF
			2025-07-29	57.6	8	T	IF
			2025-08-11	56.6	9	--	IF
			2025-08-02	53.4	10	--	IF
27-021-3410	Leech Lake Nation	2023	2023-06-14	53.0	1	--	IT
			2023-07-23	52.2	2	--	IT
			2023-05-18	51.7	3	--	IT
			2023-07-24	41.6	4	--	IT
			2023-09-06	34.8	5	--	IT
			2023-08-04	30.2	6	--	IT
			2023-08-29	27.5	7	--	IT
			2023-06-06	27.4	8	T	IT
			2023-07-25	26.0	9	--	IT
			2023-09-03	25.4	10	--	IT
27-021-3410	Leech Lake Nation	2024	2024-05-12	74.1	1	--	IF
			2024-08-19	33.6	2	--	IF
			2024-08-18	33.0	3	--	IF
			2024-09-02	31.9	4	--	IF
			2024-09-01	27.0	5	--	IF

Site ID	Site name	Year	Sample date	Daily avrg $PM_{2.5}$ ($\mu g/m^3$)	Value rank	98th percentile ranked value	Wildfire qualifier codes
			2024-07-29	23.4	6	--	IF, IT
			2024-08-20	19.8	7	--	IF
			2024-07-27	19.5	8	T	IF
			2024-08-21	18.3	9	--	IF
			2024-07-26	18.0	10	--	IF
27-021-3410	Leech Lake Nation	2025	2025-07-31	92.1	1	--	IF
			2025-07-12	85.1	2	--	IF
			2025-07-11	84.1	3	--	IF
			2025-06-02	81.7	4	--	IF
			2025-08-01	69.9	5	--	IF
			2025-07-30	68.3	6	--	IF
			2025-07-24	67.3	7	--	IF
			2025-08-11	60.8	8	T	IF
			2025-07-20	54.3	9	--	IF
			2025-08-02	51.2	10	--	IF
27-037-0470	Apple Valley	2023	2023-06-14	102.2	1	--	IT
			2023-06-28	66.2	2	--	IT
			2023-01-10	56.7	3	--	--
			2023-05-18	50.1	4	--	IT
			2023-07-15	50.0	5	--	IT
			2023-06-15	45.0	6	--	IT
			2023-01-11	44.8	7	--	--
			2023-06-27	41.0	8	T	IT
			2023-01-07	36.5	9	--	--
			2023-01-08	34.0	10	--	--
27-037-0470	Apple Valley	2024	2024-05-13	56.5	1	--	IF
			2024-08-18	29.7	2	--	IF
			2024-01-23	27.8	3	--	--
			2024-08-19	25.1	4	--	IF
			2024-01-24	24.8	5	--	--
			2024-05-12	24.3	6	--	IF
			2024-01-25	23.2	7	--	--
			2024-08-20	21.0	8	T	IF
			2024-07-27	20.4	9	--	IF
			2024-12-24	19.8	10	--	--
27-037-0470	Apple Valley	2025	2025-07-12	89.6	1	--	IF
			2025-06-03	81.6	2	--	IF
			2025-08-01	74.8	3	--	IF
			2025-07-31	73.3	4	--	IF
			2025-07-30	56.0	5	--	IF

Site ID	Site name	Year	Sample date	Daily avrg $PM_{2.5}$ ($\mu g/m^3$)	Value rank	98th percentile ranked value	Wildfire qualifier codes
			2025-07-13	52.7	6	--	IF
			2025-08-02	46.1	7	--	IF
			2025-06-12	44.5	8	T	IF
			2025-07-25	38.2	9	--	IF
			2025-06-11	35.6	10	--	IF
27-053-0963	Andersen School	2023	2023-06-14	106.0	1	--	IT
			2023-06-28	62.1	2	--	IT
			2023-01-10	50.7	3	--	--
			2023-06-27	42.2	4	--	IT
			2023-01-11	39.5	5	--	--
			2023-05-18	38.4	6	T	IT
			2023-01-07	34.6	7	--	--
			2023-06-15	34.5	8	--	IT
			2023-01-08	32.6	9	--	--
			2023-06-06	32.1	10	--	IT
27-053-0963	Andersen School	2024	2024-05-13	48.5	1	--	IF
			2024-02-21	40.3	2	--	--
			2024-02-22	29.4	3	--	--
			2024-08-18	27.3	4	--	IF
			2024-02-06	26.6	5	--	--
			2024-05-12	25.7	6	--	IF
			2024-08-19	25.0	7	--	IF
			2024-02-05	24.4	8	T	--
			2024-01-23	23.6	9	--	--
			2024-07-04	23.1	10	--	--
27-053-0963	Andersen School	2025	2025-06-03	87.7	1	--	IF
			2025-08-01	77.0	2	--	IF
			2025-07-12	76.8	3	--	IF
			2025-07-31	68.0	4	--	IF
			2025-07-30	53.7	5	--	IF
			2025-07-13	47.8	6	--	IF
			2025-08-02	44.6	7	--	IF
			2025-07-25	43.8	8	T	IF
			2025-06-12	40.1	9	--	IF
			2025-06-11	32.3	10	--	IF
27-123-0871	Harding High School	2023	2023-06-14	110.0	1	--	IT
			2023-01-10	62.5	2	--	--
			2023-06-28	61.6	3	--	IT
			2023-06-27	48.3	4	--	IT
			2023-01-11	41.7	5	--	--

Site ID	Site name	Year	Sample date	Daily avrg $PM_{2.5}$ ($\mu g/m^3$)	Value rank	98th percentile ranked value	Wildfire qualifier codes
			2023-07-15	40.7	6	--	IT
			2023-07-23	40.5	7	--	IT
			2023-01-07	40.5	8	T	--
			2023-01-08	36.7	9	--	--
			2023-05-18	32.7	10	--	IT
27-123-0871	Harding High School	2024	2024-05-13	46.6	1	--	IF
			2024-05-12	29.0	2	--	IF
			2024-08-18	28.2	3	--	IF
			2024-08-19	25.8	4	--	IF
			2024-07-04	24.3	5	--	--
			2024-01-25	23.1	6	--	--
			2024-01-23	21.3	7	--	--
			2024-01-24	20.8	8	T	--
			2024-02-21	20.7	9	--	--
			2024-01-28	19.5	10	--	--
27-123-0871	Harding High School	2025	2025-06-03	82.6	1	--	IF
			2025-07-12	75.6	2	--	IF
			2025-08-01	73.6	3	--	IF
			2025-07-31	65.3	4	--	IF
			2025-07-30	55.1	5	--	IF
			2025-07-13	51.3	6	--	IF
			2025-07-25	46.0	7	T	IF
			2025-08-02	43.3	8	--	IF
			2025-06-12	37.8	9	--	IF
			2025-06-11	31.8	10	--	IF
27-137-7001	Virginia City Hall	2023	2023-06-14	52.3	1	--	IT
			2023-07-23	43.2	2	--	IT
			2023-06-27	41.3	3	--	IT
			2023-05-18	27.4	4	--	IT
			2023-07-25	27.2	5	--	IT
			2023-06-05	26.7	6	--	IT
			2023-06-13	26.4	7	--	IT
			2023-06-26	26.2	8	T	IT
			2023-08-18	24.9	9	--	IT
			2023-08-08	24.5	10	--	IT
27-137-7001	Virginia City Hall	2024	2024-05-12	40.7	1	--	IF
			2024-08-12	26.8	2	--	IF
			2024-08-18	26.1	3	--	IF
			2024-08-13	24.1	4	--	IF
			2024-09-02	23.2	5	--	IF

Site ID	Site name	Year	Sample date	Daily avrg $PM_{2.5}$ ($\mu g/m^3$)	Value rank	98th percentile ranked value	Wildfire qualifier codes
			2024-08-14	22.2	6	--	IF
			2024-07-27	21.7	7	--	IF
			2024-07-30	20.9	8	T	IF, IT
			2024-07-20	19.9	9	--	IF
			2024-07-29	18.7	10	--	IF, IT
27-137-7001	Virginia City Hall	2025	2025-07-12	140.5	1	--	IF
			2025-07-31	111.7	2	--	IF
			2025-08-01	90.4	3	--	IF
			2025-07-30	89.1	4	--	IF
			2025-07-29	68.2	5	--	IF
			2025-08-02	67.0	6	--	IF
			2025-06-02	65.3	7	--	IF
			2025-08-11	61.3	8	T	IF
			2025-06-03	56.3	9	--	IF
			2025-07-13	54.9	10	--	IF

Calculating the 98th percentile value needed in 2025 informs the first step to recalculate the 2025 design value with measured data the years 2023 – 2025. The 98th percentile value needed in 2025 in order to achieve the daily $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$ is solved with the following equation.

$$P_{2025} = 3T - (P_{2023} + P_{2024})$$

Where: Py is the 98th percentile concentration in $\mu g/m^3$ for year y
T is the target NAAQS standard of 35 $\mu g/m^3$

Table 4 contains the actual 98th percentile value for 2025 along with the 98th percentile value needed to achieve the daily $PM_{2.5}$ NAAQS.

Table 4. 3-year average daily 98th percentile value needed in 2025 to meet the $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$

			$PM_{2.5}$ average ($\mu g/m^3$)		
Site ID	Site name	Sample date	98th percentile measured	3-year avrg measured	98th percentile needed
27-007-2304	Red Lake Nation	2023-08-04	30.8	37	
		2024-07-21	23.7		
		2025-07-29	57.6		50.5
27-021-3410	Leech Lake Nation	2023-06-06	27.4	36	
		2024-07-27	19.5		
		2025-08-11	60.8		58.1
27-037-0470	Apple Valley	2023-06-27	41.0	36	
		2024-08-20	21.0		
		2025-06-12	44.5		43.0
27-053-0963	Andersen School	2023-05-18	38.4	36	

		2024-02-05	24.4		
		2025-07-25	43.8		42.2
27-123-0871	Harding High School	2023-01-07	40.5		
		2024-01-24	20.8	36	
		2025-07-25	46.0		43.7
27-137-7001	Virginia City Hall	2023-06-26	26.2		
		2024-07-30	20.9	36	
		2025-08-11	61.3		57.9

Table 3 indicates a Red Lake Nation (27-007-2304) ranked value greater than #10 – 53.4 µg/m^3 would be required to meet the 98th percentile needed of 50.5 µg/m^3. At least three days—to rank #11—would need to be excluded from the design value calculation.

For the remaining sites, one day would need to be excluded from the design value calculation. A Leech Lake Nation (27-021-3410) ranked value of #9 – 54.3 µg/m^3 could meet the 98th percentile needed of 58.1 µg/m^3. An Apple Valley (27-037-0470) ranked value of #9 – 38.2 µg/m^3 could meet the 98th percentile needed of 43.0 µg/m^3. An Andersen School (27-053-0963) ranked value of #9 – 40.1 µg/m^3 could meet the 98th percentile needed of 42.2 µg/m^3. A Harding High School (27-123-0871) ranked value of #8 – 43.3 µg/m^3 could meet the 98th percentile needed of 43.7 µg/m^3. A Virginia City Hall (27-137-7001) ranked value of #9 – 56.3 µg/m^3 could meet the 98th percentile needed of 57.9 µg/m^3.

The ranked values above to meet the 98th percentile needed at each site requires exclusion of four sample dates in 2025 from the design value calculation; June 2, June 3, July 12 and July 31. On these dates are the 1st ranked values, or for Red Lake Nation (27-007-2304) the 1st through 3rd ranked values. Table 5 contains the sample dates, the daily average $PM_{2.5}$ concentration and the value rank for those days for each site.

Table 5. Sample dates for exclusion from 98th percentile ranking due to wildfire impact by site

Site ID	Site name	Sample date	Daily avrg $PM_{2.5}$ (µg/m^3)	Value rank	Wildfire qualifier code
27-007-2304	Red Lake Nation	2025-06-02	112.6	1	IF
27-053-0963	Andersen School	2025-06-03	87.7	1	IF
27-123-0871	Harding High School		82.6	1	IF
27-007-2304	Red Lake Nation	2025-07-12	92.1	2	IF
27-037-0470	Apple Valley		89.6	1	IF
27-137-7001	Virginia City Hall		140.5	1	IF
27-007-2304	Red Lake Nation	2025-07-31	91.0	3	IF
27-021-3410	Leech Lake Nation		92.1	1	IF

Excluding the sample dates by site in Table 5 results in adjusted 2025 $PM_{2.5}$ design values less than or equal to both the daily and the annual standards at each of the six sites. The adjusted 2025 $PM_{2.5}$ design values for the six sites are shown in Table 6.

Table 6. Adjusted daily and annual design values for 2025

Site ID	Site name	Year	$PM_{2.5}$ design value ($\mu g/m^3$)	
			Annual	Daily
27-123-0871	Harding High School	2025		35
27-053-0963	Andersen School	2025		34
27-007-2304	Red Lake Nation	2025		34
27-021-3410	Leech Lake Nation:	2025		34
27-137-7001	Virginia City Hall	2025		34
27-037-0470	Apple Valley	2025	9.0	33

The adjusted 2025 $PM_{2.5}$ daily and annual design values for the six sites, formerly exceeding the daily standard and one of those also exceeding the annual standard, are shown colored green in Figure 5 and Figure 6 alongside the unadjusted design values at the remaining sites. Page iii contains a key that cross-references sites named in the bar charts, which are a similar format to the 2027 Network Plan Data Report, and this document. The six sites with adjusted 2025 $PM_{2.5}$ design values now below the standards are Harding High School (27-123-0871), Andersen School (27-053-0963), Red Lake Nation (27-007-2304), Leech Lake Nation (27-021-3410), Virginia City Hall (27-137-7001) and Apple Valley (27-037-0470).

Figure 5. Wildfire impact adjusted $PM_{2.5}$ daily design values at six Minnesota sites compared with the primary and secondary NAAQS of 35 $\mu g/m^3$

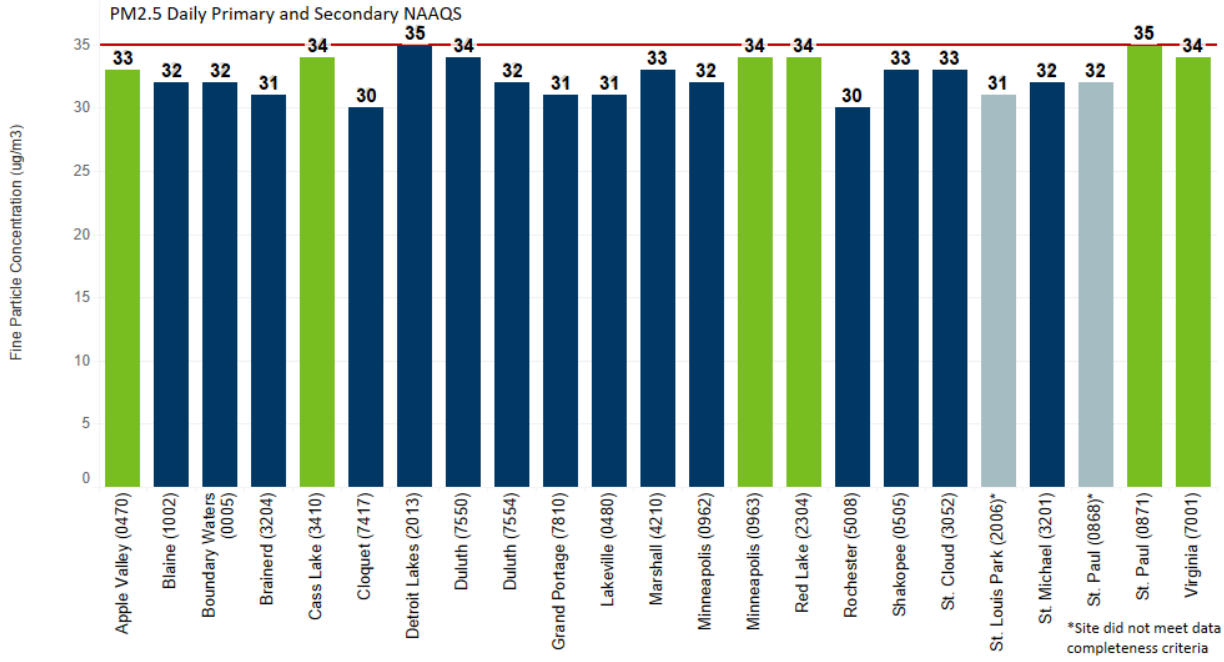
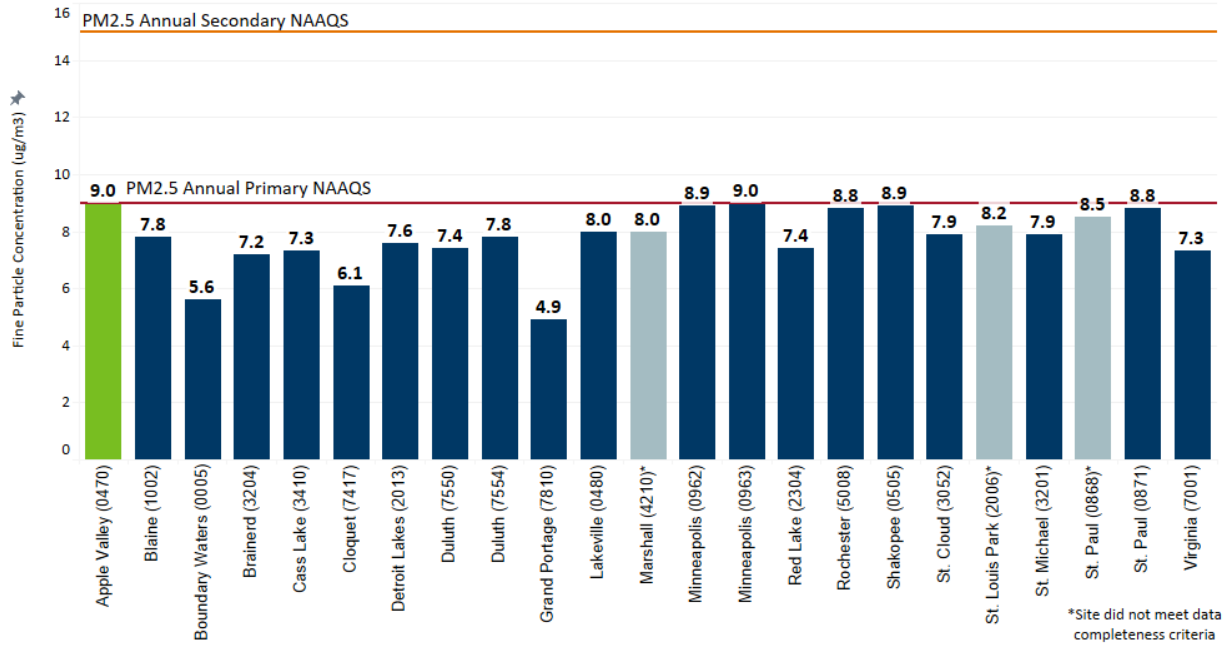


Figure 6. Wildfire impact adjusted $PM_{2.5}$ annual design values at select Minnesota sites compared with the primary NAAQS of 9.0 µg/m³and secondary NAAQS of 15.0 µg/m³



4. Supporting narrative of wildfire impact at six monitors on four days

Removal from the 98th percentile in 2025 of four days (one day at five sites and three days at one site exceeding the $PM_{2.5}$ NAAQS) results in $PM_{2.5}$ design values that meet the NAAQS. The MPCA will not request EPA remove the days from the design values on record because they lack regulatory significance in the context of attainment designation. Formal removal of the days with regulatory significance would require state submission of an exceptional event demonstration. Clean Air Act §319(b) defines an "exceptional event" as one that not only affects air quality, is not reasonably controllable or preventable and is a natural event—in this case with wildfire—but is also determined by the EPA administrator through an involved process established in regulation.

Products generated from satellite data and real-time air quality alerts issued by the MPCA support the narrative that transported smoke from Canadian wildfires impacted the six monitors on the days in 2025 with the highest $PM_{2.5}$ concentrations.

- Air quality alerts provide timely information to the public in any case in which the air quality is unhealthy. MPCA meteorologists issued air quality alerts warning of unhealthy levels of wildfire smoke covering the four days in 2025. Copies of the alerts are provided in supplementary materials to this document.

- The National Oceanic and Atmospheric Administration National Environment Satellite, Data and Information Service (NOAA/NESDIS) provides fire and smoke information over North America in its Hazard Mapping System (HMS) product. "The system combines near real-time polar and geostationary satellite observations into a common framework in which expert image analysts

perform quality control of automated fire products and digitization of smoke plumes."[6] Historical fire and smoke HMS datasets for the four days in 2025 were obtained in the form of Esri shapefiles and are depicted for each day.

Satellite products do have limitations, one being a difficulty producing measurements where clouds obscure the surface. Clouds appear white to grey on some satellite-derived imagery.

- To further corroborate the HMS product, another NOAA satellite-derived product, Aerosol Optical Depth (AOD)[7] measures the scattering and absorption of light by particles such as smoke and dust. The thicker the aerosol the more red shows in the product.

4.1. Days 1 and 2: June 2nd and 3rd 2025

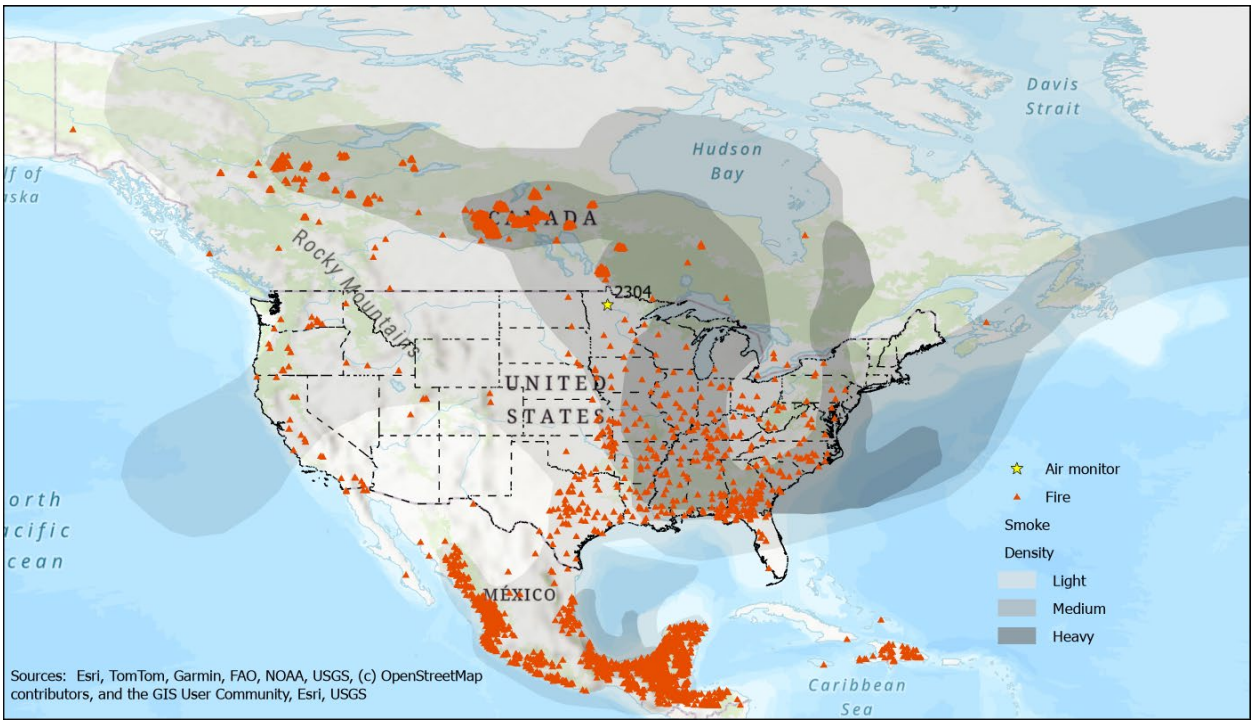
The MPCA issued an air quality alert on Monday June 2, 2025. The alert ran from Monday until noon on Wednesday June 4, 2025. The affected area included all of Minnesota and the tribal nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, Red Lake, Grand Portage, and Fond du Lac.

> *A band of very heavy ground-level smoke from Canadian wildfires has moved into northwest Minnesota Monday morning behind a cold front. This smoke will continue to follow behind the cold front as it moves southeast, and the smoke will impact northwest and north central Minnesota on Monday. The smoke will reach central and northeast Minnesota on Monday evening and southeast Minnesota early Tuesday morning. Precipitation is expected across northern and central Minnesota Monday afternoon and evening but may not help improve air quality much. Smoke will clear northwest Minnesota early Tuesday morning and air quality will begin to improve from northwest to southeast from Tuesday through Wednesday morning. The most significant impacts on air quality are expected to occur across northwest and north central Minnesota.*

In Figure 7 the HMS product pulled into ArcGIS shows fire as red triangles and smoke plumes in grey on June 2, 2025. The density of the smoke is delineated in three levels; light, medium and heavy. Placement of a yellow star on the map shows the location of the impacted monitor that day, Red Lake Nation (27-007-2304), with a first-ranked measured $PM_{2.5}$ concentration of 112.6 µg/m^3. At that location the smoke appears as medium density with heavy density nearby.

[6] HMS Hazard Mapping System. https://www.ospo.noaa.gov/products/land/hms.html#about
[7] Satellite-derived aerosol optical depth. https://www.star.nesdis.noaa.gov/goesr/product_aero_aod.php

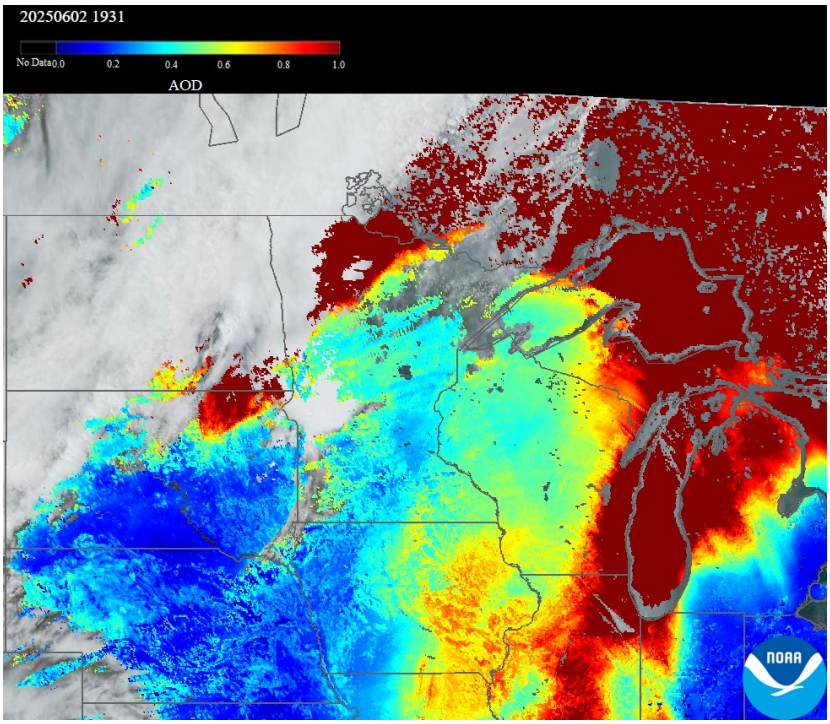
Figure 7. Satellite- derived – Hazard Mapping System fire and smoke analysis – June 2, 2025



Another NOAA satellite-derived product, Aerosol Optical Depth (AOD)[8] measures the scattering and absorption of light by particles such as smoke and dust. The thicker the aerosol the more red shows in the product. Figure 8 shows the aerosol optical depth over the upper Midwest on June 2, 2025. The deep red over the Northwest corner of Minnesota, covering the location of Red Lake Nation (27-007-2304) monitor as shown in Figure 7. Clouds obscure some parts of the state, extending into Canada and the Dakotas.

[8] Satellite-derived aerosol optical depth. https://www.star.nesdis.noaa.gov/goesr/product_aero_aod.php

Figure 8. Satellite-derived aerosol optical depth – June 2, 2025



In Figure 9 the HMS product shows fire as red triangles and smoke plumes in grey on June 3, 2025. The density of the smoke is delineated in three levels; light, medium and heavy. Placement of a yellow star on the map shows the location of the two Twin Cities Metropolitan area impacted monitors that day, Andersen School (27-053-0963) and Harding High School (27-123-0871), with first-ranked measured $PM_{2.5}$ concentrations of 87.7 and 82.6 µg/m^3, respectively. At that location the smoke appears as light density with medium density nearby.

Figure 9. Satellite- derived – Hazard Mapping System fire and smoke analysis – June 3, 2025

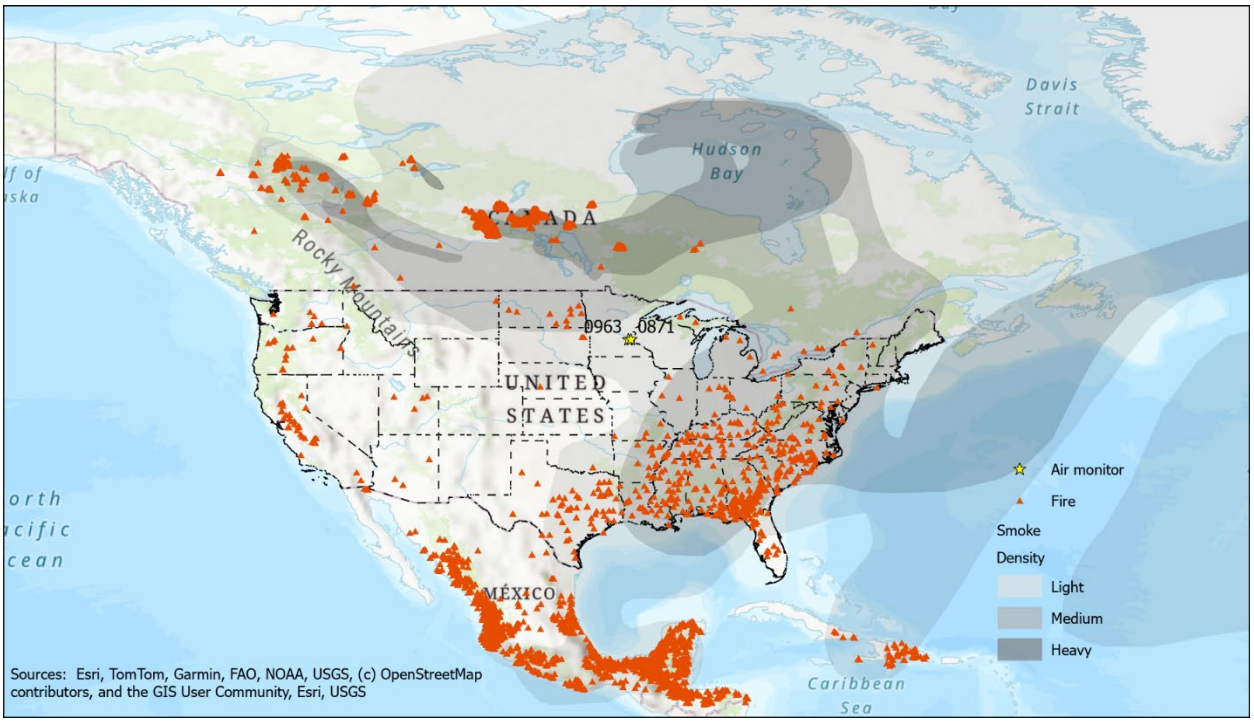
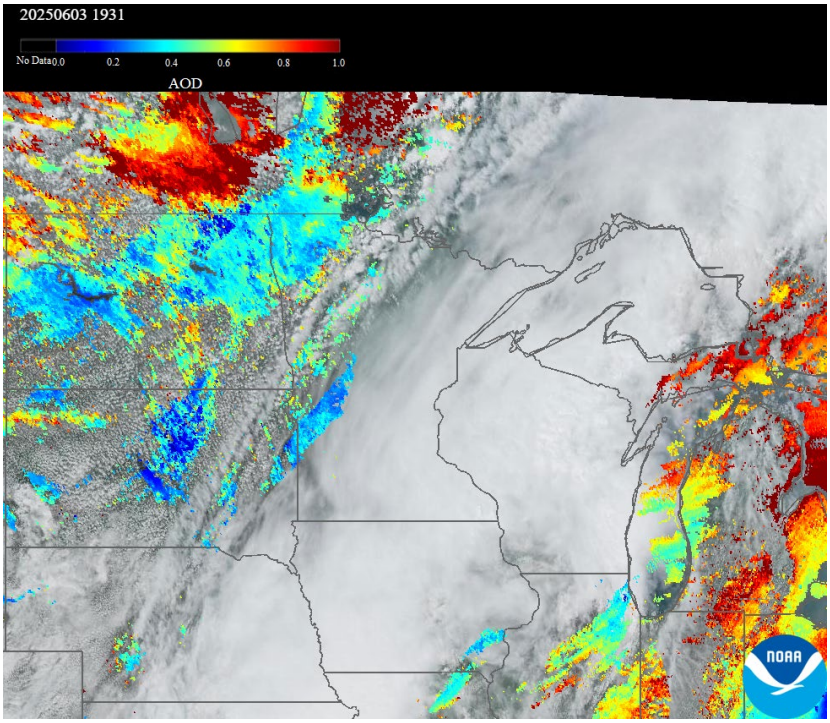


Figure 10 shows the aerosol optical depth over the upper Midwest on June 3, 2025. Clouds obscure most of the state, including the location of the Andersen School (27-053-0963) and Harding High School (27-123-0871) monitors as shown in Figure 9. This can impact the true smoke density levels observed at the monitor locations.

Figure 10. Satellite-derived aerosol optical depth – June 3, 2025



4.2. Day 3: July 12, 2025

The MPCA issued an air quality alert on Friday July 11, 2025. The alert ran from Friday until 9 a.m. on Monday July 14, 2025. The affected area included the Twin Cities metro area, the cities of Brainerd, Alexandria, Albert Lea, Marshall, Worthington, Rochester, Hinckley, St. Cloud, Winona, Ortonville, Mankato, Bemidji, East Grand Forks, Moorhead, International Falls, Two Harbors, Hibbing, Ely, Duluth, Roseau, and the Tribal Nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, White Earth, Red Lake, Grand Portage, and Fond du Lac.

> *Heavy ground-level smoke from wildfires in central Canada moved into northwest Minnesota early Friday morning behind a cold front. This first band of smoke is currently impacting northern Minnesota as it moves east during the day Friday. Air quality will worsen across northeast Minnesota Friday evening as smoke arrives over the region. A second round of smoke will move into northwest Minnesota late Friday evening. This smoke will be more widespread as it moves southeast overnight, and by Saturday afternoon the entire state may be impacted. The heaviest smoke on Saturday will be across the northern half of the state. Air quality will begin to improve across western Minnesota Sunday morning as cleaner air moves in from the west. By Sunday evening, the smoke should be gone from most of the state. Another round of smoke is possible across far northern Minnesota Sunday night.*

In **Figure 11** the HMS product pulled into ArcGIS shows fire as red triangles and smoke plumes in grey on July 12, 2025. The density of the smoke is delineated in three levels; light, medium and heavy. Placement of a yellow star on the map shows the locations of the three impacted monitors that day, Red Lake Nation (27-007-2304), Virginia City Hall (27-137-7001) and Apple Valley (27-037-0470). The Red Lake Nation (27-007-2304) site had the second-ranked measured $PM_{2.5}$ concentration of 92.1 µg/m^3 that day. Virginia City Hall (27-137-7001) and Apple Valley (27-037-0470) sites had their first-ranked measured $PM_{2.5}$ concentrations of 140.5 and 89.6 µg/m^3, respectively, that day. The smoke appears as heavy density across the entire state and beyond.

Figure 11. Satellite-derived – Hazard Mapping System fire and smoke analysis – July 12, 2025

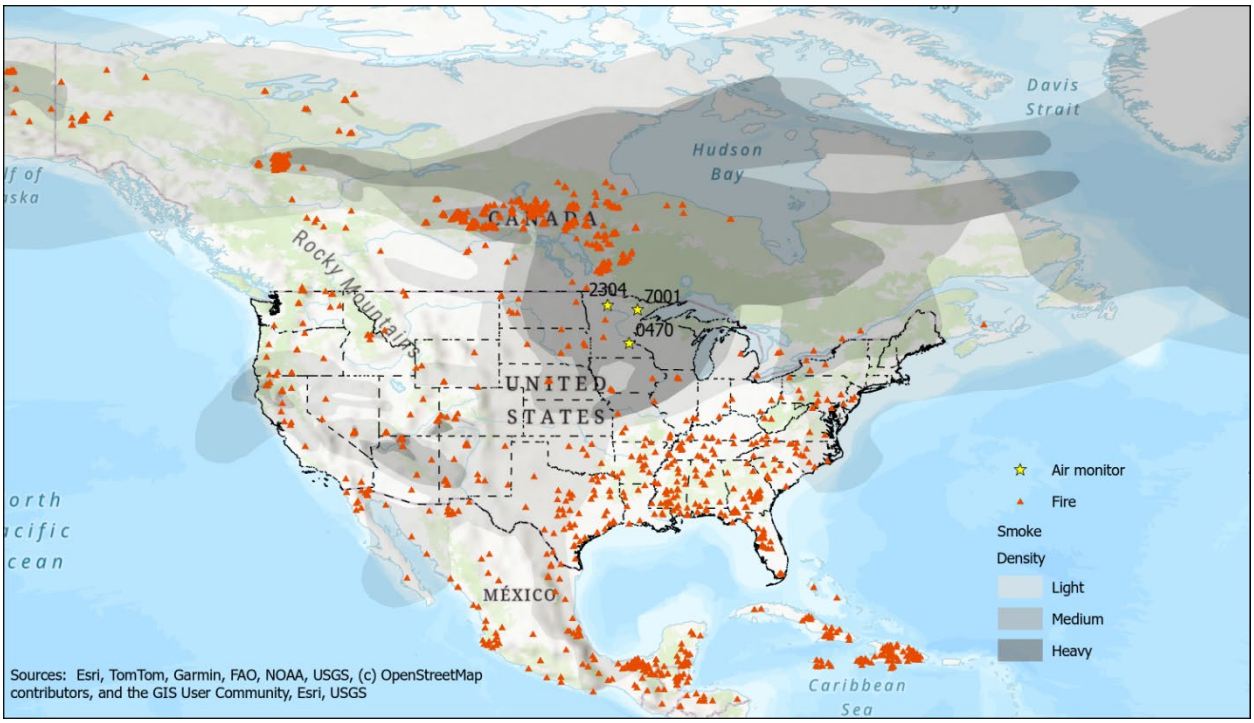
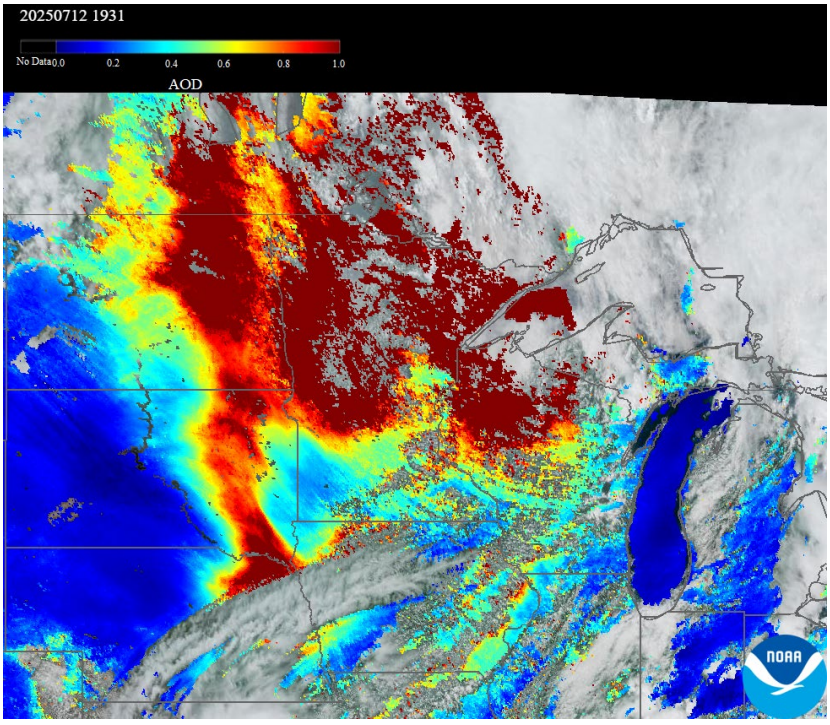


Figure 12 shows the aerosol optical depth over the upper Midwest on July 12, 2025. The deep red indicating the thickest aerosols over the Northern two-thirds of Minnesota, covering the locations of the Red Lake Nation (27-007-2304) and Virginia City Hall (27-137-7001) monitors as shown in **Figure 11**. Clouds are only spotty across most of the state, although some hotter colors show through around the location of the Apple Valley (27-037-0470) monitor.

Figure 12. Satellite-derived aerosol optical depth – July 12, 2025



4.3. Day 4: July 31, 2025

The MPCA issued an air quality alert on Wednesday July 30, 2025. The alert ran from Wednesday until 5 p.m. on Saturday August 2, 2025. The affected area included all of Minnesota, and the Tribal Nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, White Earth, Red Lake, Grand Portage, and Fond du Lac.

> *Northerly winds will continue transporting waves of heavy surface smoke from wildfires across Manitoba and Saskatchewan into Minnesota. Smoke will move south across all of Minnesota and linger through Saturday afternoon. The smoke will be reinforced by an area of high pressure that will create light winds and limit the dispersion of smoke. Heavier smoke is now expected to make it into southern Minnesota, therefore all of Minnesota will likely experience Red/Unhealthy AQI at times through Saturday afternoon when the air quality is forecasted to improve. Very dense smoke is located over Lake Superior, and the AQI forecast for Duluth and the North Shore has been upgraded to Purple, which is very unhealthy air quality.*

In Figure 13 the HMS product shows fire as red triangles and smoke plumes in grey on July 31, 2025. The density of the smoke is delineated in three levels; light, medium and heavy. Placement of a yellow star on the map shows the locations of the two impacted monitors that day, Red Lake Nation (27-007-2304) and Leech Lake Nation (27-021-3410). The Red Lake Nation (27-007-2304) site had the third-ranked measured $PM_{2.5}$ concentration of 91.0 µg/m^3 that day. The Leech Lake Nation (27-021-3410) site had its first-ranked measured $PM_{2.5}$ concentrations of 92.1 µg/m^3 that day. The smoke appears as heavy density covering the two sites and medium density the remainder of the state and beyond.

Figure 13. Satellite-derived – Hazard Mapping System fire and smoke analysis – July 31, 2025

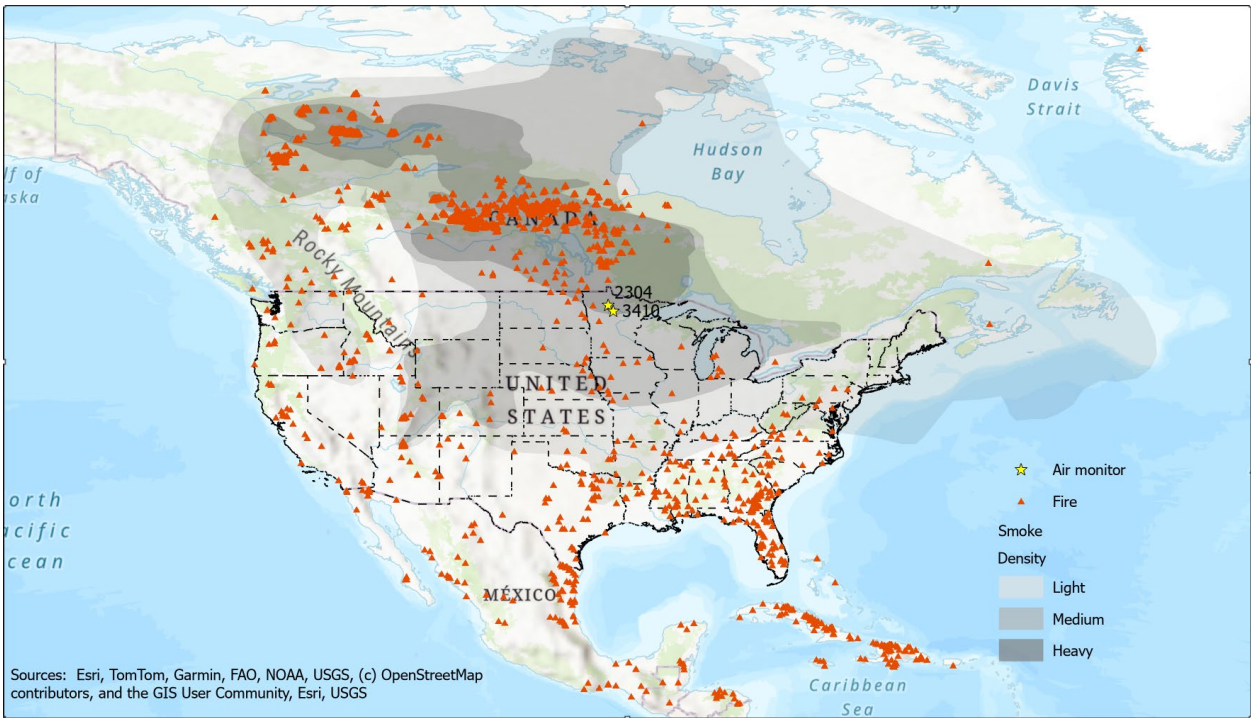
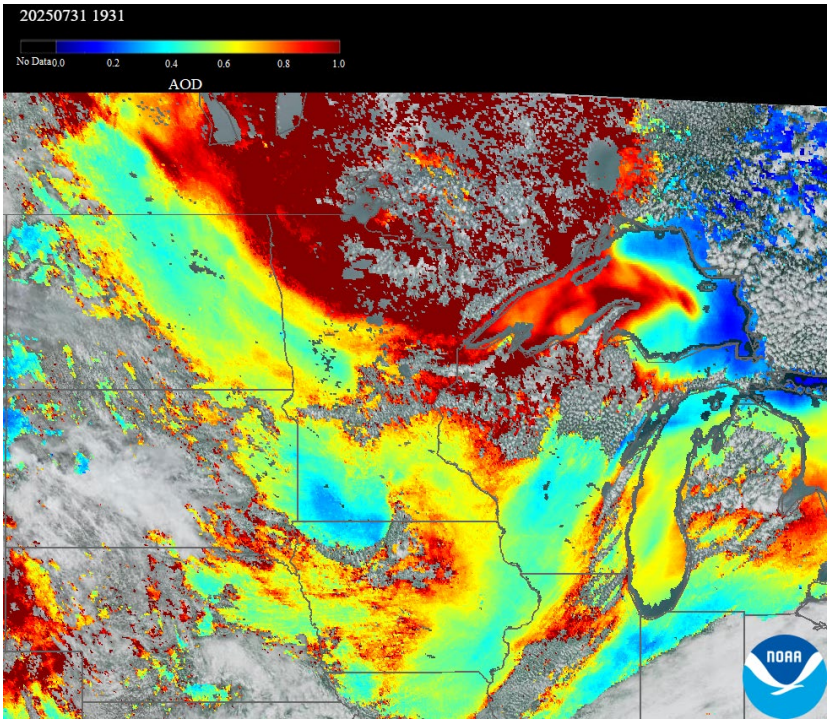


Figure 14 shows the aerosol optical depth over the upper Midwest on July 12, 2025. The deep red indicating the thickest aerosols over the Northern third of Minnesota, covering the locations of the Red Lake Nation (27-007-2304) and Leech Lake Nation (27-021-3410) monitors as shown in Figure 13. Clouds are spotty across this region, but do not interfere with the interpreted extent of the thickest aerosols.

Figure 14. Satellite-derived aerosol optical depth – July 31, 2025



4.4. Wildfire impacts on other days in the 3-year period

The six sites were impacted by wildfire on many more days in the 3-year period comprising the design values than the four days causing the monitors to exceed the daily and annual $PM_{2.5}$ NAAQS. Figure 15 contains bar charts depicting the $PM_{2.5}$ concentration every day during the 3-year period 2023-2025 for each site. Concentrations on days with wildfire qualifier codes applied are shown in dark red, while other sample days are shown in blue.

Yellow stars appear above the measured values that were identified in Section 3 and supported in Section 4, above. A reference line across each chart is 1.5 times the minimum annual 98th percentile 24-hour $PM_{2.5}$ data for the most recent 5-year period, 2021-2025, at each site and represents the typical levels of $PM_{2.5}$ impacting the monitor in non-wildfire impacted conditions.

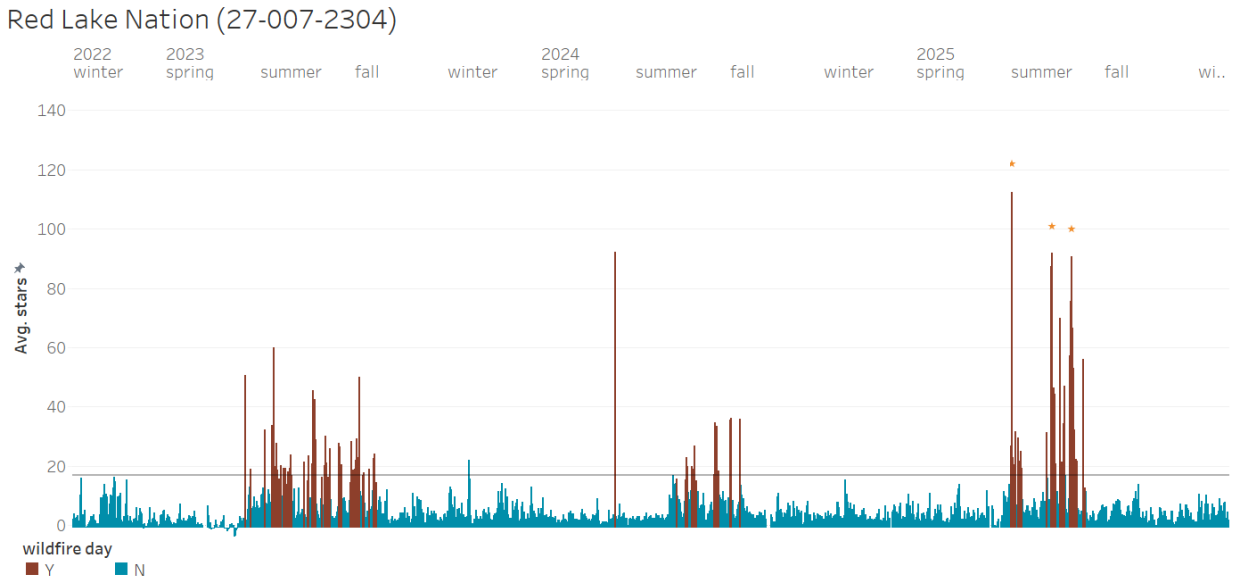
Table 7 contains the calculated values for the reference line at each site. Values above the reference line convey that wildfires clearly impact those days.

Table 7. Minimum annual 98th percentile daily $PM_{2.5}$ value and 1.5 times that value for the most recent five year of data, 2021-2025

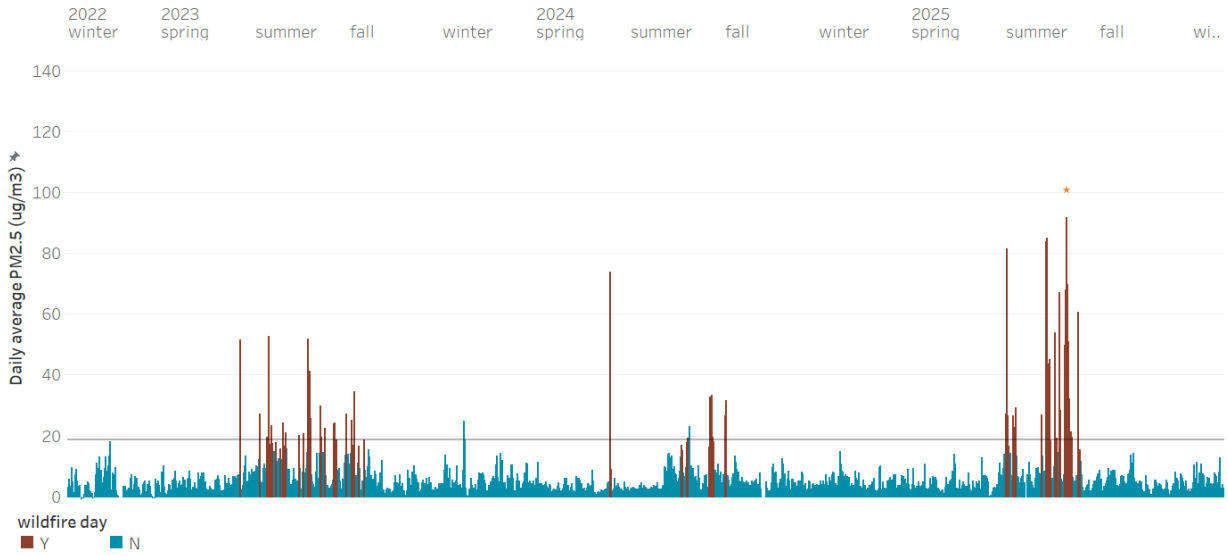
Site ID	Site name	Annual 98th percentile $PM_{2.5}$ over years 2021-2025 ($\mu g/m^3$)	
		Minimum	Minimum x 1.5
27-007-2304	Red Lake Nation	11.3	17.0
27-021-3410	Leech Lake Nation:	12.5	18.8
27-037-0470	Apple Valley	14.6	21.9
27-053-0963	Andersen School	17.8	26.7
27-123-0871	Harding High School	16.2	24.3
27-137-7001	Virginia City Hall	11.4	17.1

Some days not impacted by wildfire over the 3-year period comprising the 2025 design values have $PM_{2.5}$ concentrations above the reference line in Figure 15. These days are outside the timeframe of wildfire impact on Minnesota. Andersen School (27-053-0963) shows a gap in sample collection in July and August 2023. Site operator logbooks explain all equipment was offline while electrical power was disconnected in the part of the building servicing the monitors during construction.

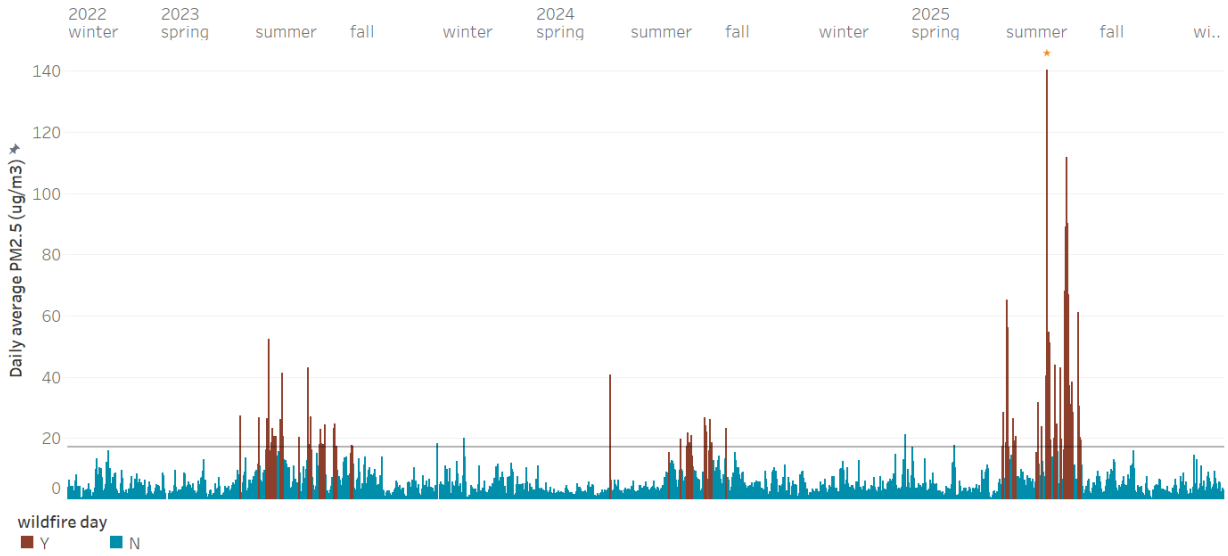
Figure 15. Daily $PM_{2.5}$ concentrations on typical days compared with wildfire impacted days by site and by season 2023 - 2025



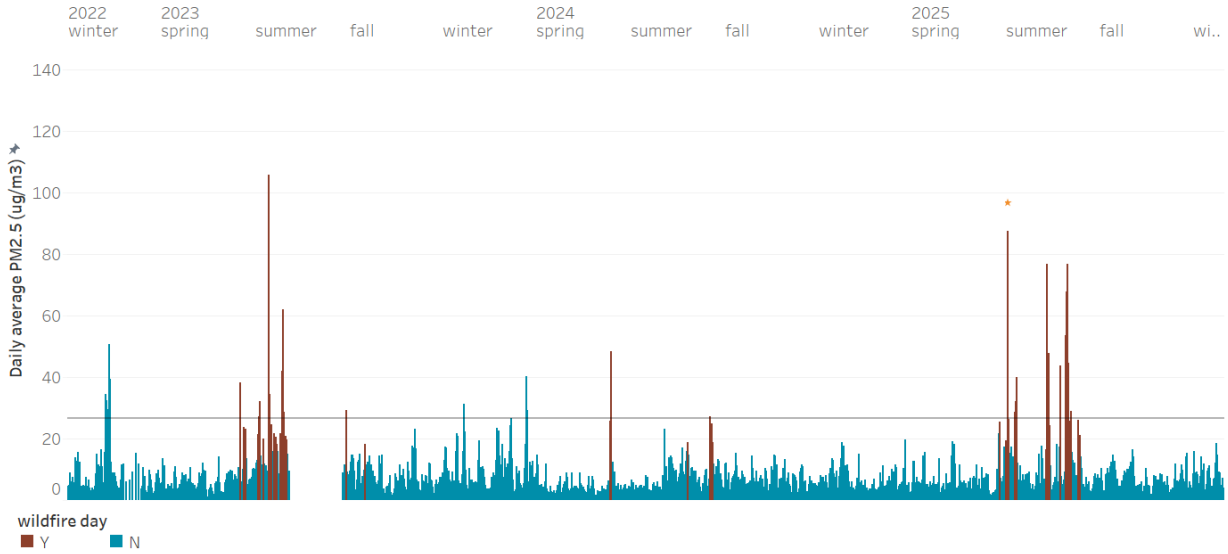
Leech Lake Nation (27-021-3410)



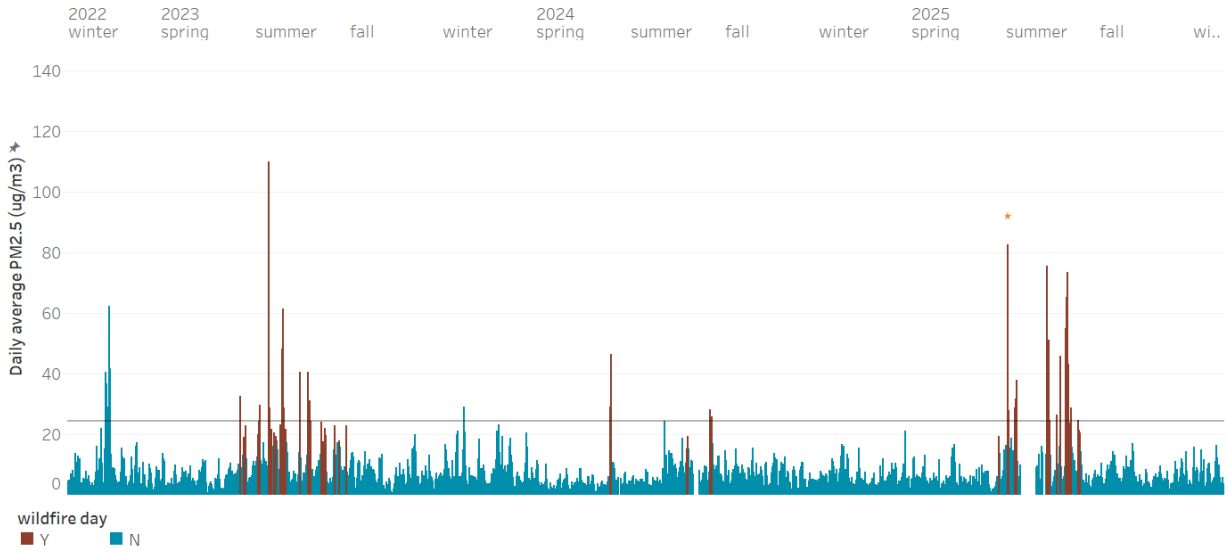
Virginia City Hall (27-137-7001)

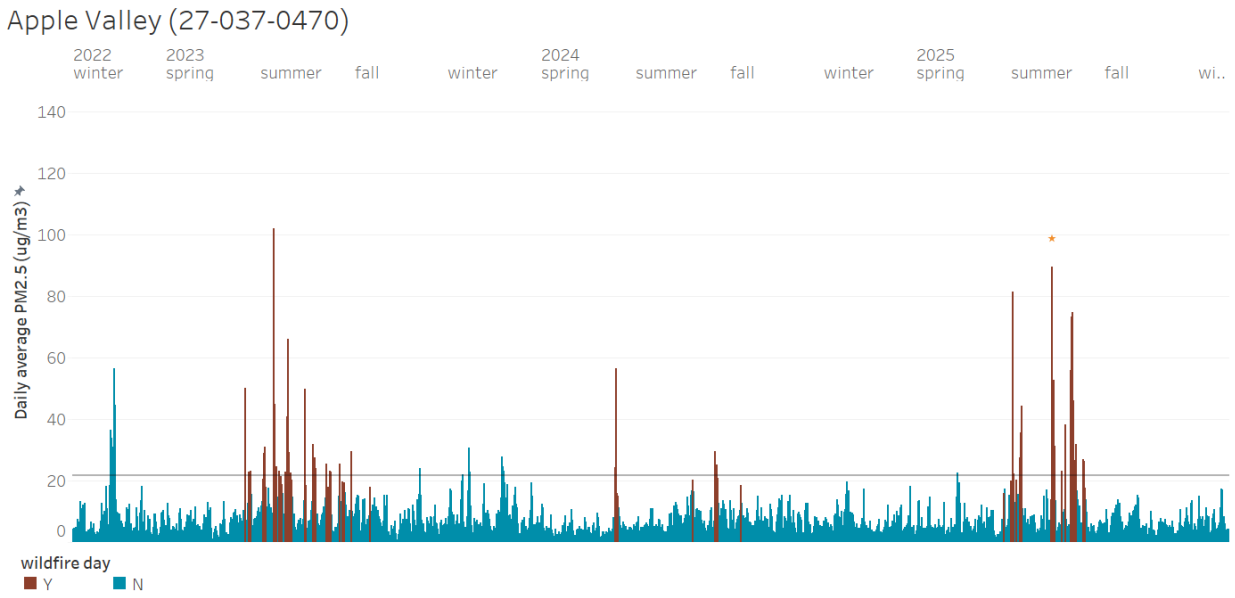


Andersen School (27-053-0963)



Harding High School (27-123-0871)





Excluding all wildfires from data years 2020 – 2025, during the period wildfires increase, show $PM_{2.5}$ design values that are relatively flat over the last decade. Figure 16 and Figure 17 show recalculated daily and annual $PM_{2.5}$ design value trends, respectively. The design value trend lines including wildfires are shown in gray for comparison with those excluding wildfire shown in full colors.

Figure 16. Daily $PM_{2.5}$ design values over the last decade at sites exceeding the daily NAAQS in 2025 excluding wildfire days after 2020

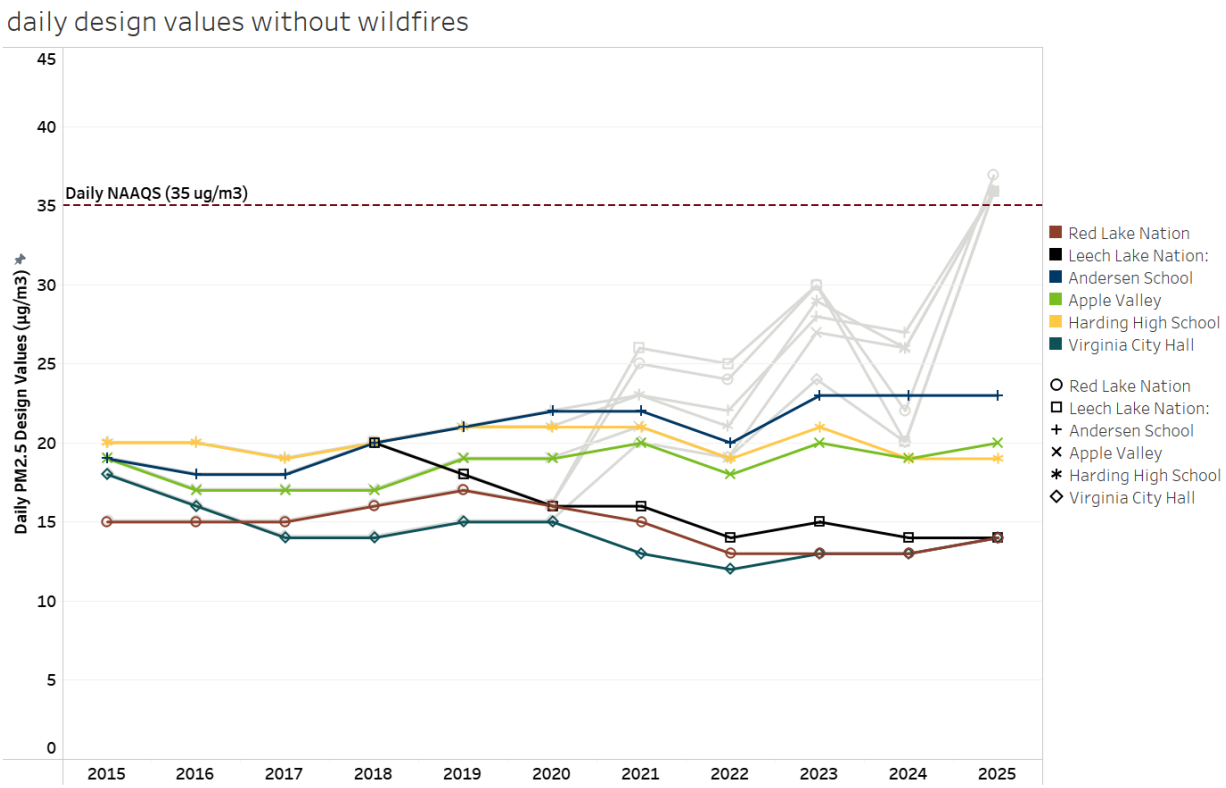
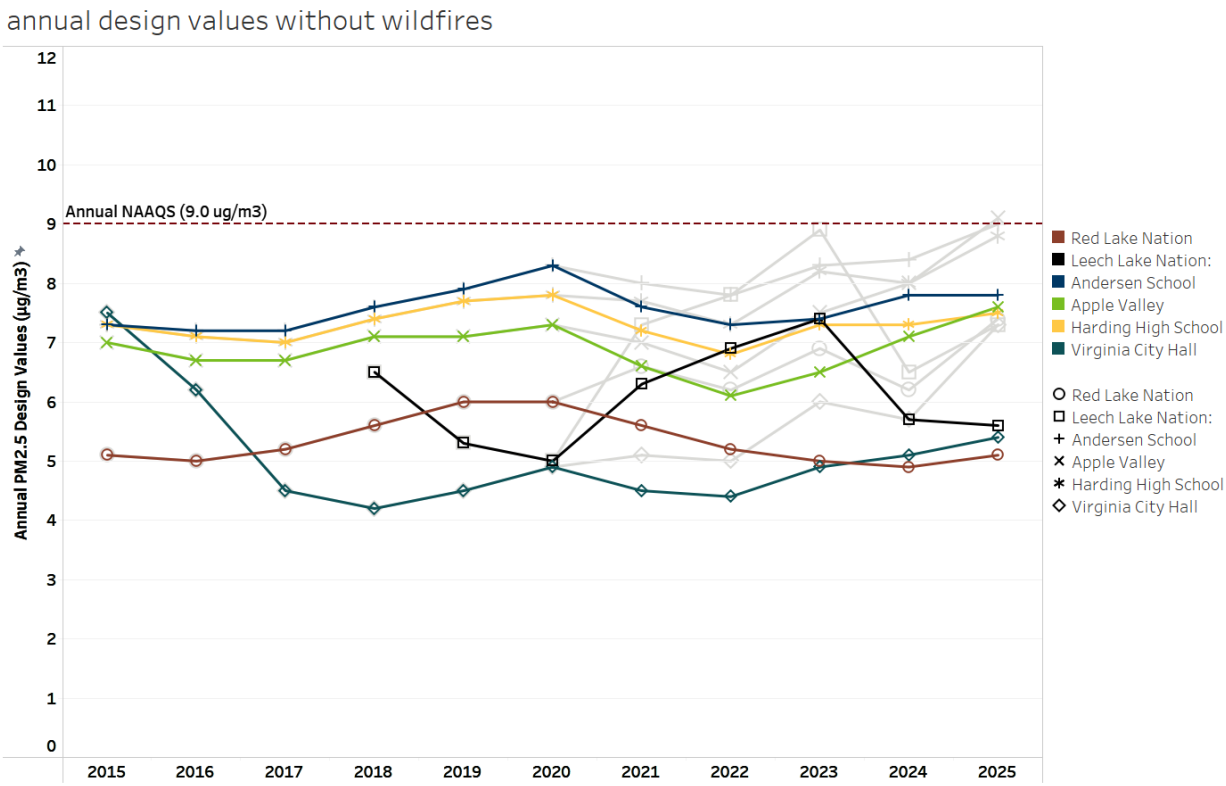


Figure 17. Annual $PM_{2.5}$ design values over the last decade at sites exceeding the annual NAAQS in 2025 excluding wildfire days after 2020



5. Design values for 2025 excluding wildfire at all sites in recent years

Wildfires did not simply impact the design values at the six sites that exceeded the $PM_{2.5}$ NAAQS in 2025, as evidenced by the count of days per year at every site in Minnesota in Table 1. Excluding all wildfires at all sites from data years 2023-2025 results in markedly lower design values for 2025.

Figure 18 and Figure 19 show the daily and annual design values for 2025, calculated with data excluding all wildfire days from 2023-2025, at air monitoring sites in Minnesota. Page iii contains a key that cross-references sites named in the bar charts, which are similar format to the 2027 Network Plan Data Report, and this document. Out of 21 sites with continuous regulatory monitors throughout Minnesota, all have design values well below the daily and annual standards, shown in light blue in the chart. The two sites, St. Louis Park City Hall (27-053-2006) and Ramsey Health Center (27-123-0868), are not represented in the chart because they still collect 24-hour $PM_{2.5}$ samples on filters every three days rather than continuous hourly samples and don't get qualifier codes assigned by MPCA meteorologists.

Figure 18. 2025 $PM_{2.5}$ daily design values excluding wildfire days 2023-2025 at all Minnesota sites compared with the primary and secondary NAAQS of 35 µg/m^3

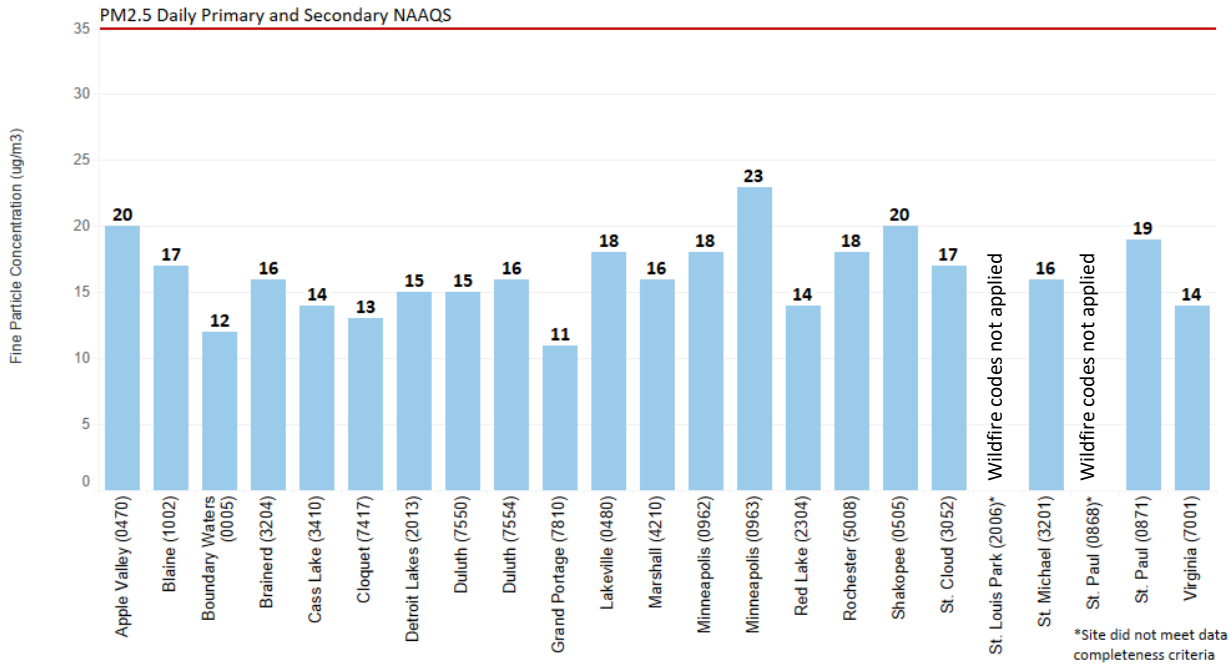
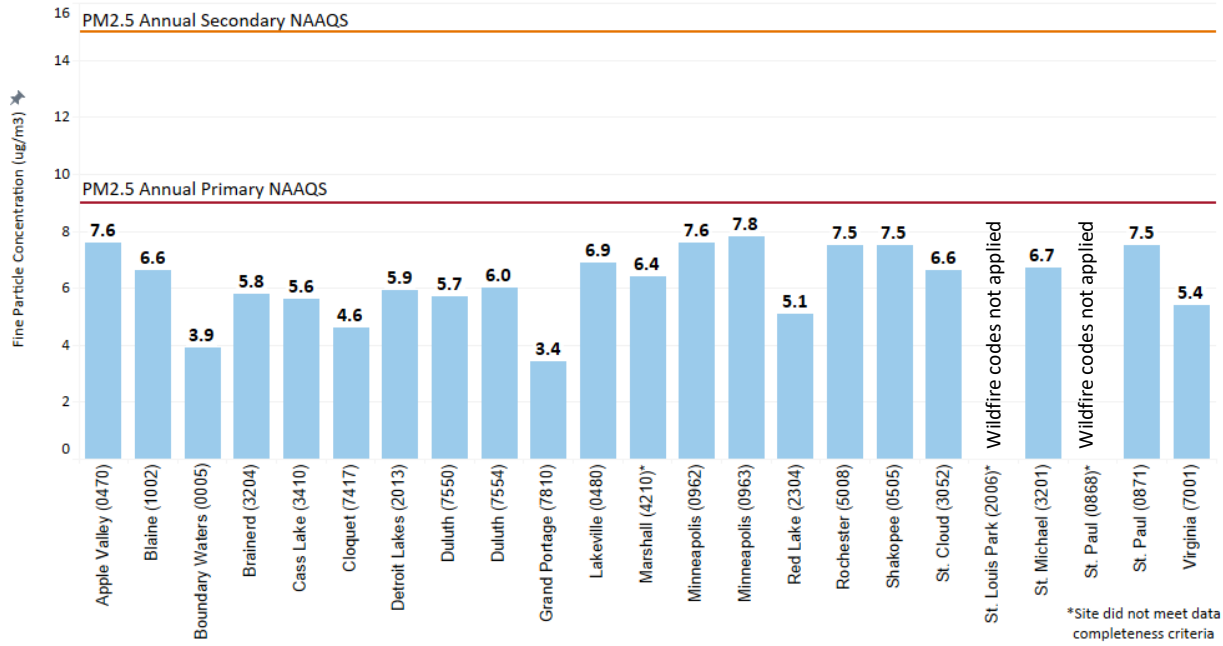


Figure 19. 2025 $PM_{2.5}$ annual design values excluding wildfire days 2023-2025 at all Minnesota sites compared with the primary NAAQS of 9.0 µg/m³ and secondary NAAQS of 15.0 µg/m³



6. Data access

All data used to support the analysis in this document are available. To obtain data used, visit https://www.pca.state.mn.us/about-mpca/information-requests

7. Supplementary material

Public releases for the air quality alerts issued by the MPCA meteorologists and AQI forecasters on the four days of interest described in greater detail in this document are included on the following pages

For release: June 2, 2025

Contact: **Ryan Lueck** 651-757-2766

The MPCA will hold a media briefing on the alert at 1:30 PM on Monday, June 2

Click here to join the meeting: https://www.zoomgov.com/j/1601794241

Air quality alert issued due to wildfire smoke for Monday, June 2 through Wednesday, June 4 for all of Minnesota

Air quality is expected to reach the maroon AQI category in northwest Minnesota, which is hazardous for everyone.

The Minnesota Pollution Control Agency (MPCA) has issued an air quality alert for all of Minnesota. The alert runs until noon on Wednesday, June 4. The affected area includes all of Minnesota and the tribal nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, Red Lake, Grand Portage, and Fond du Lac.

A band of very heavy ground-level smoke from Canadian wildfires has moved into northwest Minnesota Monday morning behind a cold front. This smoke will continue to follow behind the cold front as it moves southeast, and the smoke will impact northwest and north central Minnesota on Monday. The smoke will reach central and northeast Minnesota on Monday evening and southeast Minnesota early Tuesday morning. Precipitation is expected across northern and central Minnesota Monday afternoon and evening but may not help improve air quality much. Smoke will clear northwest Minnesota early Tuesday morning and air quality will begin to improve from northwest to southeast from Tuesday through Wednesday morning. The most significant impacts on air quality are expected to occur across northwest and north central Minnesota.

Fine particle levels are expected to reach the maroon air quality index (AQI) category, a level considered hazardous for everyone, across northwest Minnesota. This area includes East Grand Forks, Roseau, and the tribal nation of Red Lake. In the maroon area, everyone should avoid any outdoor activity and stay indoors. Fine particle levels are expected to reach the purple air quality index (AQI) category, a level considered very unhealthy for everyone, across northwest and north central Minnesota. This area includes Brainerd, Bemidji, Moorhead, International Falls, and the tribal nations of Mille Lacs, Leech Lake, and Red Lake. In the purple area, everyone should avoid prolonged or heavy exertion and stay indoors. Fine particle levels are expected to reach the red air quality index (AQI) category, a level considered unhealthy for everyone, across central and northeast Minnesota. This area includes the Twin Cities metro, Alexandria, Albert Lea, Hinckley, St. Cloud, Ortonville, Mankato, Two Harbors, Hibbing, Ely, Duluth, and the tribal nations of Upper Sioux, Prairie Island, Mille Lacs, Grand Portage, and Fond du Lac. In the red area, sensitive groups should avoid prolonged or heavy exertion and limit time spent outdoors. Everyone should limit prolonged or heavy exertion and time spent outdoors. Fine particle levels are expected to reach the orange air quality index (AQI) category, a level considered unhealthy for sensitive groups, across southwest and southeast Minnesota. This area includes Marshall, Worthington, Rochester, and Winona. In the orange area, sensitive groups should limit prolonged or heavy exertion and time spent outdoors.

What this alert means

Air moves long distances and carries pollutants. During air quality alerts due to wildfires, the air is mixed with harmful smoke. Wildfire smoke spreads or lingers depending on the size of the fires, the wind, and the weather.

The air quality index (AQI) is color-coded. Air quality alerts are issued when the AQI is forecast to reach an unhealthy level, which includes forecasts in the orange, red, purple, and maroon categories. For a full description of each air quality category, visit airnow.gov.

Maroon air quality: Hazardous

Sights and smells: In areas where air quality is in the maroon AQI category due to wildfires, the sky will look smoky. The air will seem hazy or smoky and you won't be able to see long distances. The air will smell strongly of smoke.

Health effects: This air is hazardous for everyone, and everyone will be affected. Most people will have irritated eyes, nose, and throat, coughing, chest tightness, or shortness of breath. Anyone could experience serious heart and lung effects such as asthma attack, heart attack, or stroke.

What to do: Avoid physical activity outdoors. Sensitive groups should stay indoors, keep activity levels low, and keep indoor air as clean as possible.

Purple air quality: Very unhealthy

Sights and smells: In areas where air quality is in the purple AQI category due to wildfires, the sky will look smoky. The air will seem hazy or smoky and you won't be able to see long distances. The air will smell strongly of smoke.

Health effects: This air is very unhealthy for everyone. Anyone could experience serious heart and lung effects such as asthma attack, heart attack, or stroke.

What to do: Avoid prolonged or vigorous outdoor activity. Consider rescheduling sports and other outdoor events or moving them inside. Sensitive individuals should avoid all outdoor physical activity.

Red air quality: Unhealthy

Sights and smells: In areas where air quality is in the red AQI category due to wildfires, the sky may look smoky. The air will look hazy, and you won't be able to see long distances. You may smell smoke.

Health effects: This air is unhealthy for everyone. Anyone may begin to experience symptoms such as irritated eyes, nose, and throat, coughing, chest tightness, or shortness of breath. Sensitive or more exposed individuals may experience more serious health effects, including worsening of existing heart or lung disease and respiratory and cardiovascular conditions, possibly leading to an asthma attack, heart attack, or stroke.

What to do: Reduce outdoor physical activities, take more breaks, and avoid intense activities to reduce exposure. Sensitive and more exposed individuals should avoid prolonged or vigorous activities and consider shortening, rescheduling, or moving outdoor events inside.

Orange air quality: Unhealthy for sensitive groups

Sights and smells: In areas where air quality is in the orange AQI category due to wildfires, the sky may look hazy and residents may smell smoke even when wildfires are far away.

Health effects: This air is unhealthy for sensitive groups and pollution may aggravate heart and lung disease as well as cardiovascular and respiratory conditions. Symptoms may include chest pain, shortness of breath, wheezing, coughing, and fatigue.

What to do: People in sensitive groups are encouraged to reduce outdoor physical activities, take more breaks, or do less intense activities to reduce their exposure. People with asthma should follow their asthma action plan and keep their rescue inhaler nearby.

Who's most at risk

Poor air quality impacts health. Fine particle pollution from wildfire smoke can irritate eyes, nose, and throat, and cause coughing, chest tightness, shortness of breath, dizziness, or fatigue. Smoke particles are small enough that they can be breathed deeply into lungs and enter the bloodstream. This can lead to illnesses such as bronchitis or aggravate existing chronic heart and lung diseases, triggering heart palpitations, asthma attacks, heart attacks, and strokes.

Certain groups experience health effects from unhealthy air quality sooner than others, either because they are more sensitive to fine particle pollution or because they are exposed to larger amounts of it.

Sensitive groups include:

- People who have asthma or other breathing conditions like chronic obstructive pulmonary disease (COPD).
- People who have heart disease, high blood pressure, or diabetes.
- Pregnant people.
- Children and older adults.

People with increased exposure include:

- People of all ages who do longer or more vigorous physical activity outdoors.
  - People who work outdoors, especially workers who do heavy manual labor.
  - People who exercise or play sports outdoors, including children.
- People who don't have air conditioning and need to keep windows open to stay cool.
- People in housing not tight enough to keep unhealthy air out, or who do not have permanent shelter.

Anyone experiencing health effects related to poor air quality should contact their health care provider. Those with severe symptoms, chest pain, trouble breathing, or who fear they may be experiencing a heart attack or stroke should **call 911 immediately**.

Take precautions

Reduce or eliminate activities that contribute to air pollution, such as outdoor burning, and use of residential wood burning devices. Reduce vehicle trips and vehicle idling as much as possible.

Stay informed

- Visit MPCA's Air Quality Index webpage for information on current air quality conditions in your area.
- Sign up for daily air quality forecasts and alert notifications though EnviroFlash.
- Download the EPA AirNow mobile app from the Apple App Store or the Google Play Store.

- Visit the MPCA's Air quality and health webpage for information about health and indoor and outdoor air quality and how to prevent air pollution.
- Visit the Minnesota Department of Health wildfire smoke webpage for actions you can take to protect your health against wildfire smoke.

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About the Minnesota Pollution Control Agency (MPCA)

The Minnesota Pollution Control Agency is a state agency committed to ensuring that every Minnesotan has healthy air, sustainable lands, clean water, and a better climate.

For release: July 11, 2025

Contact: **Hannah Sabroski** 651-757-2178

Air quality alert issued due to wildfire smoke until Monday, July 14, for all of Minnesota

Air quality is expected to reach the purple AQI category in northern Minnesota, which is very unhealthy for everyone.

The Minnesota Pollution Control Agency (MPCA) has issued an air quality alert for all of Minnesota. The alert runs until 9 a.m. on Monday, July 14. The affected area includes the Twin Cities metro area, Brainerd, Alexandria, Albert Lea, Marshall, Worthington, Rochester, Hinckley, St. Cloud, Winona, Ortonville, Mankato, Bemidji, East Grand Forks, Moorhead, International Falls, Two Harbors, Hibbing, Ely, Duluth, Roseau, and the Tribal Nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, White Earth, Red Lake, Grand Portage, and Fond du Lac.

Heavy ground-level smoke from wildfires in central Canada moved into northwest Minnesota early Friday morning behind a cold front. This first band of smoke is currently impacting northern Minnesota as it moves east during the day Friday. Air quality will worsen across northeast Minnesota Friday evening as smoke arrives over the region. A second round of smoke will move into northwest Minnesota late Friday evening. This smoke will be more widespread as it moves southeast overnight, and by Saturday afternoon the entire state may be impacted. The heaviest smoke on Saturday will be across the northern half of the state. Air quality will begin to improve across western Minnesota Sunday morning as cleaner air moves in from the west. By Sunday evening, the smoke should be gone from most of the state. Another round of smoke is possible across far northern Minnesota Sunday night.

Fine particle levels are expected to reach the purple air quality index (AQI) category, a level considered very unhealthy for everyone, across northern Minnesota. This area includes Brainerd, Alexandria, Hinckley, Bemidji, East Grand Forks, Moorhead, International Falls, Two Harbors, Hibbing, Ely, Duluth, Roseau, and the Tribal Nations of Mille Lacs, Leech Lake, White Earth, Red Lake, Grand Portage, and Fond du Lac. In the purple area, everyone should avoid prolonged or heavy exertion and stay indoors. Fine particle levels are expected to reach the red air quality index (AQI) category, a level considered unhealthy for everyone, across central Minnesota. This area includes the Twin Cities metro area, St. Cloud, Ortonville, and the Tribal Nations of Upper Sioux and Prairie Island. In the red area, sensitive groups should avoid prolonged or heavy exertion and limit time spent outdoors. Everyone should limit prolonged or heavy exertion and time spent outdoors. Fine particle levels are expected to reach the orange air quality index (AQI) category, a level considered unhealthy for sensitive groups, across southern Minnesota. This area includes Albert Lea, Marshall, Worthington, Rochester, Winona, and Mankato. In the orange area, sensitive groups should limit prolonged or heavy exertion and time spent outdoors.

What this alert means

Air moves long distances and carries pollutants. During air quality alerts due to wildfires, the air is mixed with harmful smoke. Wildfire smoke spreads or lingers depending on the size of the fires, the wind, and the weather.

The air quality index (AQI) is color-coded. Air quality alerts are issued when the AQI is forecast to reach an unhealthy level, which includes forecasts in the orange, red, purple, and maroon categories. For a full description of each air quality category, visit airnow.gov.

Purple air quality: Very unhealthy

Sights and smells: In areas where air quality is in the purple AQI category due to wildfires, the sky will look smoky. The air will seem hazy or smoky and you won't be able to see long distances. The air will smell strongly of smoke.

Health effects: This air is very unhealthy for everyone. Anyone could experience serious heart and lung effects such as asthma attack, heart attack, or stroke.

What to do: Avoid prolonged or vigorous outdoor activity. Consider rescheduling sports and other outdoor events or moving them inside. Sensitive individuals should avoid all outdoor physical activity.

Red air quality: Unhealthy

Sights and smells: In areas where air quality is in the red AQI category due to wildfires, the sky may look smoky. The air will look hazy, and you won't be able to see long distances. You may smell smoke.

Health effects: This air is unhealthy for everyone. Anyone may begin to experience symptoms such as irritated eyes, nose, and throat, coughing, chest tightness, or shortness of breath. Sensitive or more exposed individuals may experience more serious health effects, including worsening of existing heart or lung disease and respiratory and cardiovascular conditions, possibly leading to an asthma attack, heart attack, or stroke.

What to do: Reduce outdoor physical activities, take more breaks, and avoid intense activities to reduce exposure. Sensitive and more exposed individuals should avoid prolonged or vigorous activities and consider shortening, rescheduling, or moving outdoor events inside.

Orange air quality: Unhealthy for sensitive groups

Sights and smells: In areas where air quality is in the orange AQI category due to wildfires, the sky may look hazy and residents may smell smoke even when wildfires are far away.

Health effects: This air is unhealthy for sensitive groups and pollution may aggravate heart and lung disease as well as cardiovascular and respiratory conditions. Symptoms may include chest pain, shortness of breath, wheezing, coughing, and fatigue.

What to do: People in sensitive groups are encouraged to reduce outdoor physical activities, take more breaks, or do less intense activities to reduce their exposure. People with asthma should follow their asthma action plan and keep their rescue inhaler nearby.

Who's most at risk

Poor air quality impacts health. Fine particle pollution from wildfire smoke can irritate eyes, nose, and throat, and cause coughing, chest tightness, shortness of breath, dizziness, or fatigue. Smoke particles are small enough that they can be breathed deeply into lungs and enter the bloodstream. This can lead to illnesses such as bronchitis or aggravate existing chronic heart and lung diseases, triggering heart palpitations, asthma attacks, heart attacks, and strokes.

Certain groups experience health effects from unhealthy air quality sooner than others, either because they are more sensitive to fine particle pollution or because they are exposed to larger amounts of it.

Sensitive groups include:

- People who have asthma or other breathing conditions like chronic obstructive pulmonary disease (COPD).
- People who have heart disease, high blood pressure, or diabetes.
- Pregnant people.
- Children and older adults.

People with increased exposure include:

- People of all ages who do longer or more vigorous physical activity outdoors.
  - People who work outdoors, especially workers who do heavy manual labor.
  - People who exercise or play sports outdoors, including children.
- People who don't have air conditioning and need to keep windows open to stay cool.
- People in housing not tight enough to keep unhealthy air out, or who do not have permanent shelter.

Anyone experiencing health effects related to poor air quality should contact their health care provider. Those with severe symptoms, chest pain, trouble breathing, or who fear they may be experiencing a heart attack or stroke should **call 911 immediately**.

Take precautions

Reduce or eliminate activities that contribute to air pollution, such as outdoor burning, and use of residential wood burning devices. Reduce vehicle trips and vehicle idling as much as possible.

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###

About the Minnesota Pollution Control Agency (MPCA)

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For release: July 30, 2025

Contact: **Hannah Sabroski** 651-757-2178

Air quality alert issued due to wildfire smoke through Saturday, Aug. 2, for all of Minnesota

Air quality is expected to reach the purple AQI category in Duluth and along the North Shore, which is very unhealthy for everyone. Air quality is expected to reach the red AQI category in the rest of Minnesota, which is unhealthy for everyone.

The Minnesota Pollution Control Agency (MPCA) has issued an air quality alert for all of Minnesota. The alert runs until 5 p.m. on Saturday, Aug. 2. The affected area includes all of Minnesota, and the Tribal Nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, White Earth, Red Lake, Grand Portage, and Fond du Lac.

Northerly winds will continue transporting waves of heavy surface smoke from wildfires across Manitoba and Saskatchewan into Minnesota. Smoke will move south across all of Minnesota and linger through Saturday afternoon. The smoke will be reinforced by an area of high pressure that will create light winds and limit the dispersion of smoke. Heavier smoke is now expected to make it into southern Minnesota, therefore all of Minnesota will likely experience Red/Unhealthy AQI at times through Saturday afternoon when the air quality is forecasted to improve. Very dense smoke is located over Lake Superior, and the AQI forecast for Duluth and the North Shore has been upgraded to Purple, which is very unhealthy air quality.

Fine particle levels are expected to reach the purple air quality index (AQI) category, a level considered very unhealthy for everyone, across . This area includes Duluth and the North Shore . In the purple area, everyone should avoid prolonged or heavy exertion and stay indoors. Fine particle levels are expected to reach the red air quality index (AQI) category, a level considered unhealthy for everyone, in the rest of Minnesota. This area includes the Tribal Nations of Upper Sioux, Mille Lacs, Prairie Island, Leech Lake, White Earth, Red Lake, Grand Portage, and Fond du Lac. In the red area, sensitive groups should avoid prolonged or heavy exertion and limit time spent outdoors. Everyone should limit prolonged or heavy exertion and time spent outdoors.

What this alert means

Air moves long distances and carries pollutants. During air quality alerts due to wildfires, the air is mixed with harmful smoke. Wildfire smoke spreads or lingers depending on the size of the fires, the wind, and the weather.

The air quality index (AQI) is color-coded. Air quality alerts are issued when the AQI is forecast to reach an unhealthy level, which includes forecasts in the orange, red, purple, and maroon categories. For a full description of each air quality category, visit airnow.gov.

Purple air quality: Very unhealthy

Sights and smells: In areas where air quality is in the purple AQI category due to wildfires, the sky will look smoky. The air will seem hazy or smoky and you won't be able to see long distances. The air will smell strongly of smoke.

Health effects: This air is very unhealthy for everyone. Anyone could experience serious heart and lung effects such as asthma attack, heart attack, or stroke.

What to do: Avoid prolonged or vigorous outdoor activity. Consider rescheduling sports and other outdoor events or moving them inside. Sensitive individuals should avoid all outdoor physical activity.

Red air quality: Unhealthy

Sights and smells: In areas where air quality is in the red AQI category due to wildfires, the sky may look smoky. The air will look hazy, and you won't be able to see long distances. You may smell smoke.

Health effects: This air is unhealthy for everyone. Anyone may begin to experience symptoms such as irritated eyes, nose, and throat, coughing, chest tightness, or shortness of breath. Sensitive or more exposed individuals may experience more serious health effects, including worsening of existing heart or lung disease and respiratory and cardiovascular conditions, possibly leading to an asthma attack, heart attack, or stroke.

What to do: Reduce outdoor physical activities, take more breaks, and avoid intense activities to reduce exposure. Sensitive and more exposed individuals should avoid prolonged or vigorous activities and consider shortening, rescheduling, or moving outdoor events inside.

Who's most at risk

Poor air quality impacts health. Fine particle pollution from wildfire smoke can irritate eyes, nose, and throat, and cause coughing, chest tightness, shortness of breath, dizziness, or fatigue. Smoke particles are small enough that they can be breathed deeply into lungs and enter the bloodstream. This can lead to illnesses such as bronchitis or aggravate existing chronic heart and lung diseases, triggering heart palpitations, asthma attacks, heart attacks, and strokes.

Certain groups experience health effects from unhealthy air quality sooner than others, either because they are more sensitive to fine particle pollution or because they are exposed to larger amounts of it.

Sensitive groups include:

- People who have asthma or other breathing conditions like chronic obstructive pulmonary disease (COPD).
- People who have heart disease, high blood pressure, or diabetes.
- Pregnant people.
- Children and older adults.

People with increased exposure include:

- People of all ages who do longer or more vigorous physical activity outdoors.
  - People who work outdoors, especially workers who do heavy manual labor.
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- People who don't have air conditioning and need to keep windows open to stay cool.
- People in housing not tight enough to keep unhealthy air out, or who do not have permanent shelter.

Anyone experiencing health effects related to poor air quality should contact their health care provider. Those with severe symptoms, chest pain, trouble breathing, or who fear they may be experiencing a heart attack or stroke should **call 911 immediately**.

Take precautions

Reduce or eliminate activities that contribute to air pollution, such as outdoor burning, and use of residential wood burning devices. Reduce vehicle trips and vehicle idling as much as possible.

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