STATE CAPITOL
P.O. Box 110001
Juneau, AK 99811-0001
907-465-3500

550 West Seventh Avenue, Suite 1700
Anchorage, AK 99501
907-269-7450

Governor Mike Dunleavy
STATE OF ALASKA

February 6, 2025

Mr. Dan Opalski
Acting EPA Region 10 Administrator
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

Re: Alaska Governor's Recommendation for $PM_{2.5}$ Annual Area Designation

Dear Mr. Opalski

On behalf of Governor Dunleavy, the Alaska Department of Environmental Conservation provides the following recommendations for designation of areas for the revised annual fine particle air quality standard ($PM_{2.5}$). Please accept this letter as an initial designation in accordance with the requirements of Section 107(d)(1)(A) of the Clean Air Act.

Air quality measurement data was collected for the past three years in six areas of Alaska including Anchorage, Matanuska-Susitna Borough, Fairbanks (two locations), North Pole, and Juneau. The data shows only one community exceeding the health based annual exposure limit of 9.0 micrograms per cubic meter ($\mu g/m^3$) of air: North Pole.

Compliance with the health standard was determined by evaluating three years of ambient monitoring data in accordance with EPA's requirements under 40 CFR Part 50 Appendix N. Determination of attainment was established by comparing a three-year average of annual $PM_{2.5}$ concentrations observed at each site to the level of the standard. Table 1 lists the annual design values for the six monitoring locations in comparison to the revised annual health standard:

Table 1. *Design values for $PM_{2.5}$ monitoring locations in Alaska compared to the standard.*

$PM_{2.5}$ Monitoring Sites	**2023 Design Value ($\mu g/m^3$)**
Annual Standard	*9.0*
Anchorage	5.1
Matanuska-Susitna Valley	5.2
Fairbanks (NCore)	7.3
Fairbanks (A-Street)	8.4
North Pole	9.9
Juneau	5.1

Based on this data, Table 2 provides Alaska's designation recommendations:

Table 2. *Alaska's $PM_{2.5}$ attainment recommendations per community.*

Community	Designation Recommendations
Anchorage	Attainment
Matanuska-Susitna Valley	Attainment
Fairbanks	Attainment
North Pole	Nonattainment
Juneau	Attainment
All Other Areas of Alaska	Attainment/Unclassifia ble

Air quality characteristics in the interior of Alaska are unique due to low temperatures and low solar influence which results in atmospheric stagnation causing elevated $PM_{2.5}$ levels. With our extensive understanding and knowledge of Alaska's air quality, we are certain that locations outside of the localized North Pole area are in attainment. Additionally with the North Pole area already under a SIP for a 24-hour nonattainment designation, we believe they are working towards reducing the $PM_{2.5}$ levels and could reach Attainment standards within a years' time.

Therefore, we recommend that the urban area of North Pole and its surrounding residential areas be delayed in their designation as a nonattainment area until February of 2027 as allowed under Section 107(d)(1)(B)(i), as was EPA's practice for prior designations. For example, in 2006 the area reached nonattainment levels under the 24-hour standard but was not designated until 2009. Enclosed is supporting information with analysis regarding these designation recommendations as well as our recommended boundary for a North Pole annual $PM_{2.5}$ nonattainment area.

Please contact Jason Olds, Air Quality Division Director, at (907) 465-5109, if you or your staff have any questions about Alaska's recommendations for the fine particle $PM_{2.5}$ annual air quality standard.

Sincerely,

Mike Dunleavy
Governor

cc: The Honorable Michael Dunleavy, Governor
Grier Hopkins, Mayor Fairbanks North Star Borough
Krishna Viswanathan, EPA Region 10 Air and Radiation Division Director
Gina Bonifacino, EPA Region 10
Claudia Vaupel, EPA Region 10
Matt Jentgen, EPA Region 10
Nick Czarnecki, ADEC Air Quality

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Appendix A

Supplemental Data to: Boundary Area Designation Recommendation

February 6, 2025

Mike Dunleavy, Governor

Christina Carpenter, Acting Commissioner

(This page serves as a placeholder for two-sided copy)

APPENDIX A: SUPPLEMENTAL DATA

A1. 2021 QUARTER 1 DATA

The data collected for quarter 1 in 2021 (Table A1) is included in analysis of the $PM_{2.5}$ annual standard under the conclusion that instruments were operating within the normal range despite data flagging. This data is concluded to be of sufficient quality for weight of evidence purposes. DEC used QA null codes in AQS, but for weight of evidence has used the LIMS data from the FRM filter measurements to calculate the Q1 2021 average for estimating the annual design value for 2021-2023.

Table A1. *A-Street daily FRM $PM_{2.5}$ Concentrations for Q1 2021 used for the Weight of Evidence*

Date	LIMS Data	AQS Data	AQS Qualifier	Data used for WOE DV Calculations
1/1/2021	84.8	84.8		84.8
1/2/2021	25.6	25.6		25.6
1/3/2021	3.3	3.3		3.3
1/4/2021			AF - Scheduled but not Collected.	
1/5/2021			AF - Scheduled but not Collected.	
1/6/2021	26.3	26.3		26.3
1/7/2021	30.4	30.4		30.4
1/8/2021	30.1	30.1		30.1
1/9/2021	28.5	28.5		28.5
1/10/2021	17.7	17.7		17.7
1/11/2021	23.7	23.7		23.7
1/12/2021	28.6		AS - Poor Quality Assurance Results.	28.6
1/13/2021	59.4		AS - Poor Quality Assurance Results.	59.4
1/14/2021	38.3		AS - Poor Quality Assurance Results.	38.3
1/15/2021	11.7		AS - Poor Quality Assurance Results.	11.7
1/16/2021	30.4		AS - Poor Quality Assurance Results.	30.4
1/17/2021	27.2		AS - Poor Quality Assurance Results.	27.2
1/18/2021	13		AS - Poor Quality Assurance Results.	13
1/19/2021	3.9		AS - Poor Quality Assurance Results.	3.9
1/20/2021	25.8		AS - Poor Quality Assurance Results.	25.8
1/21/2021	34.7		AS - Poor Quality Assurance Results.	34.7
1/22/2021	25.7		AS - Poor Quality Assurance Results.	25.7
1/23/2021	19.8		AS - Poor Quality Assurance Results.	19.8
1/24/2021	19		AS - Poor Quality Assurance Results.	19
1/25/2021	22.8		AS - Poor Quality Assurance Results.	22.8

1/26/2021	24.6		AS - Poor Quality Assurance Results.	24.6
1/27/2021	35		AS - Poor Quality Assurance Results.	35
1/28/2021	28.8		AS - Poor Quality Assurance Results.	28.8
1/29/2021	28.9		AS - Poor Quality Assurance Results.	28.9
1/30/2021	7		AS - Poor Quality Assurance Results.	7
1/31/2021	14.4		AS - Poor Quality Assurance Results.	14.4
2/1/2021	14.5		AS - Poor Quality Assurance Results.	14.5
2/2/2021	12.5		AS - Poor Quality Assurance Results.	12.5
2/3/2021	8.4		AS - Poor Quality Assurance Results.	8.4
2/4/2021	10.7		AS - Poor Quality Assurance Results.	10.7
2/5/2021	18.5		AS - Poor Quality Assurance Results.	18.5
2/6/2021	5.6		AS - Poor Quality Assurance Results.	5.6
2/7/2021	23.9		AS - Poor Quality Assurance Results.	23.9
2/8/2021	19.3		AS - Poor Quality Assurance Results.	19.3
2/9/2021	26		AS - Poor Quality Assurance Results.	26
2/10/2021			AF - Scheduled but not Collected.	
2/11/2021			AF - Scheduled but not Collected.	
2/12/2021			AF - Scheduled but not Collected.	
2/13/2021			AF - Scheduled but not Collected.	
2/14/2021			AF - Scheduled but not Collected.	
2/15/2021			AF - Scheduled but not Collected.	
2/16/2021			AF - Scheduled but not Collected.	
2/17/2021	12.1		AS - Poor Quality Assurance Results.	12.1
2/18/2021	4.1		AS - Poor Quality Assurance Results.	4.1
2/19/2021	34.1		AS - Poor Quality Assurance Results.	34.1
2/20/2021	13.1		AS - Poor Quality Assurance Results.	13.1
2/21/2021	19.6		AS - Poor Quality Assurance Results.	19.6
2/22/2021	15.4		AS - Poor Quality Assurance Results.	15.4
2/23/2021	19.7		AS - Poor Quality Assurance Results.	19.7
2/24/2021	16.1		AS - Poor Quality Assurance Results.	16.1
2/25/2021	3.1		AS - Poor Quality Assurance Results.	3.1
2/26/2021	7.3		AS - Poor Quality Assurance Results.	7.3
2/27/2021	4.2		AS - Poor Quality Assurance Results.	4.2
2/28/2021	3.2		AS - Poor Quality Assurance Results.	3.2
3/1/2021	6.8		AS - Poor Quality Assurance Results.	6.8
3/2/2021	8		AS - Poor Quality Assurance Results.	8
3/3/2021			AF - Scheduled but not Collected.	
3/4/2021			AF - Scheduled but not Collected.	

3/5/2021	12.4		AS - Poor Quality Assurance Results.	12.4
3/6/2021	14.3		AS - Poor Quality Assurance Results.	14.3
3/7/2021	12.2		AS - Poor Quality Assurance Results.	12.2
3/8/2021			AF - Scheduled but not Collected.	
3/9/2021	0.2		AS - Poor Quality Assurance Results.	0.2
3/10/2021	12.8		AS - Poor Quality Assurance Results.	12.8
3/11/2021			AF - Scheduled but not Collected.	
3/12/2021			AF - Scheduled but not Collected.	
3/13/2021			AF - Scheduled but not Collected.	
3/14/2021			AF - Scheduled but not Collected.	
3/15/2021			AF - Scheduled but not Collected.	
3/16/2021			AF - Scheduled but not Collected.	
3/17/2021			AF - Scheduled but not Collected.	
3/18/2021	13.5		AS - Poor Quality Assurance Results.	13.5
3/19/2021	6.8		AS - Poor Quality Assurance Results.	6.8
3/20/2021	8.4		AS - Poor Quality Assurance Results.	8.4
3/21/2021	13.9		AS - Poor Quality Assurance Results.	13.9
3/22/2021	11.3		AS - Poor Quality Assurance Results.	11.3
3/23/2021	4.6		AS - Poor Quality Assurance Results.	4.6
3/24/2021	3.8		AS - Poor Quality Assurance Results.	3.8
3/25/2021	8.8		AS - Poor Quality Assurance Results.	8.8
3/26/2021	9.6		AS - Poor Quality Assurance Results.	9.6
3/27/2021	6.5		AS - Poor Quality Assurance Results.	6.5
3/28/2021	5.7		AS - Poor Quality Assurance Results.	5.7
3/29/2021	3		AS - Poor Quality Assurance Results.	3
3/30/2021			AF - Scheduled but not Collected.	
3/31/2021			AF - Scheduled but not Collected.	

A2. EXCEPTIONAL EVENTS

DEC is in the process of developing the Exceptional Events Waiver Request for EPA review and approval for all wildland fire smoke impacted days in 2022 and 2023 in Fairbanks and North Pole. Tables A2 and A3 summarize the data impacted by wildland fire smoke in the Fairbanks/North Pole nonattainment area during the 2022 and 2023 wildland fire season. Red bold font indicates concentrations above the 24-hour PM2.5 standard, while black bold font marks concentrations above the annual PM2.5 concentration. In total, DEC will request exclusion of 34 days in 2.22 and 21 days in 2023. A full discussion of the exceptional events can be found at https://dec.alaska.gov/air/air-monitoring/guidance/exceptional-events/.

Table A2. *2022 Wildland Fire Season FNSB $PM_{2.5}$ Concentrations, $\mu g/m^3$*

May-22 — 24-Hour $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Date	NCore FRM 1	NCore FRM 2	NCore BAM	A-St FRM	A-St BAM	HURST FRM 1	HURST FRM 2	HURST BAM
20	5		3.6	5.1	4	9.5		9.9
31	5.4		5	5.2	4.3	13.5		13.8

Black Bolded Values indicate an exceedance of the Annual NAAQS (9 $\mu g/m^3$)

Red Bolded Values indicate an exceedance of the 24-hour NAAQS (35 $\mu g/m^3$)

23 days over 35.5 11 Days over 9 < 35.5

34 Days Total

Jun-22 — 24-Hour $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Date	NCore FRM 1	NCore FRM 2	NCore BAM	A-St FRM	A-St BAM	HURST FRM 1	HURST FRM 2	HURST BAM
12	54		54.4	52.5	54.5	48.7		54.2
13	64.1	AF	64.5	62.8	64.2	61.8	60.6	67.6
14	35	36.1	35.4	35	37	35.8		40.9
15	21		21.9	20.8	21.7	21.5		24.7
16	13.8	14.2	13.7	13.2	12.1	15.6	15.6	18.4
18	10.8		10.2	10.3	10.1	10.5		13.3
22	24.1	24.9	25.5	23.7	30.9	25	25.2	30.4
23	33.5		40.3	32.9	36.5	18.2		22.1
24	46.2		51.2	40.7	43	23.3		27.8
25	103	104.3	108.2	103.3	110.2	44.2	44.4	50.3
26	66.1		67.3	64.1	66.1	50.9		57.1
27	110.1		112.5	104.2	108.9	84.2		93.7
28	216.8	230.2	208	215.6	198.8	174.8	176.1	175.2
29			60.6		61.8			56.8
30	94.5		92.2	84.2	89.9	75.5		84.3

Jul-22 — 24-Hour $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Date	NCore FRM 1	NCore FRM 2	NCore BAM	A-St FRM	A-St BAM	HURST FRM 1	HURST FRM 2	HURST BAM
1	73.1	71.8	73.5	65.8	69.5	55.7	56	62.4
2	58.4		62.5	46.8	50.7	60.3		68
3	65.8		68.8	65.4		87.2		97
4	67.4		70.3	64		67.1	67.4	76
5	107.1		112.2	105.7		102.6		115.7
6	76.3		78.6		78.1	72.5		81.3
7	56.9	57.9	61.7	57	63.2	66	66.6	77.7
8	30.2		31.5		33.7	32.4		37.8
9	142.3		139.7	140.3	145.5	108.2		117.9
10		71.2	71.8		72.5	61.1	61.6	67.8
11			50.8		49.4	46.2		50
12	46.5		47.8	45.7	46.9	44.7		50.5
13	27.1	27.3	28	27.2	29.5	27	26.1	33.3
15	9		9.1	8.8	9.3	10.2		12.8

Table A-3. *2023 Wildland Fire Season FNSB $PM_{2.5}$ Concentraions, $\mu g/m^3$*

July 2023

24-Hour $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Date	NCore FRM 1	NCore FRM 2	NCore BAM	A-St FRM	A-St BAM	HURST FRM 1	HURST FRM 2	HURST BAM
24	**18.1**	**18.6**	**18.4**	**18.3**	**16.1**	**18.6**	**18.5**	**14.9**
25	**14.5**		**13.5**	**14**	**13.9**	**15.3**		**12.1**
26	**18.3**		**18**	**17.4**	**19.1**	**19**		**16.3**
27	**19.2**		**19.1**	**18.4**	**18.3**	**16.1**		**13.4**
28	**26.2**		**24.8**	**25.7**	**26.2**	**31.1**		**29.3**
29	8.2	8.3	8.4	8.3	**9.4**	**13.4**		**12.4**
30	2.4		2.1	2.7	2.4	**11**		**9.7**

August 2023

24-Hour $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Date	NCore FRM 1	NCore FRM 2	NCore BAM	A-St FRM	A-St BAM	HURST FRM 1	HURST FRM 2	HURST BAM
1	7.3	5.9	4.8	5.4	5.4	**10.5**	**10.3**	**9.7**
2	7.1		6.2	7.4	6.7	**17**		**15.2**
3	**17.4**		**17.8**	**18**	**17.7**	**43.5**		**45.9**
4	**27**	**27.0**	**27.2**	**25.8**	**21.3**	**35**	**34.1**	**30.6**
5	**46.5**		**47.1**	**45.8**	**45.2**	**56.1**		**56.4**
6	**107.7**		**107.3**	**108.5**	**109.2**	**120.3**		**122.5**
7	**156.2**		**137.5**		**143.8**	**141.6**	**140.5**	**141.8**
8	**88.2**	**60.6**	**57.7**	**57.9**	**53.8**	**62.6**		**54.6**
9	**83.1**		**81.2**	**82.8**	**81.3**	**100.2**		**99**
10	**110.3**	**113.5**	**98.9**	**108.2**	**105.4**	**82.7**	**95**	**92**
11	**30.8**		**28.2**	**29.2**	**28.1**	**32**		**30.2**
12	**21**		**18.7**	**21.8**	**20.6**	**11.7**		8.8
15	**10.0**		8.5	**9.0**	**8.8**	**9.1**		**7.0**
19	6.9	7.9	6	7.0	6.9	6.1	**9.5**	4.3

Black Bolded Values indicate an exceedance of the Annual NAAQS (9 µg/m³)

Red Bolded Values indicate an exceedance of the 24-hour NAAQS (35 µg/m³)

7 days over 35.5 **14 Days over 9 < 35.5**

21 Days Total

A3. CONTRIBUTION FROM INTERNATIONAL SOURCES

$PM_{2.5}$ concentration measured at Alaska monitors is impacted by international emissions generated in the Russian Far East and Siberia, East Asia, Canada and Europe, along with international marine traffic conducting trade between North America and Asia. Figure A1 shows the geographical proximity of Alaska to neighboring countries.

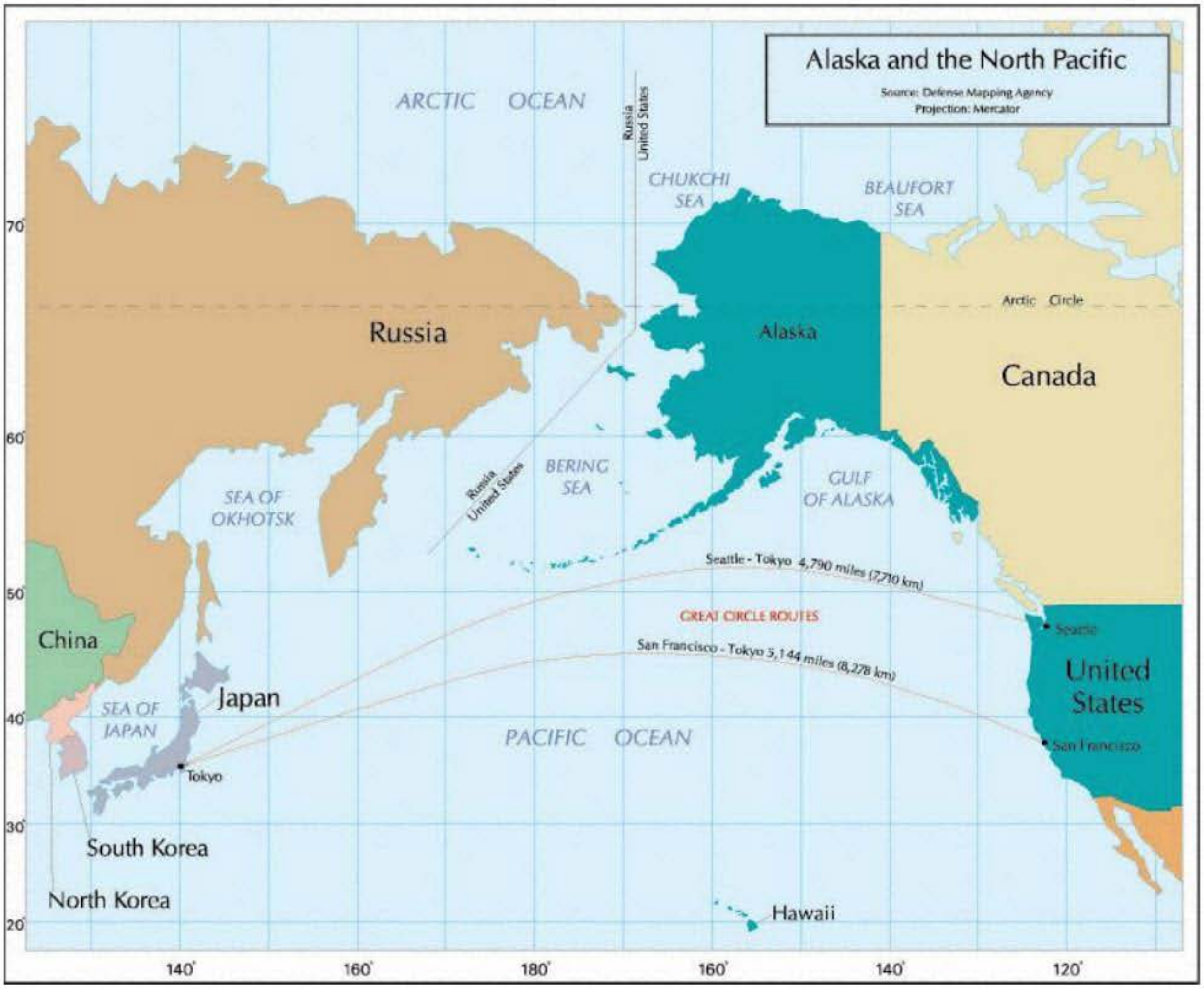


Figure A1. Geographic proximity of Alaska to Russa, Canada, and East Asian countries.

ALASKA DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

Boundary Area Designation Recommendation

Revised Primary Annual $PM_{2.5}$ National Ambient Air Quality Standard

February 6, 2025

Mike Dunleavy, Governor

Christina Carpenter, Acting Commissioner

(This page serves as a placeholder for two-sided copy)

Alaska Department of Environmental Conservation

Revised Primary Annual PM2.5 National Ambient Air Quality Standard

Boundary Area Designation

1. INTRODUCTION

On February 7, 2024, the United States Environmental Protection Agency (EPA) revised the primary annual National Ambient Air Quality Standard (NAAQS) for fine particulate matter ($PM_{2.5}$) from 12.0 micrograms per cubic meter ($\mu g/m^3$) to 9.0 $\mu g/m^3$. The State of Alaska is required to submit nonattainment area recommendations and appropriate boundaries to the U.S. EPA for the purpose of implementing the 2024 revised primary annual fine particulate matter standard and identifying areas that violate the standards[1].

All areas of the State are recommended as attainment/unclassifiable with the exception of North Pole. The recommended nonattainment area for the $PM_{2.5}$ revised annual NAAQS includes the North Pole Air Quality Control Zone- an existing regulatory zone for the 24-hour $PM_{2.5}$ nonattainment area. The boundary for the annual standard will be smaller than the current 24-hour $PM_{2.5}$ Fairbanks North Star Borough (FNSB) nonattainment boundary. The rationale for this smaller recommended nonattainment area for the annual $PM_{2.5}$ NAAQS is explained in detail in the following sections that evaluate and compare air quality, emissions and meteorology between the North Pole Air Quality Control Zone and adjacent areas and is summarized in Section 7 at the end of this document.

Alaska Department of Environmental Conservation (DEC) staff has performed an analysis using the U.S. EPA's guidance[2] to determine areas throughout the state not in attainment of the revised standard. Determination of attainment and nonattainment is established by comparing a three-year average of annual $PM_{2.5}$ concentrations to the level of the standard[3]. The nonattainment area recommendations contained in this report are based on 2021-2023 $PM_{2.5}$ air quality monitoring data. U.S. EPA guidance recommends that in making boundary recommendations for nonattainment areas, the states should evaluate and consider the following five factors:

1. Air Quality Data
2. Emissions and Emissions-Related Data
3. Meteorology
4. Geography and Topography
5. Jurisdictional Boundaries

[1] CAA 107(d)(1)(A).
[2] EPA Memorandum: Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard(February 7, 2024), https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf.
[3] 40 CFR Part 50, Appendix N.

Design values based on the 2021-2023 $PM_{2.5}$ monitoring data (Table 1-1) show that some areas in Alaska are already in attainment of the 9.0 µg/m^3 standard, with the only violating monitor being in North Pole, Alaska. The city of North Pole lies within the FNSB located in the interior of Alaska. This area is susceptible to certain environmental and meteorological events throughout a yearly timespan that leaves the area prone to experience higher concentrations of suspended pollutants in the air. Among these events are extreme cold climates and low solar activity in the winter months, leading to the generation of a low inversion layer made of stagnant particle suspension, and forest fires in the summer months, leading to the dispersion of organic matter in the area. Further details and analysis contributing to these design values, the movement of particles in the area, the makeup of small particulate matter in the air, and the impact of weather and geographical features that contribute to higher $PM_{2.5}$ concentrations are included in the following sections.

DEC is recommending that the boundaries for the 9.0 µg/m^3 standard include the North Pole Air Quality Control Zone established by FNSB[4] and currently regulated by DEC in efforts to curtail the area's existing violation of the 24-hour $PM_{2.5}$ NAAQS. The boundary for the North Pole Air Quality Control Zone is included in the 24-hour $PM_{2.5}$ State Implementation Plan (SIP)[5], which has been fully approved by EPA[6]. This recommendation includes city limits along with surrounding residential areas that may contribute to the NAAQS violation as evaluated through five factors outlined above and assessed throughout this document.

Table 1-1 *2023 annual design values from $PM_{2.5}$ monitoring sites. Design values are in units: µg/m^3.*

$PM_{2.5}$ Monitoring Sites	2023 Annual Design Value
Anchorage	5.1
Matanuska-Susitna Valley	5.2
Fairbanks NCore	6.9
Fairbanks A Street	7.5
North Pole Hurst Rd	9.5
Juneau	5.1

1.1 Reasoning for Recommended Boundary

The FNSB Nonattainment Area entered nonattainment status due to FNSB's violation of the 24-hour $PM_{2.5}$ NAAQS upon EPA's revision in 2006[7]. Existing boundaries of the 24-hour $PM_{2.5}$ nonattainment area include a larger portion of the FNSB surrounding the urban areas of Fairbanks

[4] Fairbanks North Star Borough Ordinance No. 2015-01. (February 27, 2015).
[5] SIP Section III.D.7.03 Nonattainment Boundary and Design Day Episode Selection (November 19, 2019). https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/.
[6] 88 Fed. Reg. 84674 (December 5, 2023).
[7] 74 Fed. Reg. 58688 (November 13, 2009).

and North Pole and their nearby residential areas, and became a designated nonattainment boundary effective December 2009 (Figure 1-1)[8]. The existing boundary was established based on the data of one monitoring unit located within the urban center of Fairbanks. Thus, very little insight and knowledge of the surrounding areas of Fairbanks and North Pole's air quality characteristics and contributing factors were understood at that time. Since the state and EPA last designated an area to address $PM_{2.5}$ NAAQS violations, additional monitoring units at maximum impact sites have been established to better understand the complexity of air quality within the FNSB. Monitors in both the Fairbanks and North Pole urban centers have allowed Alaska DEC staff to evaluate factors that impact local air quality levels and have given valuable insight into the dynamic of $PM_{2.5}$ emissions and its contributors. As a result of increased monitoring efforts and involvement within the Fairbanks North Star Borough, notable differences between the annual $PM_{2.5}$ concentrations in the Fairbanks and North Pole areas are evident. Analysis from monitoring data in these areas coupled with modeling techniques support the State of Alaska's recommendation for a smaller nonattainment area around the city of North Pole and surrounding residential areas to address the revised annual $PM_{2.5}$ NAAQS.

Surrounding locations outside of Fairbanks and North Pole with emissions-producing activity, namely Eielson Air Force Base to the southeast of North Pole, were evaluated in prior boundary designations and found to be of little influence on North Pole/Fairbanks air quality[9]. The impact from this area remains unchanged and was therefore excluded from this boundary recommendation; wintertime high $PM_{2.5}$ days contributing to the annual standard violation occur during strong inversions, low wind speeds, and low transport from Eielson to the North Pole/Fairbanks area. Emissions inventory at Eielson was evaluated and determined to have little significant effect on the North Pole/Fairbanks emissions density[10].

In considering a smaller boundary, DEC first evaluated characteristics in the entire area surrounding Fairbanks and North Pole. As noted in Table 1-1, average design values show that the only location in the state of Alaska in violation of the revised annual $PM_{2.5}$ NAAQS is the North Pole area, with a design value of 9.5 $\mu g/m^3$ at its maximum impact site (Hurst Rd). The neighboring city of Fairbanks has a design value average of 6.9 and 7.5 $\mu g/m^3$ at its monitoring sites (NCore and A-Street). Emissions inventories show higher emission density of all combined sources in North Pole than in Fairbanks, with no significant contribution from regions outside these areas.[11] There are clear differences in design values and emission densities between Fairbanks and North Pole, however given the proximity of the two urban centers, the possibility exists where emissions from each neighboring town might influence the other. Due to this possibility, DEC staff analyzed

[8] *Id.* at 58702.

[9] SIP Section III.D.7.03 Nonattainment Boundary and Design Day Episode Selection (November 19, 2019). https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/

[10] SIP Section III.D.7.06 Appendix. Emission Inventory Worksheet. https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/

[11] As shown in detail later in Table 3.1-11 and Table 3.1-13 of Section 3, total emissions within the Fairbanks North Star Borough but outside the existing 24-hour nonattainment area are much lower than emissions within the nonattainment area.

the contribution and influence of $PM_{2.5}$ from Fairbanks and North Pole, respectively, through meteorology and rural monitoring data.

DEC took additional efforts to examine the quarterly averaged $PM_{2.5}$ concentrations for the calendar years 2021-2023. Annual data is separated by quarters where Quarter 1 (Q1) includes January 1 through March 31; Quarter 2 (Q2) includes April 1 through June 30; Quarter 3 (Q3) includes July 1 through September 30; and Quarter 4 (Q4) includes October 1 through December 31. Seasonal patterns are evident within these quarters; summer and winter months exhibit noticeable differences in concentration levels, chemical speciation profiles, and meteorological analysis. Exceedances of the annual NAAQS occurred solely in winter months[12] and, coupled with the clear discrepancies at different times of year, DEC was led to analyze annual data through a seasonal lens to understand air quality in the North Pole and Fairbanks areas.

The close proximity of the two urban areas, yet noticeable differences in their respective design values, warrants considerable effort in understanding the transport, characteristics, make-up and projections of fine particulate matter and its precursors in both Fairbanks and North Pole. These are important to understand not only throughout the entire year, but also during specific seasons when violations occur. Through the examination of air quality data, emissions sources, meteorology, geography, and jurisdictional boundaries, it is DEC's evaluated conclusion that North Pole's air quality characteristics are attributed to local emission sources with little contribution from neighboring urban centers. This in-depth analysis aided in DEC's decision to recommend the North Pole Air Quality Control Zone as the annual $PM_{2.5}$ nonattainment boundary.

1.2 Proposed Nonattainment Area

The State of Alaska recommends the existing North Pole Air Quality Control Zone as the nonattainment area for the revised annual $PM_{2.5}$ NAAQS. The North Pole zone lies within the larger FNSB 24-hour $PM_{2.5}$ nonattainment area and is one of three "Air Quality Control Zones" (AQCZs) dividing the existing nonattainment area[13]. These subareas are included in the 24-hour $PM_{2.5}$ SIP,[14] and have been approved by the EPA[15]. The larger nonattainment area, the three air quality control zones and the North Pole Zone are included in Figures 1-1 and 1-2, followed by a detailed description of the boundaries.

The North Pole AQCZ corresponds to the North Pole portion of the 24-hour nonattainment area described later in Section 3 within which controllable source emissions comparisons are shown between the North Pole portion and the remainder of the existing nonattainment area. Those emissions comparisons, as well as ambient monitoring data and air flow comparisons between the

[12] Excluding exceptional events in summer months, April through September.
[13] 18 AAC 50.030.
[14] SIP Section III.D.7.03 Nonattainment Boundary and Design Day Episode Selection (November 19, 2019). https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/
[15] 40 CFR Part 52, 88 Fed. Reg. at 84674 (Dec. 5, 2023)

two portions of the existing 24-hour nonattainment area presented in Section 2 and Section 4, respectively are the basis for this proposed boundary for the annual $PM_{2.5}$ nonattainment area.

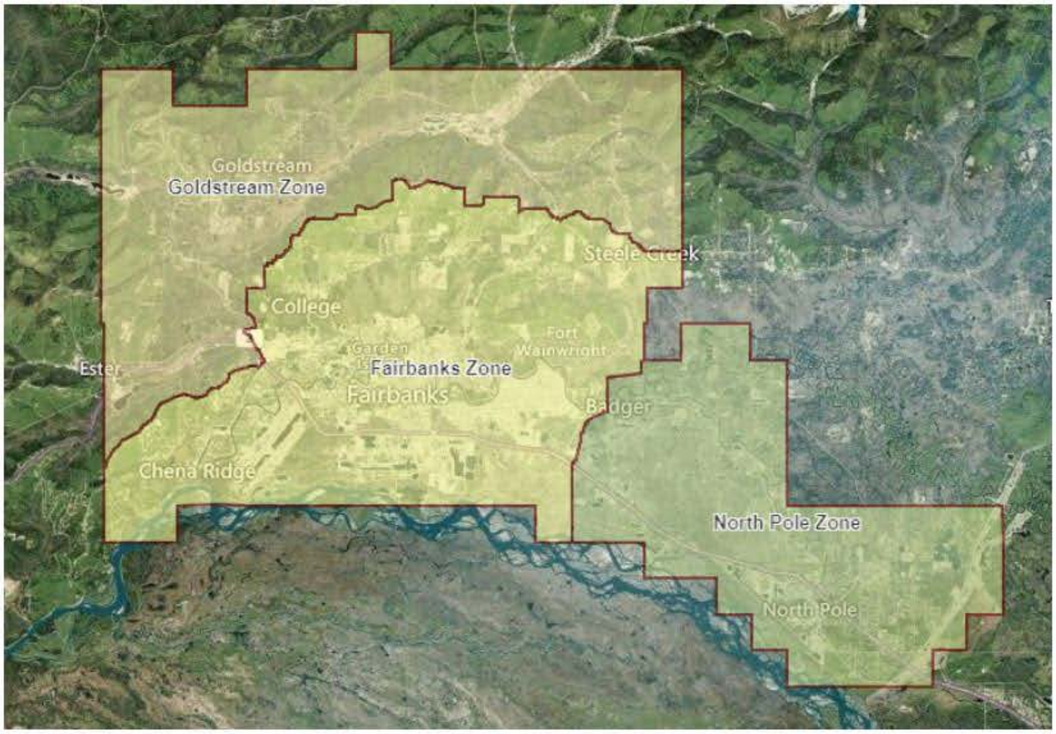


Figure 1-1 *Current 24-hour PM2.5 Nonattainment area separated into three "Air Quality Control Zones"*

The EPA rulemaking establishing the 24-hour $PM_{2.5}$ nonattainment area[16] included the following townships and ranges within the Fairbanks North Star Borough:

- MTRS F001N001W—All Sections;
- MTRS F001N001E—Sections 2–11, 14–23, 26–34;
- MTRS F001N002W—Sections 1–5, 8–17, 20–29, 32–36;
- MTRS F001S001E—Sections 1, 3–30, 32–36;
- MTRS F001S001W—Sections 1–30;
- MTRS F001S002E—Sections 6–8, 17–20, 29–36;
- MTRS F001S002W—Sections 1–5, 8–17, 20–29, 32–33;
- MTRS F001S003E—Sections 31–32;
- MTRS F002N001E—Sections 31–35;
- MTRS F002N001W—Sections 28, 31–36;
- MTRS F002N002W—Sections 32–33, 36;
- MTRS F002S001E—Sections 1–2;
- MTRS F002S002E—Sections 1–17, 21–24; and

[16] 74 Fed. Reg. 58688, 58702 (November 13, 2009).

- MTRS F002S003E—Sections 5–8, 18

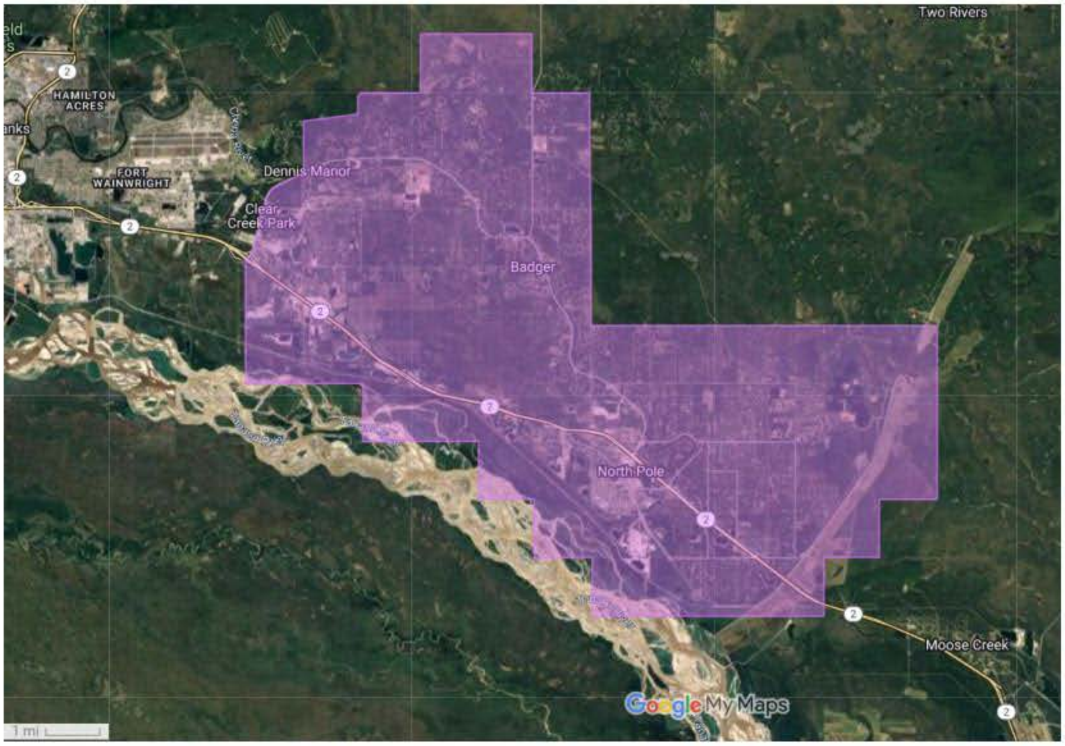


Figure 1-2 *North Pole Air Quality Control Zone.*

Within the larger nonattainment area, the formal boundary separating the Fairbanks and North Pole Air Quality Control Zones are as follows: [17, 18]

- Beginning at the northeast corner of MTRS F001S001E Section 10;
- Southwest to Hobgoblin lane;
- South along Hobgoblin Lane to its intersection with Prester John Drive;
- West along Prester John Drive to its intersection with Sonja Street;
- South along Sonja Street and continuing along the section line to its intersection with Badger Road;
- Southwest along Badger Road to its intersection with the northern border of MTRS F001S001E Section 21;
- West along the northern border to the northwest corner of MTRS F001S001E Section 21 NE ¼ NW ¼;
- South along the western border of MTRS F001S001E Section 21 NE ¼ NW ¼ to its intersection with Badger Road;

[17] SIP Amendment Vol. II: III.D.7.03, Nonattainment Boundary and Design Day Episode Selection (November 19, 2019), https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/.
[18] 40 CFR Part 52, 88 Fed. Reg. at 84674 (Dec. 5, 2023).

- South on Badger Road to its intersection with the western border of MTRS F001S001E Section 21; and
- South along the section line and ending at the section line's intersection with the southern nonattainment area border at the southwest corner of MTRS F001S001E Section 33.

Figure 1-3 shows the demarcation line between the Fairbanks and North Pole AQCZs based on these boundary descriptions.

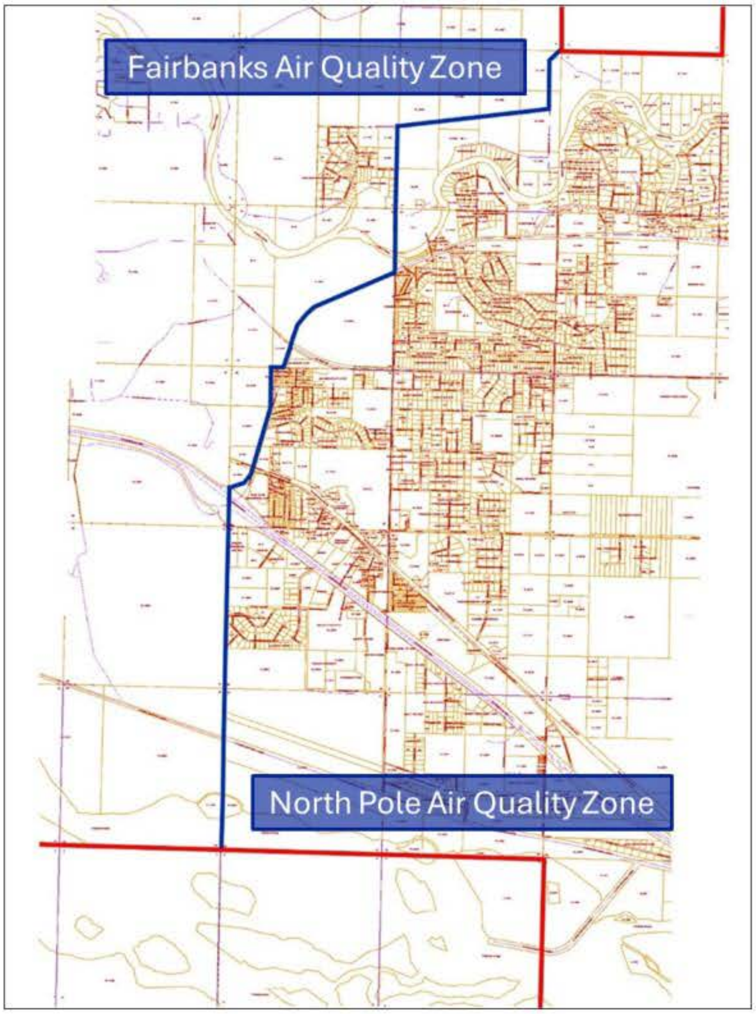


***Figure 1-3** Residential boundaries between Fairbanks and North Pole nonattainment zones.*

2. FACTOR 1- AIR QUALITY DATA

2.1 $PM_{2.5}$ Design Value Calculations

The 24-hour and annual $PM_{2.5}$ design values for areas represented by Alaska's $PM_{2.5}$ monitoring network are summarized in Table 2.1-1. Some of the locations were impacted by wildland fire smoke. For those areas DEC has calculated the design values excluding exceptional events. The exceptional events waiver request documents for the 2022 and 2023 wildland fire seasons can be found on the DEC website, (https://dec.alaska.gov/air/air-monitoring/guidance/exceptional-events/).

***Table 2.1-1** Design values excluding wildfire smoke exceptional events across Alaska*

$PM_{2.5}$ Monitoring Sites	98th Percentile			Weighted Annual Mean			2023 Design Value	
	2023	2022	2021	2023	2022	2021	24-hour	Annual
Anchorage	14.2	24.0	18.7	4.2	4.9	6.0	19	5.1
Matanuska-Susitna Valley	17.5	21.2	21.2	4.1	4.4*	4.4	25*	5.2*
Fairbanks NCore	20	27.5	29.1	6.4	6.7	8.0	26	6.9
Fairbanks A Street	27.8	24.2	34.1**	7.4	6.7	8.9**	27**	7.5**
North Pole Hurst Rd	51.9	51.2	65.5	9.5	8.3	11.8	56	9.5
Juneau	16.8	23.0	17.1	5.3	5.3	4.7	19	5.1

* Maximum value substitutions applied due to data completeness criteria not being met. Substitutions were performed according to the procedures outlined in 40 CFR Part 50, Appendix N, § 4.2 (c) (i) and § 4.1 (c) (ii).

** Annual values did not meet data completeness criteria. This value is preliminary and subject to the maximum value substitution test as outlined in 40 CFR Part 50, Appendix N. A Street DVs cannot be officially calculated until 2024 monitoring data has been collected and verified.

Table 2.1-1 shows data for the metropolitan area of the state. DEC operates two State and Local Air Monitoring Station (SLAMS) sites in the Anchorage Metropolitan Statistical area, which includes the Municipality of Anchorage and the Matanuska-Susitna Borough. There are three SLAMS sites in the Fairbanks North Star Borough and one site in the City and Borough of Juneau.

As can be seen in the table above, only the North Pole monitor exceeds the 2024 annual design value (DV) of 9 $\mu g/m^3$. The site is the maximum impact site for the 24-hour average $PM_{2.5}$ nonattainment area. The nonattainment area is split into three air quality control zones, the North Pole, Fairbanks and Goldstream air quality zones. There are two additional monitoring sites in the Fairbanks air quality zone, the NCore and A-Street sites. The A-Street site is considered the maximum impact site for the Fairbanks air quality zone. Monitoring sites in Fairbanks and North Pole are shown in Figure 2.1-1.

DEC experienced some disruption of the normal monitoring process during the COVID-19 pandemic in 2021. During the first quarter of 2021 DEC reported less than 50% data capture for the A-Street SLAMS monitor to the EPA AQS database. While the instruments operated as normal, there was insufficient documentation to guarantee that all quality assurance and control procedures had been observed. DEC decided to flag the data as invalid so as not to bias future regulatory action. With data capture below the required threshold of 50%, no design value can be calculated for periods that include the calendar year 2021. Therefore, the earliest design value for this site will be available for 2024. A later review of the collected data and instrument performance indicates that the instruments continued to perform within the normal operating range. DEC concluded that the collected data is of sufficient quality for weight of evidence purposes and is therefore included in this analysis.

Figure 2.1-1 *Monitoring sites located in Fairbanks and North Pole.*

2.1.1 $PM_{2.5}$ Air Quality in Fairbanks and North Pole

Initial air quality monitoring in the FNSB for the 24-hour $PM_{2.5}$ nonattainment area was conducted by FNSB staff until September of 2016, when DEC assumed all monitoring activities. The 24-hour

$PM_{2.5}$ nonattainment area was designated based on data from the only SLAMS monitor in the FNSB, the State Office Building site. To better understand the air quality problem, FNSB staff conducted mobile and short-term monitoring in various portions of the nonattainment area and established a long-term site in North Pole. The Hurst Road monitoring site was established in North Pole as the maximum impact site for the 24-hour average $PM_{2.5}$ nonattainment area. Due to increased understanding of air quality in the area, the nonattainment area was split into three air quality zones: Goldstream, Fairbanks, and North Pole zones. Within the Fairbanks area, the 24-hour average $PM_{2.5}$ design value for the NCore site has been below the standard since 2015, when exceptional events due to wildland fire smoke are excluded from the calculations (Table 2.1-2). Due to these observations, DEC established a maximum impact site for the Fairbanks air quality zone, the A-Street monitoring site, in 2018.

During the COVID-19 pandemic, DEC experienced some disruption of the normal monitoring process, specifically at the A-Street site. During the first few months of 2021, DEC staff observed social distancing practices, which caused some interference to normal site operations. While the routine data review indicated that all QA/QC processes were conducted, some of the documentation could not be independently verified. DEC flagged the data during this time as invalid, which resulted in a data capture rate of below 50% for the first quarter of 2021. Based on 40 CFR Part 50 Appendix N, no substitution is allowable for those quarters and therefore no official design value can be calculated. The earliest DV can be calculated using calendar years 2022-2024. A later review of the Quarter 1 collected data in 2021 and instrument performance indicates that the instruments continued to perform within the normal operating range. DEC concluded that the collected data is of sufficient quality for weight of evidence purposes and is therefore included in this analysis. The data for the 1st quarter of 2021 is included in the accompanying document: Appendix A.

Table 2.1-2 *Design values excluding wildfire smoke exceptional events in the FNSB nonattainment area*

Calendar years 2021-2023	**Fairbanks Air Quality Zone**	**North Pole Air Quality Zone**
24-hour $PM_{2.5}$ design value	27*	56
Annual $PM_{2.5}$ design value	7.5*	9.5

Note: Exceedance exceptional event values not included.
* Data from Fairbanks Air Quality Zone A-St monitoring site. *Due to QA issues in the first Quarter of 2021, official data capture at the site was below 50% and insufficient data exist for calculating design values. . The information provided here is intended for weight of evidence discussion.*

2.1.2 Seasonal Differences in Concentration

$PM_{2.5}$ concentrations in the Interior of Alaska follow a seasonal trend; typically, spring, summer and early fall are characterized by clean ambient air, with the exception of wildland fire smoke impacts, while the winter months (October to March) show higher daily concentrations into the moderate to unhealthy range depending on location. Wildland fires are a frequent occurrence in the Interior of Alaska, with a typical wildfire season starting in late May and continuing into August. Monitoring data for the past 20 years underscore these trends, with daily concentrations in the summer months in the lower single digits, unless impacted by wildland fire smoke. DEC has posted annual graphs for Fairbanks back to 2000 (https://dec.alaska.gov/air/air-monitoring/alaska-concerns/community-data/fairbanks-stateofficebldg-ncore-pm25-data/) and for North Pole back to 2015 on its website (https://dec.alaska.gov/air/air-monitoring/alaska-concerns/community-data/northpole-pm25-data/). The shoulder seasons experience higher concentrations typically when temperatures drop below freezing and inversions trap pollution close to the ground.

The same trends are depicted below. Figure 2.1-2 shows the timeseries of daily $PM_{2.5}$ concentrations for 2021 to 2023 at the two Fairbanks monitoring sites, while Figure 2.1-3 shows the North Pole Hurst Road concentrations for the same years.

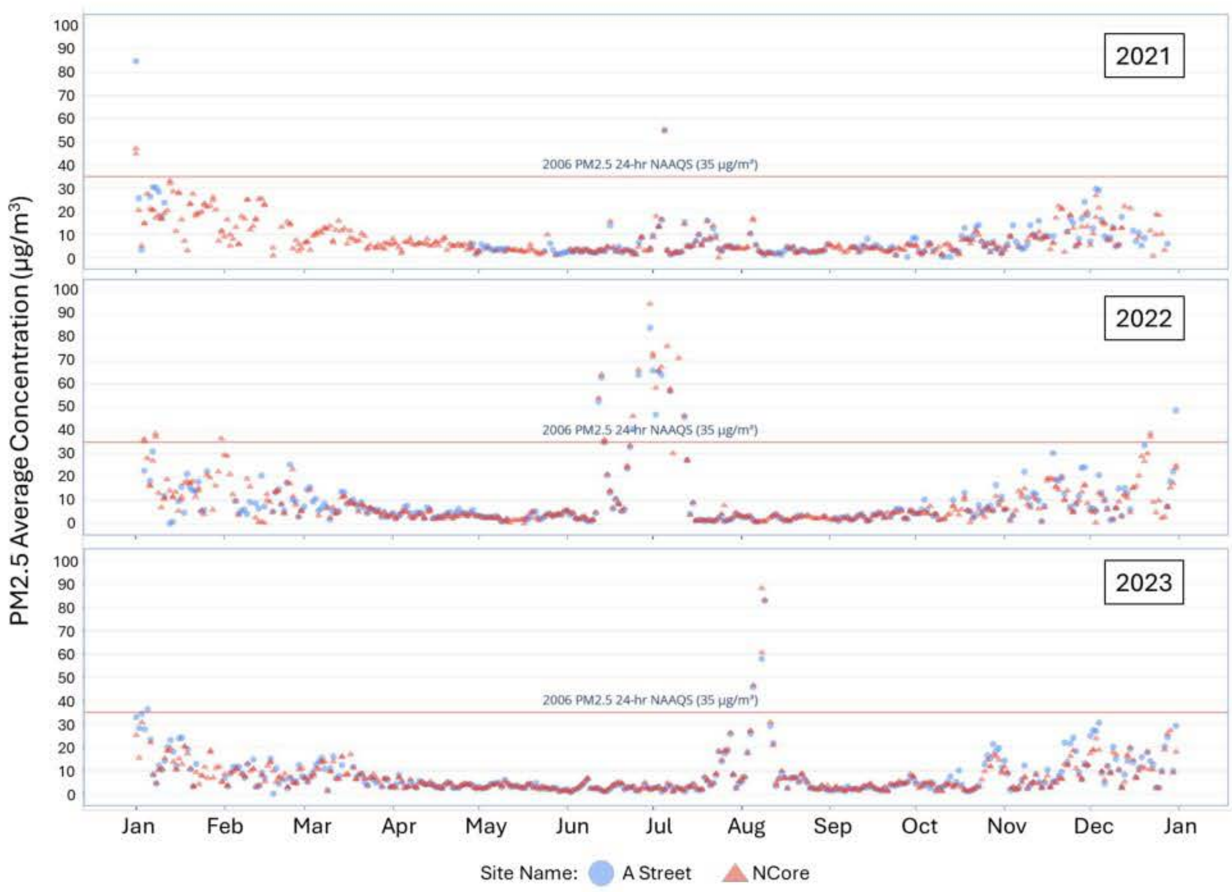


Figure 2.1-2 *Timeseries of Fairbanks daily $PM_{2.5}$ concentration in 2021-2023. The red triangles denote data from the NCore site, the blue dots represent A-Street monitoring site data.*

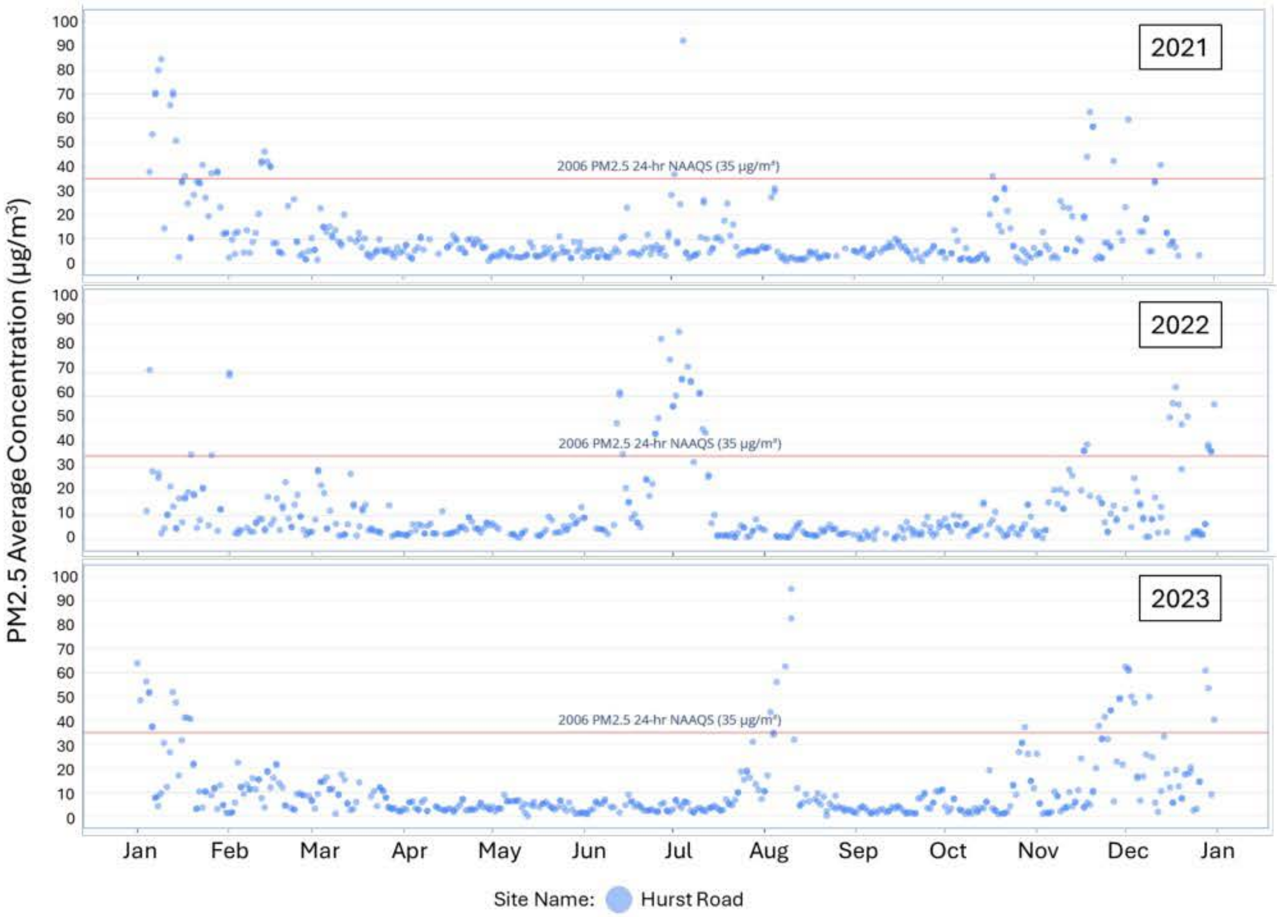


Figure 2.1-3 *Timeseries of North Pole daily $PM_{2.5}$ concentration in 2021-2023. The blue dots represent Hurst Road site monitoring data.*

The timeseries plots show that $PM_{2.5}$ concentrations follow a similar pattern for all sites and years. The beginning of each year is dominated by high concentrations, then followed by low springtime concentrations. In summer months during the last three years, wildland fire smoke impacted all three sites. The concentration outside of the smoke impact are low in the fall and then increase again towards the end of the year, as wintertime inversions coupled with wood heating emissions cause $PM_{2.5}$ concentrations to rise.

The $PM_{2.5}$ concentrations in the Fairbanks and North Pole areas are highly impacted by inversion events. During winter, the high daily concentrations lead to elevated quarterly concentration for Q1 and Q4, while the daily concentrations for the rest of the year are in the single digits, unless the area experiences wildland fire smoke. Table 2.1-3 shows the quarterly concentrations for the calendar years 2021 through 2023 for the three monitoring sites in Fairbanks and North Pole. The numbers in parentheses are quarterly averaged concentrations excluding days with wildfire flags. When wildfire impacted data is excluded, the quarterly averaged concentration for North Pole is 4.5 $\mu g/m^3$ for Q2 and 3.8 $\mu g/m^3$ for Q3. In Fairbanks the average concentration for Q2 and Q3 range from 3.4 to 3.6 $\mu g/m^3$. (As explained later in Section 3, these quarterly differences in ambient concentrations are driven almost exclusively by wildfire and prescribed fire emissions, which peak in Q2 and Q3, coupled with greater air flow and the lack of inversions in these quarters.

The non-winter quarterly concentrations are well below the annual standard of 9 $\mu g/m^3$.

As mentioned above, the A-Street site experienced low data capture in the first quarter of 2021. The data in the table below for Q1 2021 is for weight of evidence use only. The data had been reported as nullified in AQS, because there was insufficient data to prove that the monthly required Quality Assurance (QA) checks had been conducted. The instrument performed normally during this timeframe and QA checks before and after Q1 are within the required ranges.

For the two Fairbanks sites, no daily 24-hour average concentrations were measured above 9 $\mu g/m^3$ between April 1st to September 31st in 2021 to 2023 unless the sites were impacted by wildland fire smoke. In North Pole, only nine days were measured above 9 $\mu g/m^3$ between April 1st to September 31st in 2021 to 2023 outside of the wildland fire season, out of which the three days in September were associated with slash burning and the remaining six occurred in April and were associated with nighttime inversions and most likely related to home heating emissions[19]. The data clearly indicates that non wildfire smoke impacted non-winter concentrations in the FNSB do not contribute to an exceedance of the annual $PM_{2.5}$ standard.

Table 2.1-3: *Quarterly averaged $PM_{2.5}$ from 2021 -2023 in the FNSB*

Hurst Rd, North Pole							
	Q1	Q2	Q3	Q4	Annual	DV	# days impacted by wildland fire smoke
2021	20.7	5.8 (5.0)	8.2 (4.3)	12.8	11.9 (10.7)		28
2022	11.8	12.8 (4.8)	12.9 (3.2)	13.3	12.7 (8.2)		28
2023	14.6	3.8	12.5 (3.8)	15.8	11.7 (9.5)	**12.1 (9.5)**	20
Averages		4.5	3.8				
A-St, Fairbanks							
	Q1	Q2	Q3	Q4	Annual	DV	# days impacted by wildland fire smoke
2021	**17.7**[1]	3.5 (3.3)	5.5 (4.5)	8.7	8.9 (8.6)		11
2022	9.6	13.2 (3.7)	10.9 (2.7)	***10.6***	11.1 (6.7)		28
2023	11.2	3.3	9.6 (3.5)	10.1	8.6 (7)	**9.3 (7.5)**	16
Averages		3.4	3.6				
NCore, Fairbanks							
	Q1	Q2	Q3	Q4	Annual	DV	# days impacted by wildland fire smoke
2021	13.8	4.2 (4.0)	5.4 (3.8)	8.3	7.9 (7.5)		12
2022	11.7	12.7 (3.1)	11.3 (2.6)	9.4	11.3 (6.7)		27
2023	9.8	3.2	11.8 (3.7)	8.8	8.4 (6.4)	**9.2 (6.9)**	16
Averages		3.4	3.4				

[1] Data with QA flag used for weight of evidence purposes only.

[19] Personal communication, DEC Monitoring Staff, September 2024.

DEC is in the process of developing the Exceptional Events Waiver Request for EPA review and approval for all wildland fire smoke impacted days in 2022 and 2023 in Fairbanks and North Pole. The data impacted by wildland fire smoke in the Fairbanks/North Pole nonattainment area during the 2022 and 2023 wildland fire season can be found in the accompanying document: Appendix A. DEC will request exclusion of 29 days in 2022 and 21 days in 2023. A full discussion of the exceptional events can be found at https://dec.alaska.gov/air/air-monitoring/guidance/exceptional-events/.

2.2 Chemical Speciation

2.2.1 Introduction

The air quality data available to analyze includes two super-SASS[20] speciation monitors in the FNSB nonattainment area, they are co-located with a Federal Reference Method (FRM) monitor at Hurst Road and NCore.[21] The third monitor, A-Street, uses speciation from NCore and a local FRM monitor. An analysis of speciation for all three monitor locations is discussed below, including a description of the methodology used to create speciation plots and a seasonal comparison for wintertime (quarters 1 and 4) and summertime (quarters 2 and 3) speciation. For all three monitors, wintertime averages for quarter 1 and 4 are above the annual standard due to strong wintertime inversions and cold temperatures trapping pollutants near the ground. The speciation for $PM_{2.5}$ in the winter is well studied from analysis done for the 24-hr $PM_{2.5}$ nonattainment area[22]. The components of $PM_{2.5}$ in the Fairbanks area are organic carbon (OC), elemental carbon (EC), sulfate (SO_4), nitrate (NO_3), ammonium (NH_4), other primary particulates (OPP) and lastly particle bound water (PBW) associated with the filter and the blank that must be accounted for to have the speciation filter equal the FRM filter. The process to make the filters equal and speciate the FRM $PM_{2.5}$ data is an EPA method that was followed and approved in the $PM_{2.5}$ 24-hr SIPs is called sulfate, adjusted nitrate, derived water, inferred carbonaceous material balance approach (SANDWICH.)[23,24]

[20] Met One Instruments: Speciation Air Sampling System.

[21] https://dec.alaska.gov/media/kmrfthes/adec_2024-annual-network-plan_final_20240627.pdf

[22] ADEC, Amendments to: State Air Quality Control Plan, Vol. II: III.D.7.8, Modeling at III.D.7.8, https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-2024-amendment-serious-sip/

[23] US EPA, 2017, Modeling Guidance for Demonstrating Air Quality Goals for Ozone, PM2.s and Regional Haze chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf

[24] Frank NH. Retained nitrate, hydrated sulfates, and carbonaceous mass in federal reference method fine particulate matter for six eastern U.S. cities. J Air Waste Manag Assoc. 2006 Apr;56(4):500-11. doi: 10.1080/10473289.2006.10464517. PMID: 16681214.

2.2.2 Methodology

Figures 2.2-1 through 2.2-6 exhibit the per-site species fraction and average concentrations for each quarter over 2021-2023. Each monitor has four plots, representing each of the four quarters (e.g. Hurst Q1 2021-2023, Hurst Q2 2021-2023, etc.). The R programming language was used to perform the analysis, and SANDWICH was used to correct for inherent differences in the measurement process. The SANDWICH algorithm and R scripts mirror the Excel spreadsheet developed by ADEC for the 24-hour Serious SIP[25].

First, two datasets containing speciation and FRM data for the entire country from 2021-2023 were downloaded from the EPA tool AirData and imported into the R development environment RStudio.[26] Next, the data was cleaned to produce a dataset that contained the data required for the analysis. The variables and EPA parameter codes required to produce the SANDWICH analysis are as follows:

- $PM_{2.5}$ (88101)
- Ammonium Ion (88301)
- Nitrate (88306)
- Sulfate (88403)
- Organic Carbon TOR (88320)
- Elemental Carbon TOR (88321)
- Calcium (88111)
- Silicon (88165)
- Titanium (88161)
- Iron (88126)

The EPA parameter codes have only one method for each component except for the organic carbon which have two methods. The organic carbon method used in the analysis was Total Organic Reflectance (TOR), which is appropriate for the type of filter in the monitor. The SANDWICH algorithm was then applied to each day that contained both speciation and FRM data. This produced a dataset that contained corrected speciation data for every 3 days over the time span, except where data could not be collected or verified. Exceptional events (EEs) and fire days were compared to the SANDWICH dataset, so that each entry in the new dataset had a flag describing whether that day had been an exceptional event.

Each quarter's average $PM_{2.5}$ for the years 2021-2023 was computed using the data from Table 2.1-3. The data from each monitor and these quarterly average $PM_{2.5}$ values were passed through a statistics function that followed the annual standard guidance from the EPA to produce species fractions and concentrations for each quarter. These values were then plotted using the R package ggplot2 to produce Figures 2.2-1 through 2.2-6. The following symbols were used to represent the different species of $PM_{2.5}$:

[25] SIP Section III.D.7.08. https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/.

[26] https://aqs.epa.gov/aqsweb/airdata/download_files.html

- EC: Elemental Carbon
- NH4r: Ammonium Ion
- NO3: Nitrate
- OC: Organic Carbon
- OPP: Other Primary Particulates
- PBW: Particle Bound Water
- SO4: Sulfate

Hurst Road (North Pole)- Winter

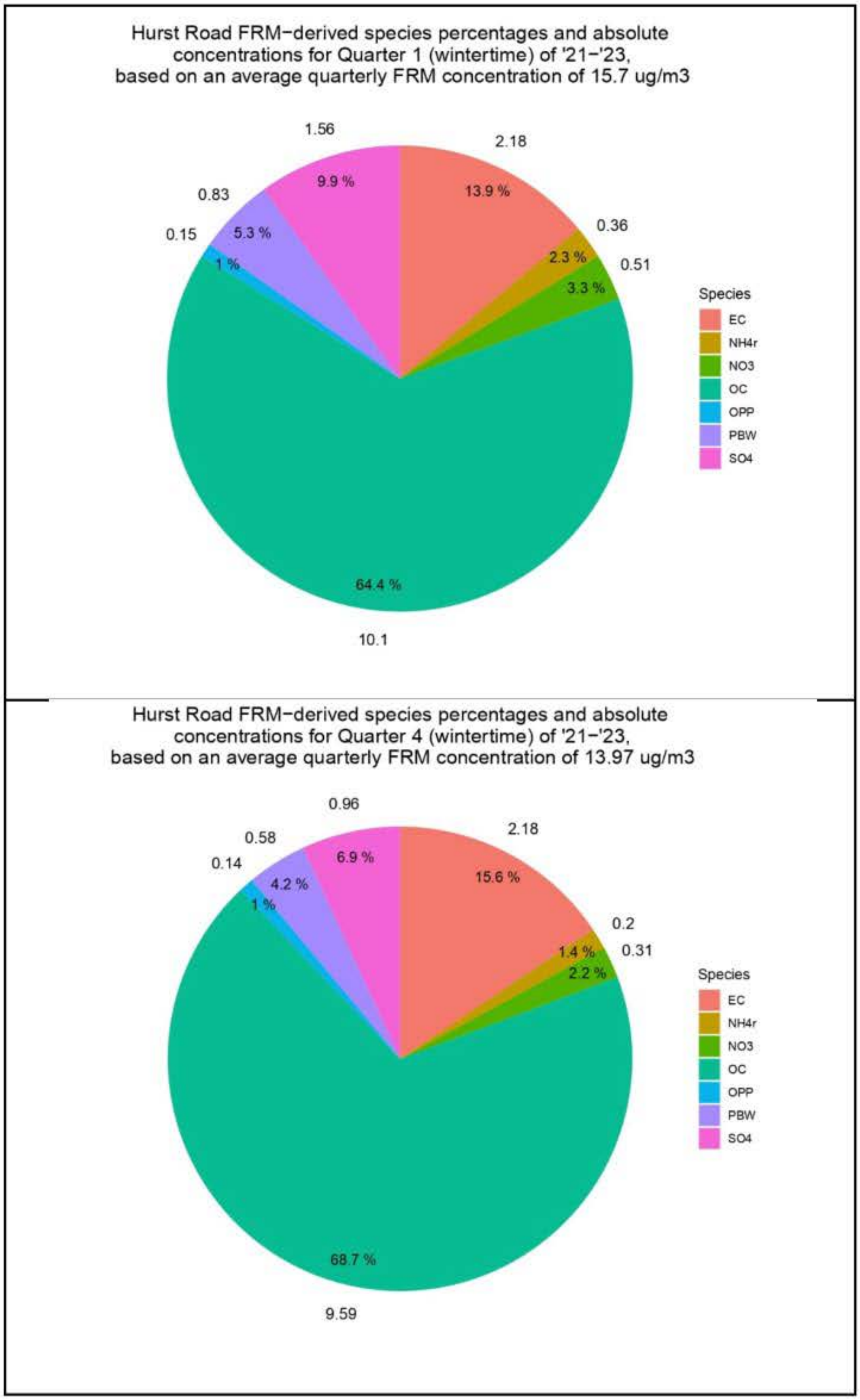
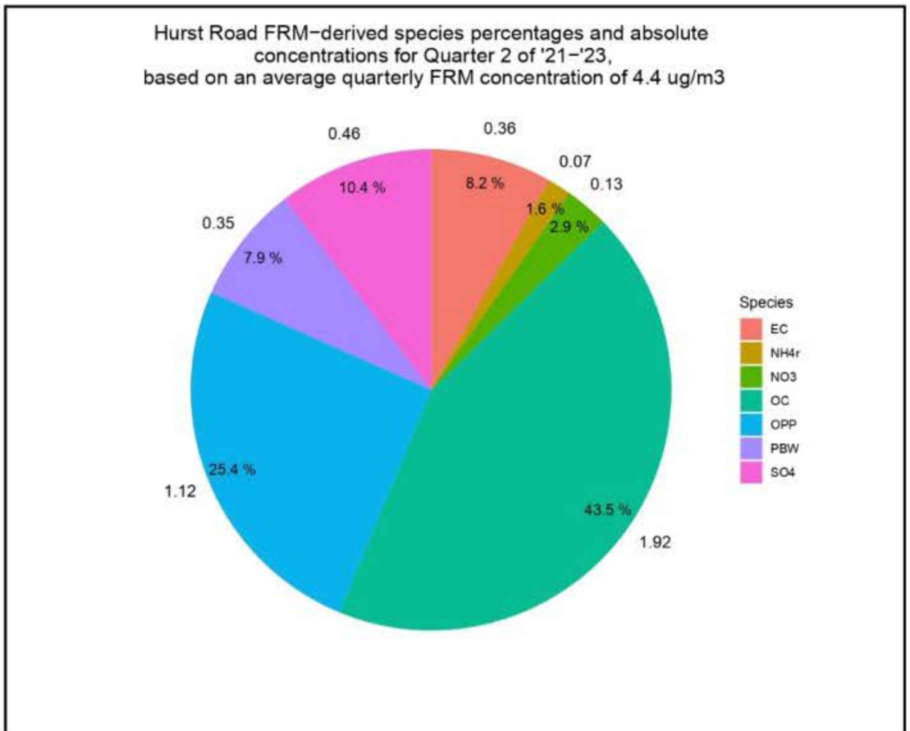


Figure 2.2-1: *Hurst Road (North Pole) FRM-derived species percentages and absolute concentrations (located beside species type, $\mu g/m^3$) for Quarters 1 and 4 of years 2021-2023, based on a quarterly FRM average for all three years for each quarter. Quarters 1 and 4 represent wintertime months.*

Hurst Road (North Pole)- Summer



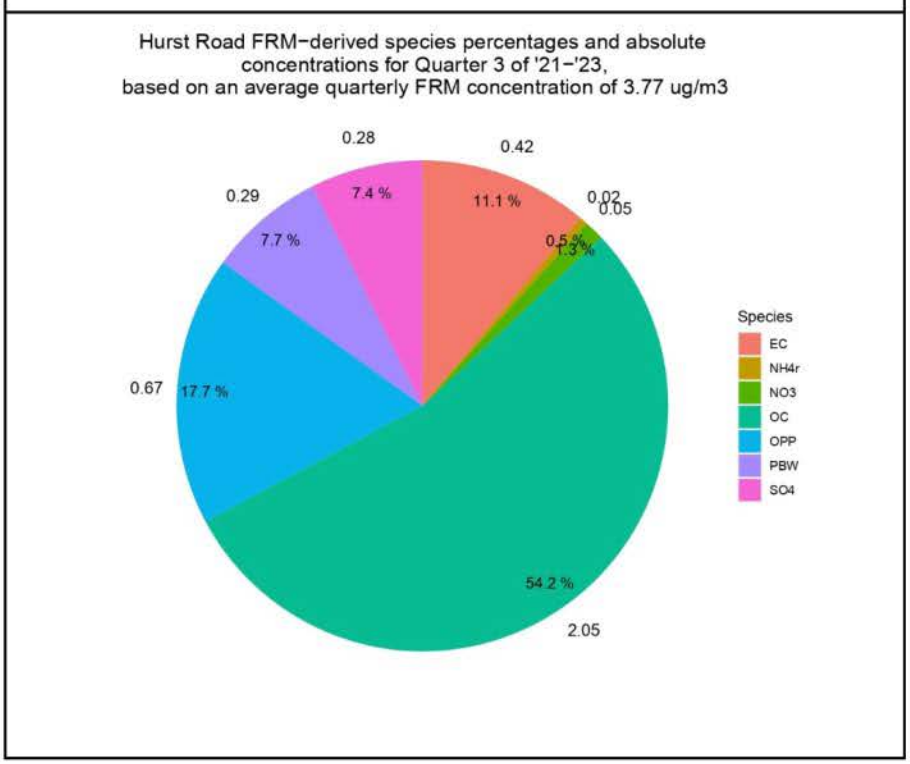


Figure 2.2-2: *Hurst Road (North Pole) FRM-derived species percentages and absolute concentrations (located beside species type, $\mu g/m^3$) for Quarters 2 and 3 of years 2021-2023, based on a quarterly FRM average for all three years for each quarter. Quarters 2 and 3 represent summertime months.*

NCore (Fairbanks)- Winter

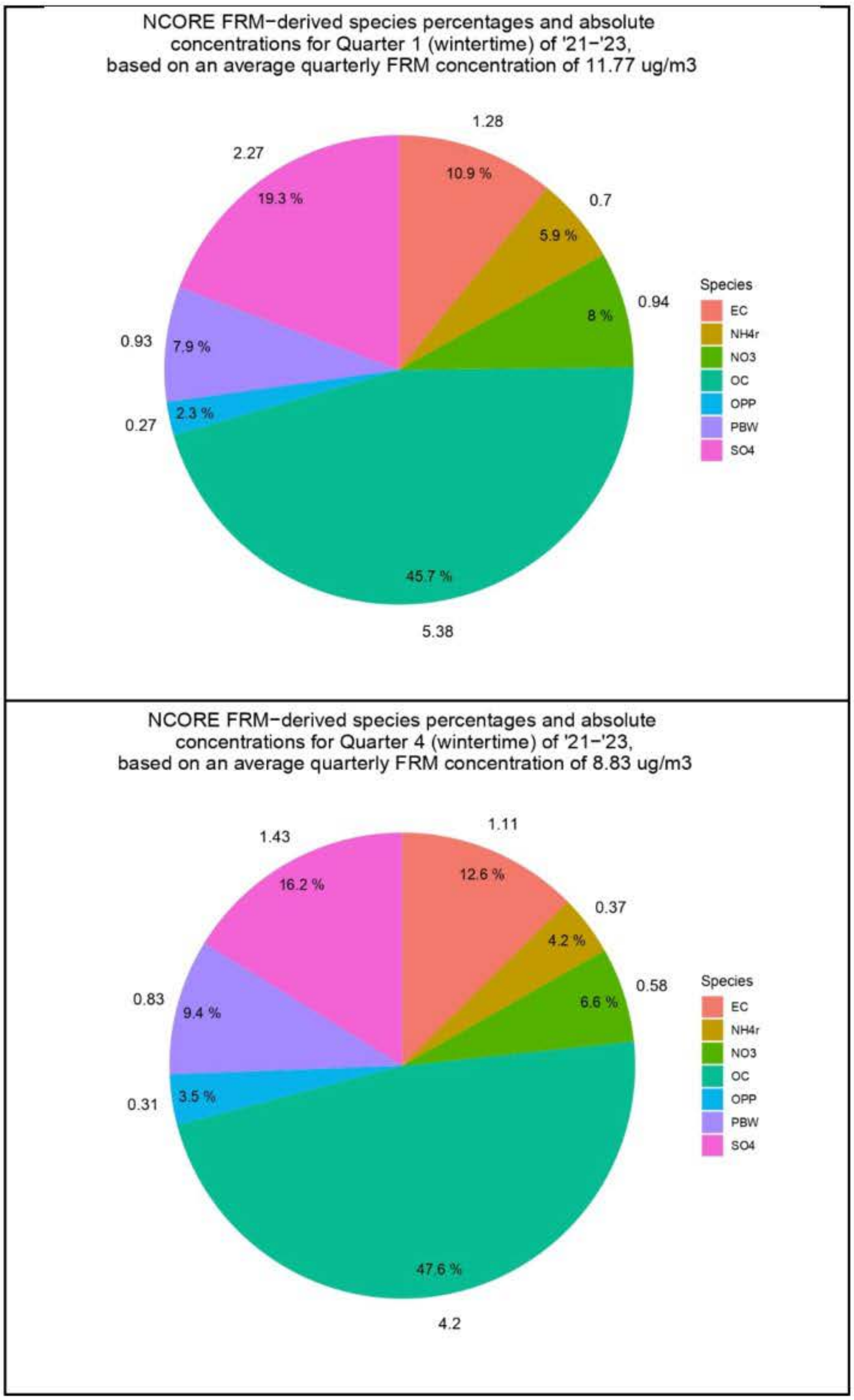
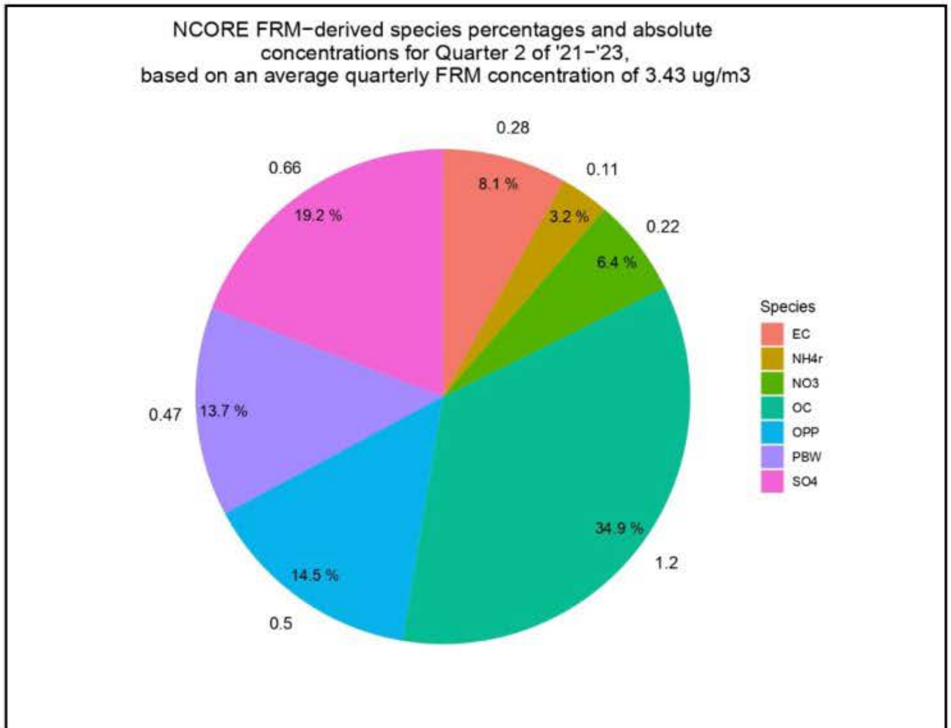


Figure 2.2-3: *NCore (Fairbanks) FRM-derived species percentages and absolute concentrations (located beside species type, $\mu g/m^3$) for Quarters 1 and 4 of years 2021-2023, based on a quarterly FRM average for all three years for each quarter. Quarters 1 and 4 represent wintertime months.*

NCore (Fairbanks)- Summer



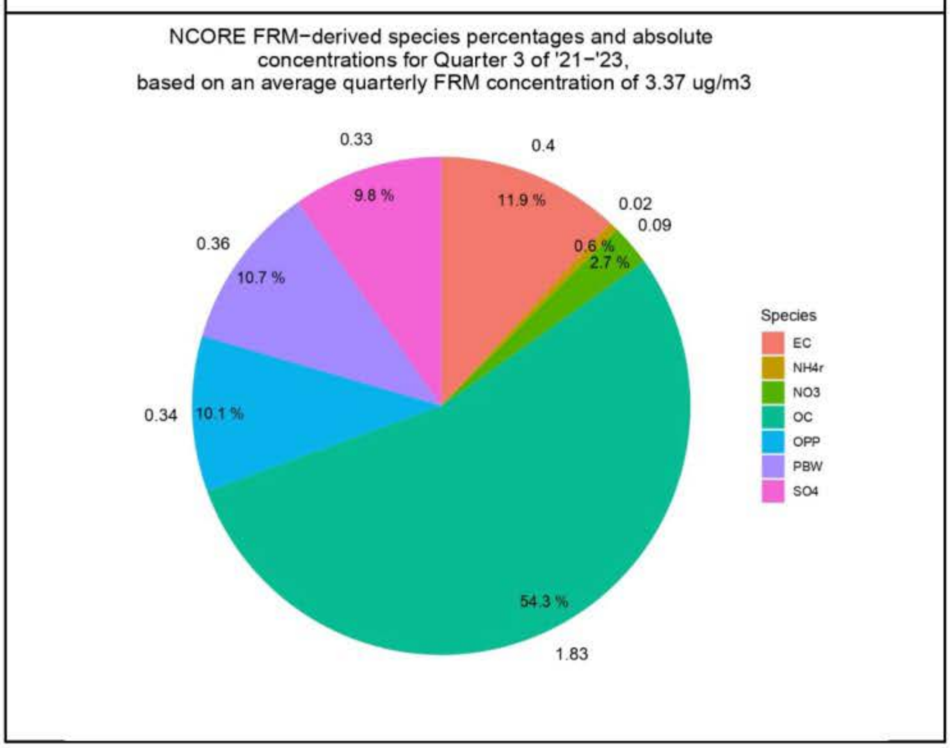


Figure 2.2-4: *NCore (Fairbanks) FRM-derived species percentages and absolute concentrations (located beside species type, µg/m³) for Quarters 2 and 3 of years 2021-2023, based on a quarterly FRM average for all three years for each quarter. Quarters 2 and 3 represent wintertime months.*

A-Street (Fairbanks)- Winter

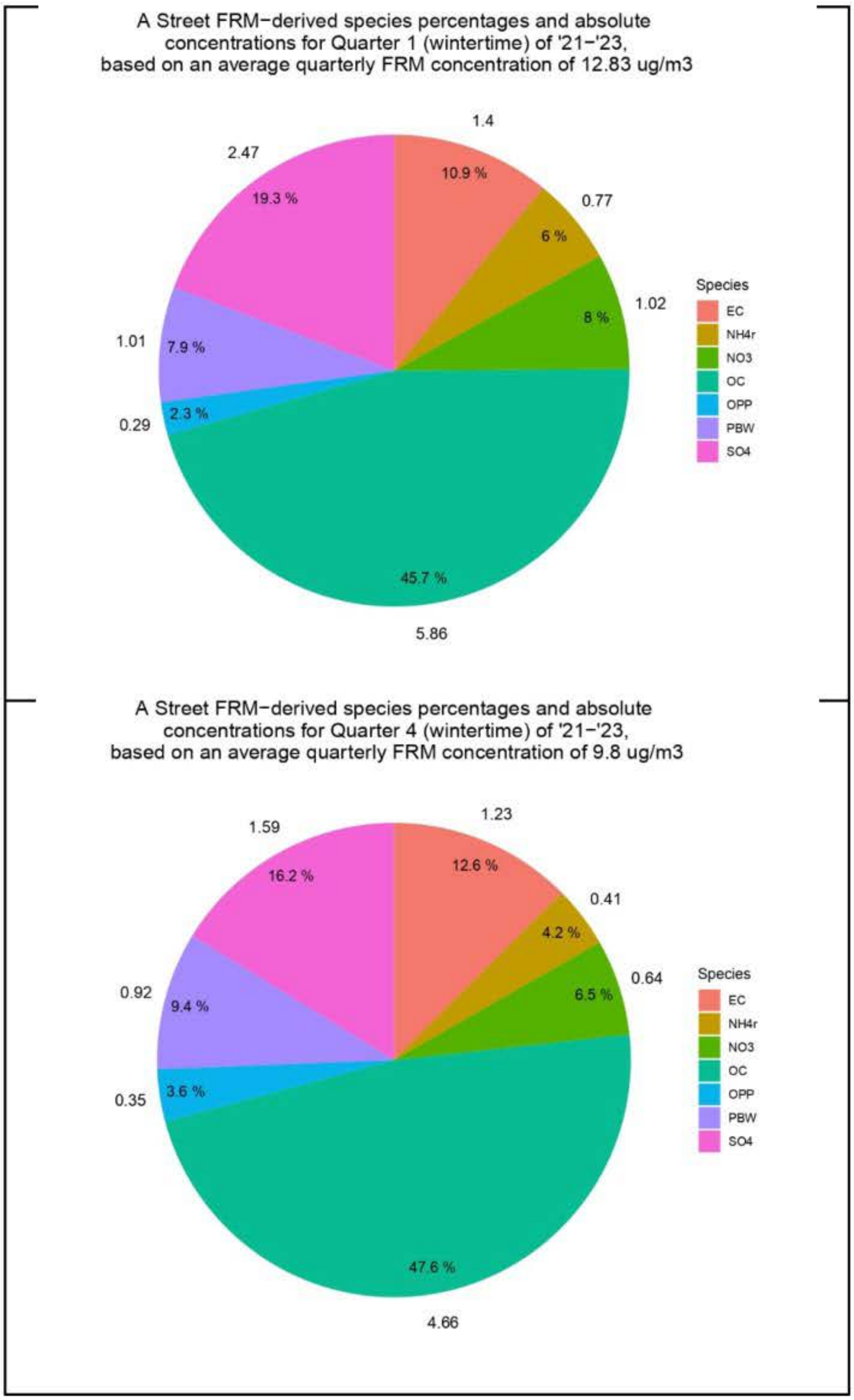


Figure 2.2-5 *A-Street (Fairbanks) FRM-derived species percentages and absolute concentrations (located beside species type, µg/m³) for Quarters 1 and 4 of years 2021-2023, based on a quarterly FRM average for all three years for each quarter. Quarters 1 and 4 represent wintertime months.*

A-Street (Fairbanks)- Summer

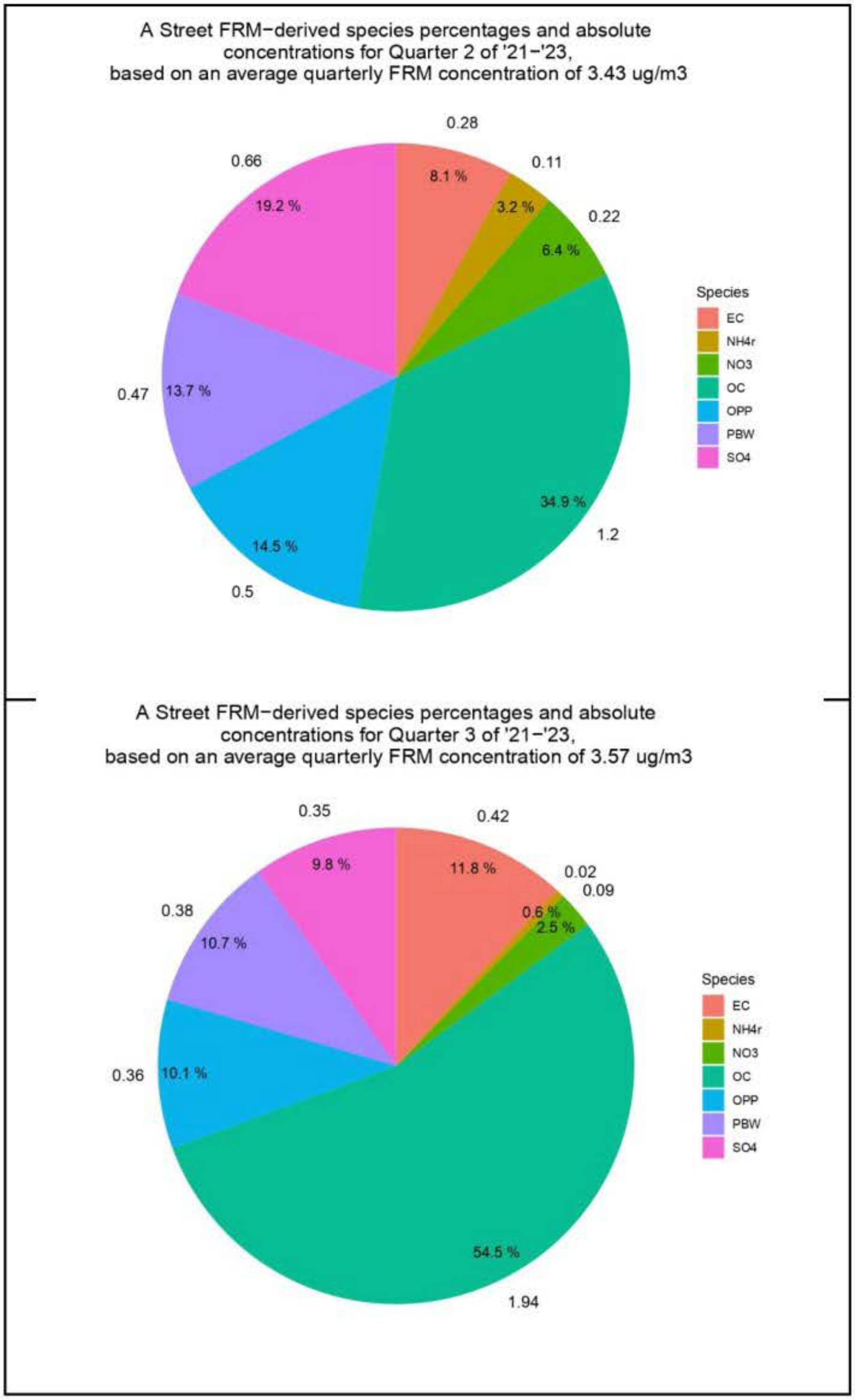


Figure 2.2-6 *A-Street (Fairbanks) FRM-derived species percentages and absolute concentrations (located beside species type, µg/m³) for Quarters 2 and 3 of years 2021-2023, based on a quarterly FRM average for all three years for each quarter. Quarters 2 and 3 represent summertime months.*

2.2.3 Speciation analysis

In order to characterize what contributes to the high $PM_{2.5}$ days for the annual standard > 9 µg/m³, the components of $PM_{2.5}$ are analyzed. All four quarters for years 2021-2023 are averaged for the winter and summer for the Hurst Road and NCore monitors in North Pole and Fairbanks, respectively. For both monitors, the averages of the summer quarters (Q2 and Q3) range between 3 and 5 µg/m³ and wintertime quarters (Q1 and Q4) range between 10 and 15 µg/m³. The largest contributing source sector to high $PM_{2.5}$ days in the winter is space heating (70% at the Hurst Road monitor in North Pole for years 2017-2021 high winter-time days), which includes wood stoves and fuel oil. The wood stove and fuel oil components of $PM_{2.5}$ are characterized by organic carbon and sulfate. The dominant species monitored at Hurst Road, NCore, and A-Street in wintertime months (Q1 and Q4) are organic carbon, elemental carbon, and sulfate (Figures 2.2-1 to 2.2-6). The speciation in the summer months (Q2 and Q3) is on average 48% organic carbon, similar in composition to Denali National Park monitor results (see Figure 2.3-3). The total organic carbon in winter months (Q1 and Q4) at the violating monitor in North Pole of 10 µg/m³ compared to 2 µg/m³ in the summer (Q2 and Q3). During the winter months when the average of $PM_{2.5}$ is 15 µg/m³, a majority of the exceedance is organic carbon.

The difference from winter to summer is a much larger fraction from other primary particulates (OPP) in the summer months at all three monitors. The OPP component makes up 12-15% of $PM_{2.5}$ in quarter 2 (April-June) and 6 - 9% in quarter 3 (July-September). These percentages are higher in summer months, but even higher in April through June from the long-range transport, a trend that is similar to the makeup of SOIL at Denali National Park throughout the year (Figure 2.3-3). The primary particulates in winter are very low at 2 - 4% of the $PM_{2.5}$ in the winter and one of the main seasonal differences. The other primary particulates (OPP = Si*3.72 + Ca*1.63 + Fe*2.42 + Ti*1.94) contain silica, calcium, iron and titanium and are generally associated with soil, road dust and long-range transport of dust from Asia[27]. The OPP fraction in the Fairbanks and North Pole areas speciation monitors is similar to SOIL in the IMPROVE monitors used for visibility in the Regional Haze plan (SOIL = 2.42*Fe+2.49*Si+1.94*Ti + 1.63*Ca). Overall, the summer months with increased OPP, the average total $PM_{2.5}$ is 3-5 µg/m³, and not in exceedance of the standard. The summer quarters 2 and 3 have the $PM_{2.5}$ components similar as winter, but at much lower concentrations. The portion of the sulfate in the summer is associated with background concentrations, modeling for the 24-hr standard shows the background for sulfate at 0.4 µg/m³ in the winter according to the EQUATES[28] model used for the background conditions[29]. In addition, the Denali monitor has been analyzed for the Regional Haze plan, [30]using back trajectory modeling, GEOSCHEM and photochemical grid modeling completed by EPA in 2016 and a

[27] https://dec.alaska.gov/air/anpms/regional-haze-planning/
[28] https://www.epa.gov/cmaq/equates
[29] III.D.7.09 Modeling Chapter, https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-proposed-serious-sip-amendments-2024/
[30] https://dec.alaska.gov/air/anpms/regional-haze/sip/

majority of the sulfate, up to 50% of $PM_{2.5}$ is attributed to long range transport of international pollution.

The wintertime speciation associated with quarters 1 and 4 are similar to the 24-hr $PM_{2.5}$ standard with high organic carbon and sulfate. The moderate and serious area state implementation plans for the 24-hr $PM_{2.5}$ standard and associated control strategies lower the $PM_{2.5}$ for the annual standard as well and therefore lower the absolute concentration of organic carbon and sulfate.[31,32]

[31] https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/, Section III.D.7.07
[32] https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-moderate-sip/, Section 5.07

2.3 Rural Contributions

This section aims to estimate the rural contribution to urban $PM_{2.5}$ concentration, measured at violating regulatory monitor sites, and thereby provide additional evidence to consider in deciding which nearby areas should be included in a designated nonattainment area. To establish background $PM_{2.5}$ concentration levels from regional sources, DEC employed the use of urban increment analysis released by EPA as well as additional aerosol data from monitors located in rural locations in Alaska. Aerosol data is collected by the Monitoring of Protected Visual Environment (IMPROVE) network, a multi-agency, nation-wide visibility monitoring network which began in support of the EPA's Regional Haze Rule (RHR). Each IMPROVE monitor is located in a Federal Class I area (CIA) in the state. These monitors exist in five areas: Denali National Park (Denali NP), Trapper Creek, Tuxedni Wildlife Area (WA), Simeonof WA, and Bering Sea WA (Figure 2.3-1 and Table 2.3-1). The monitor in closest proximity to the Fairbanks North Star Borough is located in Denali National Park, which lies approximately 90 miles southwest from the urban centers of Fairbanks and North Pole in the center of the Alaska Range. This monitoring unit will be used to broadly examine $PM_{2.5}$ in rural sources.

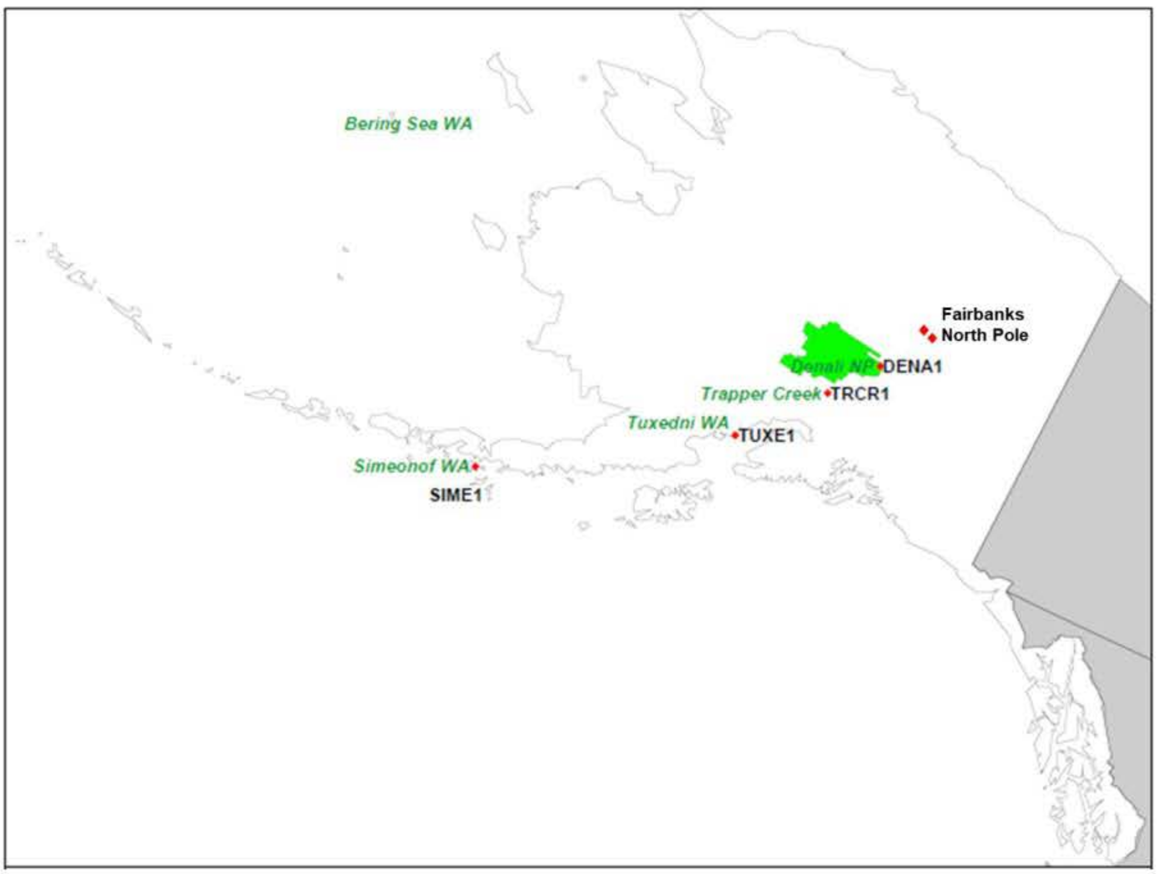


Figure 2.3-1 *Map of Federal CIAs and Representative IMPROVE Monitors in Alaska.*

Table 2.3-1 *Alaska CIAs and Representative IMPROVE Monitors*[33]

Class I Area	Representative IMPROVE Site	Latitude	Longitude	Elevation (m)
Denali NP	DENA1	63.72	-148.97	658
Simeonof WA	SIME1	55.33	-160.51	57
Tuxedni WA	TUXE1	59.99	-152.67	15
Bering Sea WA*	N/A			
Trapper Creek**	TRCR1	62.32	-150.32	155

*Federal Class I area with no IMPROVE monitoring site
**Not a Federal Class I area

Aerosol $PM_{2.5}$ concentration averages from Denali NP over a 24-year period are shown in Figure 2.3-2. Yearly averages in Denali between the years of 2021-2024 range from 0.71 – 2.99 µg/m^3. $PM_{2.5}$ concentrations between 2021 and 2023 do not exceed 2.0 µg/m^3, well below the 9.0 µg/m^3 standard.

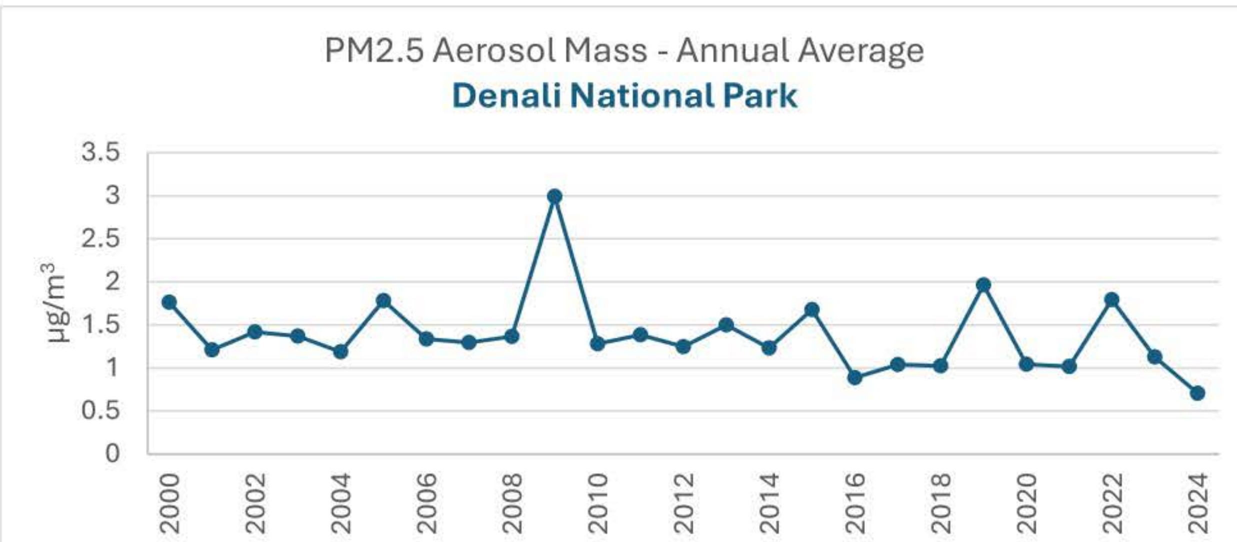


Figure 2.3-2 *Fine particulate matter (PM2.5) concentrations from Denali National Park over the years 2000 – 2024.*[34]

Urban increment analysis provided by EPA[35] uses annual $PM_{2.5}$ averages from Chemical Speciation Network (CSN) sites as well as IMPROVE monitors to estimate the regional contribution to urban $PM_{2.5}$ monitors. An "urban concentration" value is calculated by subtracting a regional $PM_{2.5}$ concentration from the nearest IMPROVE site (Denali NP) from that of the CSN monitors located in North Pole (Hurst Rd) and Fairbanks (NCore). The final urban concentration

[33] 2015 Regional Haze Progress Report. Volume III: Appendix III.K.10. https://dec.alaska.gov/air/anpms/regional-haze/sip.
[34] https://views.cira.colostate.edu/fed/

[35] https://www.epa.gov/particle-pollution-designations/particle-pollution-designations-memorandum-and-data-2024-revised#A

represents $PM_{2.5}$ concentrations without regional influence. In EPA's urban increment analysis, concentrations are speciated into chemical components of $PM_{2.5}$: ammonium sulfate, ammonium nitrate, organic mass, elemental carbon, and a crustal component. For purposes of viewing overall regional influence for the $PM_{2.5}$ mass, DEC summated EPA's speciated elements to represent total $PM_{2.5}$ urban increment. Totaled $PM_{2.5}$ urban increment concentrations are exhibited in Table 2.3-2. Average urban concentrations in Fairbanks are 6.75 $\mu g/m^3$ while average urban concentrations in North Pole are 9.65 $\mu g/m^3$, highlighting a low contribution from regional sources and clear differences between locations. DEC used EPA's urban increment analysis to observe overall regional influence on urban monitors, but carried out a more in-depth analysis on IMPROVE monitor chemical speciation in the following sections.

Table 2.3-2 *Urban increment analysis of North Pole and Fairbanks showing average annual $PM_{2.5}$ urban concentrations.*

	Average Annual $PM_{2.5}$ Urban Increment Analysis ($\mu g/m^3$)	
	Fairbanks	**North Pole**
CSN	7.62	10.58
IMPROVE	0.87	0.93
Urban Concentration	6.75	9.65

*Values are not a mass balance representation but are a totaled value from adding speciated components.

The chemical composition of $PM_{2.5}$ mass is measured by IMPROVE aerosol samplers; these monitors collect 24-hour integrated filter samples every third day. Each monitoring location operates four samplers designed to quantify aerosol species that are related to visibility impairment. The aerosol species collected for regional haze purposes include ammonium sulfate (AmmSO4), ammonium nitrate (AmmNO3), organic mass (OM), elemental carbon (EC), fine soil, coarse mass (CM), soil (SOIL) and sea salt. Time series plots showing daily mass budgets for aerosol speciation in Denali NP are exhibited in Figure 2.3-3. Examination of specific days throughout the 2021-2023 time period show that in Denali NP, there were zero days in 2021, eight days in 2022, and two days in 2023 that exceeded the annual NAAQS of 9.0 $\mu g/m^3$. Exceedances of the annual NAAQS only occur in the summer months and are directly correlated to exceptional events due to wildfires. Chemical composition of the $PM_{2.5}$ mass further supports this conclusion; suspended aerosol during these days is largely comprised of organic mass which is a byproduct of burning and transport of organic matter from wildfires (Figure 2.3-3). Aerosol concentration for all days outside of exceptional events between the years 2021-2023 are well below the annual NAAQS.

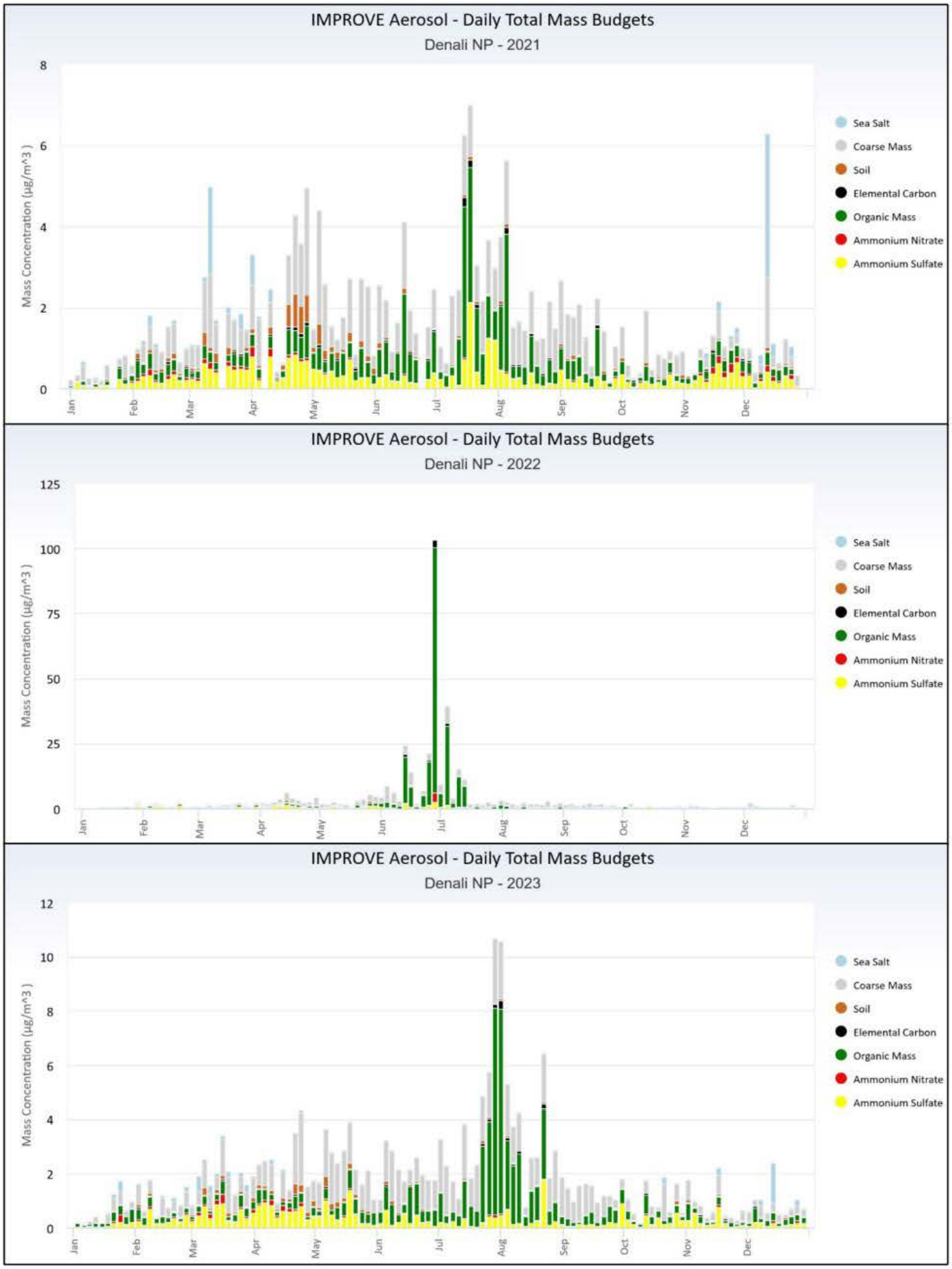


Figure 2.3-3 *Daily total mass budgets (in µg/m^3) at Denali National Park for the years 2021-2023.*

Additionally, speciation differences are evident between summer and winter months for the Denali Park IMPROVE monitor (Figure 2.3-4). Winter months are defined with high compositions of coarse mass (Q1 and Q4: 35%), ammonium sulfate (Q1: 24% and Q4: 22%) and organic mass (Q1: 20% and Q4: 22%). Summer months are defined with high compositions of organic mass (Q2: 48% and Q3: 47%) and coarse mass (Q2: 31% and Q3: 40%). The higher relative percentage of organic mass and, in part, coarse mass in Q3 at Denali NP's IMPROVE monitor is consistent with suspended organic particles due to wildfire activity. The higher percentage of sulfate during winter months is consistent with speciation studies in prior sections of this document (Section 2.2) and in analysis completed for the 24-hour $PM_{2.5}$ Serious SIP[36]. The similarity in speciation profiles between the FNSB area and Denali NP is expected due to similarity in summer and winter time events that affect both areas: wildfires in summer and space heating sources in winter.

It is not likely that pollution sources in Denali NP contribute towards the $PM_{2.5}$ concentrations measured in Fairbanks and North Pole due to separation by geographical features and wind patterns during days and seasons where the NAAQS are exceeded, most notably in the winter months. A more in-depth analysis on bulk transport due to wind transport during the winter months can be found in Factor 3: Meteorology.

In addition to rural contributions of $PM_{2.5}$ monitored by neighboring IMPROVE monitors, considerable effort has been given to understanding contributions of suspended pollutants from sources outside of Alaska in the Alaska Regional Haze State Implementation Plan.[37] Research shows that a portion of the measured $PM_{2.5}$ concentration in the state can be attributed to international sources; the state is heavily impacted by international emissions generated in the Russian Far East and Siberia, East Asia, Canada, and Europe, along with international marine traffic conducting trade between North America and Asia[38,39]. International anthropogenic emissions contribute 0.5 – 1.3 $\mu g/m^3$ (approximately 13% - 50%) to annual average $PM_{2.5}$ in Alaska, meaning that a portion of the measured $PM_{2.5}$ in the Fairbanks and North Pole areas, as well as at the Denali NP IMPROVE monitor, are subject to background contribution from international sources. $PM_{2.5}$ concentrations at monitors in these areas reflect this contribution.

[36] https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/
[37] https://dec.alaska.gov/air/anpms/regional-haze/, Second Implementation Period Combined SIP Section
[38] https://dec.alaska.gov/air/anpms/regional-haze/sip#appendices, Appendix III.K.13.I
[39] A representation of Alaska's geographic proximity to neighboring countries can be found in Appendix A, Section A3.

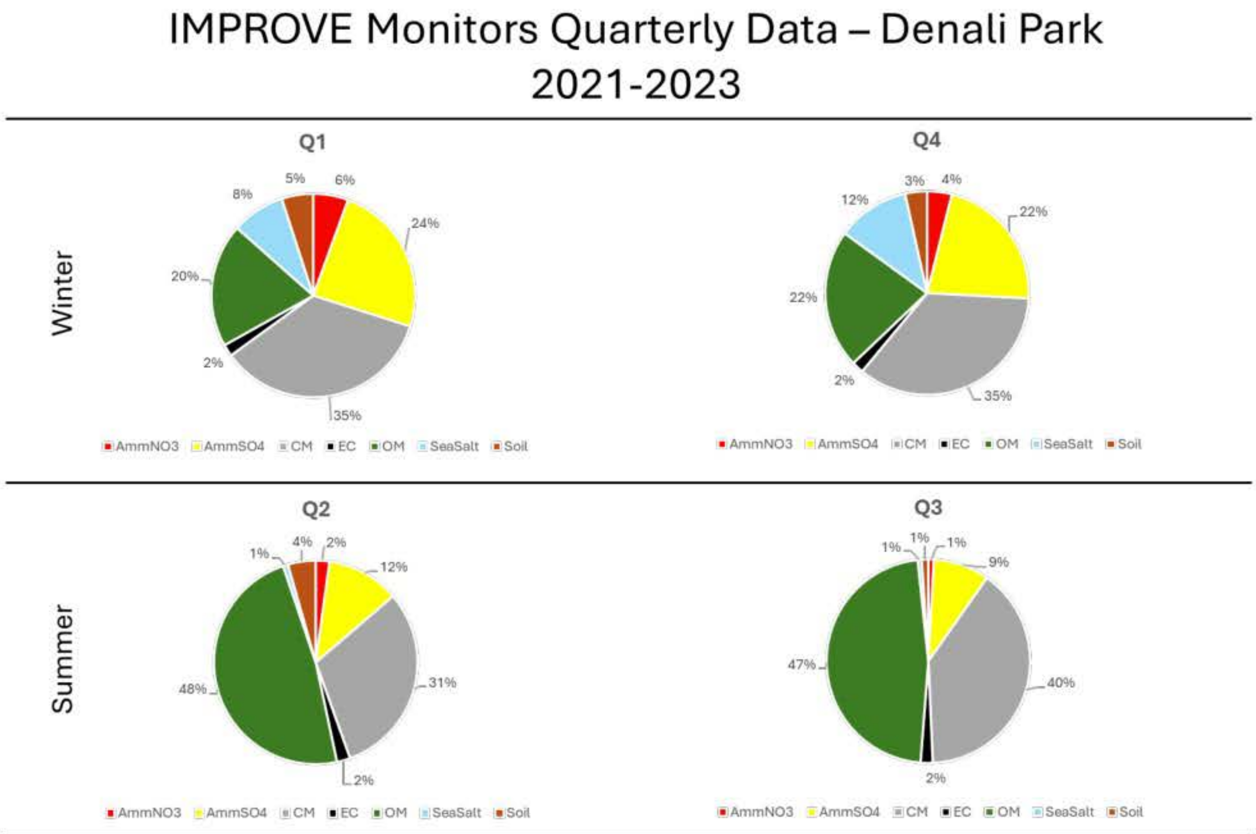


Figure 2.3-4: *Speciation percentages for the years 2021-2023 in Denali Park by quarter. Quarter 1 (Q1) represents monitored data from January 1 – March 31; Quarter 2 (Q2) represents from April 1 – June 30; Quarter 3 (Q3) represents July 1 – September 30; and Quarter 4 (Q4) represents October 1 – December 31. Q1 and Q4 signify "winter months" while Q2 and Q3 signify "summer months".*

2.4 Summary

Analysis of all $PM_{2.5}$ monitors throughout the state shows that North Pole is the only location in violation of the revised annual $PM_{2.5}$ NAAQS, with a design value of 9.5 $\mu g/m^3$ at its maximum impact site. The closest neighboring urban center is Fairbanks with design values of 7.5 and 6.9 $\mu g/m^3$ at its monitoring units. Seasonal data at all sites are similar; high concentrations of $PM_{2.5}$ are evident during the winter months but not during summer months. Exceptional events are taken into account during summer months at all three sites and are due to the occurrence of wildfires.

Chemical speciation profiles echo the seasonal differences observed from monitoring results. Winter $PM_{2.5}$ mass consists mostly of organic carbon, elemental carbon and sulfate, due to emissions from space heating; wood stoves and fuel oil. In contrast, summer $PM_{2.5}$ mass mostly consists of organic carbon, likely due to the prevalence of wildfires in the area. Speciation results solidify the conclusion that the annual standard is violated in North Pole due to wintertime emissions.

All analysis was compared against the closest rural $PM_{2.5}$ monitor to the Fairbanks North Star Borough—an IMPROVE monitor located in Denali National Park, approximately 90 miles to the southwest—in order to estimate rural contribution to the urban $PM_{2.5}$ violating monitor in North Pole. At the Denali NP monitor, $PM_{2.5}$ concentration levels are extremely low and have not exceeded 2.0 $\mu g/m^3$ in the past 15 years. Urban increment analysis shows little contribution from regional sources to the overall urban concentrations of North Pole and Fairbanks. Speciation profiles at Denali NP are similar to those of the North Pole and Fairbanks areas because emission sources are similar; summertime profiles can be attributed to wildfires while wintertime profiles can be attributed to space heating emissions. Contribution of $PM_{2.5}$ to North Pole from the Denali NP area is extremely slim due to distance, separation by geographical features, and wind patterns. Additionally, some background $PM_{2.5}$ levels are attributed to international sources that cannot be controlled by Alaska measures. This analysis exhibits a low possibility that contribution from rural sources aids in violating the annual standard at the North Pole monitor.

3. FACTOR 2- EMISSIONS AND EMISSIONS-RELATED DATA

Following EPA's guidance, Factor 2 examines emissions and emissions-related data and metrics. As described within this section, this includes examination of the magnitude and spatial extent of both directly emitted $PM_{2.5}$ as well as applicable precursor pollutants. These precursor pollutants consist of sulfur dioxide (SO_2), oxides of nitrogen (NOx), volatile organic compounds (VOC) and ammonia (NH_3). It also includes discussions of population density and degree of urbanization as well as traffic and commuting patterns throughout the spatial extent considered.

Unlike the rest of the U.S., Alaska is sparsely populated. Sources of $PM_{2.5}$ and potential precursor emissions generally correlate with populated areas or travel corridors with some exceptions such as wildland fires. As explained in the following subsection, the overall approach to evaluating emission sources and locations relevant to determining nonattainment boundaries for the annual $PM_{2.5}$ NAAQS consisted of the development and examination of a set of inventories of different spatial extents and robustness.

3.1 Overview of Emissions Inventory Approach

The existing Fairbanks nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS is a 244 square mile area in the western portion of the Fairbanks North Star Borough (FNSB). The evaluation of emission sources and locations germane to determining appropriate boundaries for the nonattainment area for the annual $PM_{2.5}$ NAAQS began with analyzing emissions over a broad spatial extent that included the FNSB plus the three surrounding boroughs: Denali Borough, Southeast Fairbanks Census Area, and Yukon-Koyukuk Census Area.

This four-borough area is termed the "Outer Inventory" and is shown as the yellow shaded boroughs in Figure 3.1-1. For spatial context, the existing 24-hour Fairbanks nonattainment area is the small tan area in Figure 3.1-1. The Outer Inventory encompasses over 190,000 square miles, bigger than the state of California.[40] And as seen from the scale at the top of Figure 3.1-1, transport distances to the 24-hour nonattainment area from Outer Inventory area can exceed 200 miles.

[40] California is 163,695 square miles. World Population Review, https://worldpopulationreview.com/states/california/how-big.

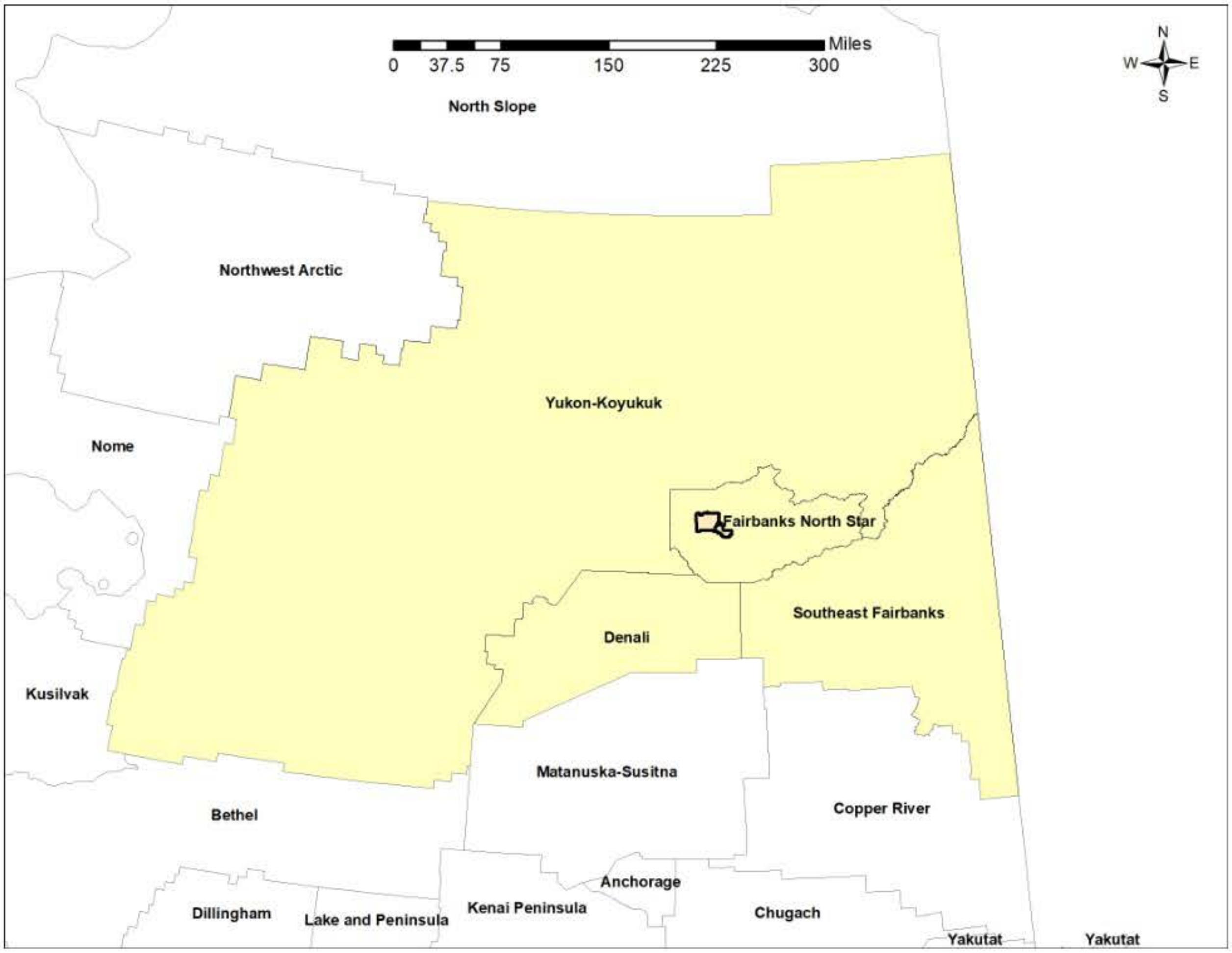


Figure 3.1-1: *Four Borough Outer Inventory Extent*

In addition to the Outer Inventory, emissions within a "Middle Inventory" consisting of the entire Fairbanks North Star Borough were also evaluated. The FNSB Middle Inventory area is 7,335 square miles.

Finally, emissions and source locations within an "Inner Inventory" that comprised the existing 24-hour nonattainment area (of 244 square miles) were examined.

Table 3.1-1 provides an overview of the data sources and methodologies used to develop emission estimates by source category for each of the three spatial inventories. Emissions were generally estimated based on calendar year 2020 source activity and emission factors except where noted.

And as shown in Table 3.1-1, the rigor or use of local data generally increases from the Outer to the Inner Inventory. The Four Borough Outer Inventory was based entirely on the 2020 NEI, which for a number of key source categories (other than stationary point and on-road mobile source) includes Source Classification Code (SCC)-specific estimates based on data from other regions of the U.S. that are extrapolated to Alaska boroughs based on source activity surrogates.

Table 3.1-1 *Overview of Data Sources and Inventory Methods for Layered Inventories by Source Sector and Key Source Category*

Source Sector	Category	Four Borough Outer Inventory	Fairbanks North Star Borough Middle Inventory	24-Hour $PM_{2.5}$ Nonattainment Area Inner Inventory
Point	All	2020 NEI	2020 NEI, SIP EI - Annual Extrapolation	2020 NEI, SIP EI - Annual Extrapolation
Area (Non-Point)	Biogenics		2020 NE, Spatial Allocation	2020 NEI, Spatial Allocation
	Construction Dust		2020 NE, Spatial Allocation	2020 NEI, Spatial Allocation
	Paved & Unpaved Road Dust		2020 NEI, ADOT&PF Road Surface VMT	2020 NEI, ADOT&PF Road Surface VMT
	Fires - Prescribed Fires		2020 NEI, Spatial Allocation	2020 NEI, Spatial Allocation
	Fires - Wildfires		2020 NEI, Spatial Allocation	2020 NEI, Spatial Allocation
	Fuel Combustion - Residential - Wood		SIP EI - Annual Extrapolation	SIP EI - Annual Extrapolation, Spatial Allocation
	Other Space Heating		SIP EI - Annual Extrapolation	SIP EI - Annual Extrapolation, Spatial Allocation
	Waste Disposal		2020 NEI, Spatial Allocation	2020 NEI, Spatial Allocation
	All Others		2020 NEI, Spatial Allocation	2020 NEI, Spatial Allocation
On-Road Mobile	All		2020 NEI, Spatial Allocation	2020 NEI, Spatial Allocation
Nonroad Mobile	All		2020 NEI, Spatial Allocation	2020 NEI, Spatial Allocation

For the Middle Inventory (encompassing the entire Fairbanks North Star Borough), refinements to 2021 NEI estimates by source category are highlighted in green. For these source categories, local data from the 2024 Amendment 24-hour Fairbanks $PM_{2.5}$ SIP inventory were used for key source categories (e.g., residential space heating and point sources within the 24-hour nonattainment area). Their source activity was extrapolated from winter episodic to annual estimates based on throughput data specific to each category that is described later in Section 3.3. In Table 3-1.1 these instances are denoted as "SIP EI – Annual Extrapolation."

The rightmost column of Table 3.1-1 highlights further emission estimation refinements used in generating the Inner Inventory (which corresponds to the existing Fairbanks 24-hour $PM_{2.5}$

nonattainment area). These refinements generally consisted of using appropriate spatial surrogates to allocate emissions from the Middle Inventory into the Inner Inventory. Where feasible, emissions within the Inner Inventory were then further spatially allocated to the Fairbanks and North Pole portions of the 24-hour nonattainment area.

The following three subsections present and discuss the resulting Outer, Middle and Inner inventories, respectively.

3.2 Outer Emissions Inventory Analysis

Outer Inventory emissions for directly emitted $PM_{2.5}$ as well as all potential precursor gases (SO_2, NOx, VOC and NH_3) were developed for calendar year 2020 based entirely on the 2020 NEI. Sector wide emissions were provided for the Point, On-Road Mobile and Non-Road Mobile source sectors. Within the Non-Point sector, emissions were tabulated by key source categories that reflect differences in emissions, both by source category as well as by borough within the four borough Outer Inventory.

Direct $PM_{2.5}$ Emissions – Table 3.1-2 shows the breakdown of Outer Inventory direct $PM_{2.5}$ emissions by source category and borough. Fairbanks North Star Borough (FNSB) is highlighted as the "reference borough" for comparison as the Middle and Inner inventories zoom to and within the FNSB. As seen in Table 3.1-2, direct $PM_{2.5}$ emissions are four to nearly twenty times higher in the Fairbanks North Star Borough (FNSB) than the other three boroughs. Within the FNSB, Prescribed Fires represent 86.3% of annual $PM_{2.5}$ emissions, with secondary contributions from Residential Wood Combustion (8.0%), Wildfires (2.6%) and Waste Disposal (2.5%). Emissions of All Stationary Point, On-Road and Non-Road Mobile, and the remaining Non-Point sources comprise only 0.6% of annual $PM_{2.5}$ emissions in the FNSB.

Table 3.1-2 *Outer Inventory $PM_{2.5}$ Emissions by Borough and Key Source Category*

		$PM_{2.5}$ (tons/year)			
Sector	**Source Category**	**Fairbanks North Star**	**Denali**	**Southeast Fairbanks**	**Yukon-Koyukuk**
Point	All	118	16	44	22
NonPoint	Biogenics	0	0	0	0
NonPoint	Construction, Paved & Unpaved Road Dust	318	29	101	150
NonPoint	Fires - Prescribed Fires	95,371	6	0	0
NonPoint	Fires - Wildfires	2,839	912	228	25,253
NonPoint	Fuel Comb - Residential - Wood	8,859	205	689	859
NonPoint	Waste Disposal	2,733	64	181	89
NonPoint	All Others	173	10	12	21
OnRoad	All	34	3	5	6
NonRoad	All	29	1	2	3
TOTALS		**110,473**	**1,246**	**1,262**	**26,403**

Apart from the splits between Prescribed Fires and Wildfires and lower shares of Residential Wood Combustion and Waste Disposal, annual $PM_{2.5}$ emissions in Denali, Southeast Fairbanks, and Yukon-Koyukuk boroughs have similar relative amounts to total borough emissions as in the FNSB.

Prescribed Fire emissions are those from scheduled or controlled burns with the goal of managing wildlife habitat by mimicking natural wildfires in a controlled manner, reducing fuel buildup, and minimizing the risk of large uncontrolled wildfires. They are significant in the FNSB but largely non-existent in the other sparsely populated boroughs. Within the FNSB, they tend to occur in areas around the Fairbanks metropolitan area and the Tanana River Plain to the south of Fairbanks. The military has extensive training grounds within the Tanana Plain. Thus, prescribed fires occur actively in this area to reduce fuel buildup and minimize uncontrolled wildfire risks.

The Alaska Division of Forestry and Fire Protection conducts and oversees Prescribed Fire burns in Alaska in conjunction with the U.S. Bureau of Land Management, Alaska Fire Service (BLM AFS). Prescribed burns are conducted only in the Spring and sometimes early Fall during periods of favorable air quality. They are conducted in these periods to reduce fuel loads before the summer wildfire season and again in early Fall as needed before ambient $PM_{2.5}$ air quality worsens during winter.

An interagency website (AKFireInfo.com) developed and maintained by several state and federal agencies (including those noted above), is used to communicate information regarding scheduled prescribed fire burns to the public. It also contains historical information on prescribed burns,[41] listing the spring and fall periods in each year during which the burns occur. Spring prescribed burns typically begin in mid to late April (depending on snowpack/soil moisture) and last about three to four weeks. Fall burns begin in late September or early October and are generally completed by mid-October.

<u>Treatment of Wildland Fires</u> – Wildland Fires consist of two components: 1) Wildfires, and 2) Prescribed Fires. Wildfires generally fall under the category of naturally occurring Exceptional Event source activity, and thus are excluded or discounted from consideration of the source categories that impact determination of appropriate nonattainment area boundaries for the annual $PM_{2.5}$ standard.

Similarly (but not identically) Prescribed Fires, although they are not naturally occurring emissions, are part of a wildland management strategy intended to significantly reduce the magnitude and extent of Wildfire emissions. Moreover, their activity is generally limited to 2-to-4-week windows in Spring and early Fall. As can be seen from Figure 2.1-1 through Figure 2.1-6, presented earlier in within Section 2.1.2, ambient $PM_{2.5}$ concentrations in the Fairbanks 24-hour nonattainment area are below the revised 9 $\mu g/m^3$ annual $PM_{2.5}$ standard. Thus, Prescribed Fire source activity and emissions do not materially contribute to violation of the annual standard within the Fairbanks-North Pole area.

---

[41] https://akfireinfo.com/category/prescribed-fire/#:~:text=By%20BLM%20Alaska%20Fire%20Service,May%201%2C%E2%80%A6%20Read%20More%20%E2%80%BA

Variability of Wildland Fires – Another important aspect of wildland fires is their significant year to year variability within Interior Alaska. Table 3.1-3 presents a comparison of Wildland Fire $PM_{2.5}$ emissions for each of the four outer inventory boroughs in calendar years 2020 and 2022, broken down by the Prescribed Fire and Wildfire subcategories.

Table 3.1-3 *Outer Inventory Wildland Fire $PM_{2.5}$ Emissions by Borough and Subcategory – 2022 vs. 2020*

Sector	Source Category	Wildland Fire $PM_{2.5}$ (tons/year)			
		Fairbanks North Star	Denali	Southeast Fairbanks	Yukon-Koyukuk
2020 Wildland Fire Emissions					
NonPoint	Fires - Prescribed Fires	95,371	6	0	0
NonPoint	Fires – Wildfires	2,839	912	228	25,253
TOTAL 2020 WILDLAND FIRES		**110,473**	**1,246**	**1,262**	**26,403**
2022 Wildland Fire Emissions					
NonPoint	Fires - Prescribed Fires	1,228	43	87,117	90
NonPoint	Fires – Wildfires	43,088	97,324	49,773	1,238,219
TOTAL 2022 WILDLAND FIRES		**44,316**	**97,367**	**136,890**	**1,238,309**

Sources: 2020 emissions from 2020 NEI, 2022 emissions from Alaska Interagency Coordination Center https://fire.ak.blm.gov/content/aicc/Statistics%20Directory/Previous%20Years%20Data%20and%20FFR%20Handouts/2022%20Fire%20Data/Current%20Alaska%20Fires%20Data%202022-12-31%201700.xlsx

As shown in Table 3.1-3, $PM_{2.5}$ emissions for both Wildland Fire components (Prescribed Fires and Wildfires) varied dramatically between the two years. For example, within the FNSB Prescribed Fire emissions dropped from 95,371 tons/year to 1,228 tons/year while Wildfire emissions changed in the opposite direction, increasing from 2,829 tons/year in 2020 to 43,088 tons/year in 2022. Similarly significant swings in Wildland Fire emissions in the other boroughs was also seen between 2020 and 2022.

These large variations in year-to-year Wildland Fire emissions in Interior Alaska are the result of differences in weather from one year to the next (wind patterns, precipitation and soil moisture, etc.), coupled with the fact that wildfires in these areas are generally triggered by summer thunderstorms and lightning strikes. The locations of the wildfire origin also significantly impact resultant emissions as they tend to occur in remote areas with little or no roadway access. Prescribed fires (though man-made) are an important land management tool used to mitigate activity and emissions from naturally occurring wildfires. Due to the source and nature of these burning activities, DEC believes that neither wildfires nor prescribed burns should be included when determining annual nonattainment area boundaries.

Precursor Pollutant Emissions – Table 3.1-4 through Table 3.1-7 provide similar Outer Inventory tabulations for potential precursor pollutants SO_2, NOx, VOC and NH_3, respectively.

Common to the 2020 NEI-based Outer Inventory emissions for each of the precursor pollutants is the fact that Prescribed Fires are the largest source category in the FNSB, ranging from 45% (for NOx) to 96% (for NH_3).

Table 3.1-4 *Outer Inventory SO_2 Emissions by Borough and Key Source Category*

		SO_2 (tons/year)			
Sector	**Source Category**	**Fairbanks North Star**	**Denali**	**Southeast Fairbanks**	**Yukon-Koyukuk**
Point	All	1,913	391	22	49
NonPoint	Biogenics	0	0	0	0
NonPoint	Construction, Paved & Unpaved Road Dust	0	0	0	0
NonPoint	Fires - Prescribed Fires	6,328	0	0	0
NonPoint	Fires - Wildfires	186	59	16	1,713
NonPoint	Fuel Comb - Residential - Wood	158	3	12	15
NonPoint	Waste Disposal	185	4	11	7
NonPoint	All Others	46	28	2	2
OnRoad	All	2	0	0	0
NonRoad	All	0	0	0	0
TOTALS		**8,818**	**486**	**62**	**1,785**

Table 3.1-5 *Outer Inventory NOx Emissions by Borough and Key Source Category*

		NOx (tons/year)			
Sector	**Source Category**	**Fairbanks North Star**	**Denali**	**Southeast Fairbanks**	**Yukon-Koyukuk**
Point	All	4,474	301	414	276
NonPoint	Biogenics	1,000	1,182	3,449	17,262
NonPoint	Construction, Paved & Unpaved Road Dust	0	0	0	0
NonPoint	Fires - Prescribed Fires	7,806	1	0	0
NonPoint	Fires - Wildfires	225	70	21	2,205
NonPoint	Fuel Comb - Residential - Wood	987	22	74	481
NonPoint	Waste Disposal	1,015	24	68	76
NonPoint	All Others	879	138	115	604
OnRoad	All	774	90	135	180
NonRoad	All	192	7	10	37
TOTALS		**17,352**	**1,835**	**4,286**	**21,121**

Unlike with direct $PM_{2.5}$, Biogenics are a significant source of emissions for VOC (from plants), and NOx (from soil) to a lesser extent. However, like Wildfires, Biogenics are a natural emission source. Control of their emissions through an air quality plan is thus not practical. To the extent that VOC and NOx are precursors of significance for annual $PM_{2.5}$ in interior Alaska, biogenic emissions would likely be addressed within the background component of an air quality model.

Thus, like the earlier arguments for Prescribed Fires and Wildfires, DEC believes that Biogenic emission sources should be excluded or discounted in evaluating source categories and emissions toward determination of appropriate annual $PM_{2.5}$ nonattainment area boundaries.

Table 3.1-6 *Outer Inventory VOC Emissions by Borough and Key Source Category*

Sector	Source Category	VOC (tons/year) Fairbanks North Star	Denali	Southeast Fairbanks	Yukon-Koyukuk
Point	All	290	10	134	82
NonPoint	Biogenics	34,490	35,733	56,794	464,399
NonPoint	Construction, Paved & Unpaved Road Dust	0	0	0	0
NonPoint	Fires - Prescribed Fires	275,838	18	0	0
NonPoint	Fires - Wildfires	8,225	2,646	654	72,758
NonPoint	Fuel Comb - Residential - Wood	797	11	47	48
NonPoint	Waste Disposal	60	1	25	2
NonPoint	All Others	1,778	104	178	210
OnRoad	All	494	29	56	68
NonRoad	All	646	49	73	121
TOTALS		**322,620**	**38,600**	**57,960**	**537,689**

Table 3.1-7 *Outer Inventory NH_3 Emissions by Borough and Key Source Category*

Sector	Source Category	NH_3 (tons/year) Fairbanks North Star	Denali	Southeast Fairbanks	Yukon-Koyukuk
Point	All	2	15	1	0
NonPoint	Biogenics	0	0	0	0
NonPoint	Construction, Paved & Unpaved Road Dust	0	0	0	0
NonPoint	Fires - Prescribed Fires	19,189	1	0	0
NonPoint	Fires - Wildfires	572	184	45	5,061
NonPoint	Fuel Comb - Residential - Wood	40	0	2	2
NonPoint	Waste Disposal	41	0	4	1
NonPoint	All Others	19	0	1	1
OnRoad	All	28	3	4	6
NonRoad	All	1	0	0	0
TOTALS		**19,892**	**204**	**57**	**5,071**

<u>Emission Density by Borough</u> – A final means of evaluating Outer Inventory emissions and their importance in establishing nonattainment area boundaries consisted of tabulating and comparing emission densities (in tons per year per square mile) by borough and pollutant.

Table 3.1-8 shows total Outer Inventory emissions and land area of each borough. Again, FNSB is highlighted for comparison to the other boroughs.

Table 3.1-8 Outer Inventory Borough Land Area and Total Emissions by Pollutant

Borough Name	Area (sq mi)	Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Fairbanks North Star	12,238	110,473	8,818	17,352	322,620	19,892
Denali	7,201	1,246	486	1,835	38,600	204
Southeast Fairbanks	24,283	1,262	62	4,286	57,960	57
Yukon-Koyukuk	143,618	26,403	1,785	21,121	537,689	5,071

Emission densities for each borough were then calculated by dividing total borough emissions by its land area. The resulting emission densities (in tons per year per square mile) are presented below in Table 3.1-9.

Table 3.1-9 Outer Inventory Borough Emission Densities by Pollutant

Borough Name	Area (sq mi)	Emission Densities (tons/year/sq mi)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Fairbanks North Star	12,238	9.03	0.72	1.42	26.36	1.63
Denali	7,201	0.17	0.07	0.25	5.36	0.03
Southeast Fairbanks	24,283	0.05	0.00	0.18	2.39	0.00
Yukon-Koyukuk	143,618	0.18	0.01	0.15	3.74	0.04

As seen in Table 3.1-9, emission densities for both direct $PM_{2.5}$ and all potential precursor pollutants are generally orders of magnitude higher in the FNSB than in the other three boroughs. And as noted earlier, transport distances from these other boroughs to the Fairbanks area within the FNSB can approach up to 200 miles. These emission density comparisons, coupled with the transport distances to FNSB and the IMPROVE monitor-based rural ambient $PM_{2.5}$ concentrations presented earlier in Section 2.3, clearly indicate that emissions from Denali, Southeast Fairbanks and Yukon-Koyukuk boroughs do not significantly impact ambient $PM_{2.5}$ concentrations in the Fairbanks-North Pole area.

Thus, it is believed these findings provide clear evidence that these three boroughs (or portions thereof) should not be included within the North Pole annual $PM_{2.5}$ nonattainment area boundaries.

3.3 Middle Emissions Inventory Analysis

As explained in Section 3.1, the Middle Emissions Inventory extent is the entire FNSB. As summarized earlier in Table 3.1-1, it starts with 2020 NEI emissions (like the Outer Inventory) but includes more refined estimates for several source categories based on the 24-hour Fairbanks $PM_{2.5}$ SIP and other local sources. These refinements included source activity and emissions based on local (non-NEI) data as well as spatial allocations of emissions within the FNSB. The key refinements are summarized as follows:

- *Point* – Point source emissions for facilities within the existing 24-hour Fairbanks $PM_{2.5}$ nonattainment area were estimated based on winter episodic emissions for the 2020

Baseline year from DEC's 2024 Amendment to the Fairbanks Serious Area $PM_{2.5}$ SIP. As part of SIP development, activity data was obtained from each facility by emission unit that included fuel throughput percentages by quarter (Winter=Dec-Feb, Spring=Mar-May, Summer=Jun-Aug, Fall=Sep-Nov). The winter throughput fractions were assumed to be representative of the SIP modeling episodes. The remaining throughput fractions (Spring through Fall) were then used to extrapolate SIP episodic point source emissions for each facility and emission unit to an annual basis. For facilities outside the nonattainment area, the 2020 NEI data were used.

- *Paved and Unpaved Road Dust* – A GIS-based road surface layer[42] was obtained from the Alaska Department of Transportation and Public Facilities (ADOT&PF) that identified the road surface type (paved or unpaved) for over 3,800 freeway and arterial road segments across the state. This layer was merged with another spatial layer[43] from ADOT&PF that contained 2021[44] Annual Average Daily Traffic (AADT) and segment length. The merged dataset was then filtered to segments within the FNSB, and 2021 daily vehicle miles traveled (VMT) was calculated for each road segment by multiplying its AADT by its length. The 2021 VMT estimates were then tabulated by road surface and subarea (either within or outside the 24-hour nonattainment area) and used to develop spatial allocation factors for both paved and unpaved road dust emissions by subarea (Inside NAA or Outside NAA). These spatial allocation factors were then applied to the 2020 NEI estimates of paved and unpaved road dust emissions for the FNSB to apportion them by subarea.

- *Residential Space Heating* – The 2024 Amendment SIP episodic emissions inventory was also used to provide a locally-based estimate of residential space heating emissions across the FNSB. Space heating emissions were divided into two subcategories: 1) Wood-burning devices, and 2) All other heating devices. Winter and annual fuel and energy use data collected under a 2023 Residential Home Heating survey that supported the SIP residential space heating inventory were used to extrapolate episodic wintertime space heating emissions to an annual basis. These local estimates were used to replace the 2020 NEI emissions for the residential space heating source categories.

- *Waste Disposal, Municipal Landfills* – The Waste Disposal source category reflects emissions from several subcategories that include municipal landfills, open burning (e.g., yard waste), municipal and industrial wastewater treatment, and commercial/institutional incineration. In comparing FNSB waste disposal emissions between the 2020 NEI and the 2024 Amendment SIP inventory, it was observed that the 2020 NEI estimated the Municipal Landfill subcategory $PM_{2.5}$ emissions to be three orders of magnitude higher than contained in the SIP inventory (2,521 tons/year NEI vs. 0.47 tons/year from the SIP for calendar year 2020). The SIP emissions estimate for municipal landfill emissions in the

[42] https://data-soa-akdot.opendata.arcgis.com/maps/85eda5cf21ef4014b03d1819dd388869
[43] https://data-soa-akdot.opendata.arcgis.com/datasets/3c6be4c726ae462aa9f67a392af35e2c_0/explore?location=60.784994%2C26.000000%2C5.60
[44] Due to impacts of COVID-19 that affected vehicle travel in 2020, 2021 AADT were used to provide a better representation of normal traffic patterns across Alaska.

FNSB came from the 2017 NEI. And the only municipal landfill in the FNSB is in Fairbanks; the South Cushman Landfill south of the downtown area. A review of EPA's earlier 2014 NEI found that municipal landfill $PM_{2.5}$ emissions for FNSB were estimated to be at a similar level to that in the 2017 NEI (0.15 tons/year). DEC then reviewed EPA's technical documentation published in conjunction with the 2020 NEI[45] and found no reported changes in the methods used to estimate municipal landfill emissions relative to earlier NEIs. DEC also contacted the South Cushman Landfill[46] in Fairbanks and determined that there had been no significant changes to the amount of disturbed acreage (a key source of landfill $PM_{2.5}$ emissions) or other operations at the facility since 2017. Therefore the 2017 NEI estimate for FNSB municipal landfill $PM_{2.5}$ emissions (0.45 tons/year) was used and population growth projected to 0.47 tons/year in 2020 as in the SIP.

Based on these refinements, Table 3.1-10 summarizes emissions by pollutant and key source category for the Middle Inventory area, the entire FNSB. The Biogenics, Prescribed Fires and Wildfires category are shaded to reflect the fact that they represent natural, exceptional event or related sources that would not be considered "Controllable sources" as they relate to developing an appropriate nonattainment area boundary and SIP-based control measures. This classification does not mean these categories would be excluded from a SIP inventory, but rather represent source categories that are not practicable to control under SIP attainment planning.

Table 3.1-10 *Middle Inventory Emissions by Pollutant and Key Source Category – Entire FNSB*

Sector	Source Category	FNSB Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Point	All	214	1,815	4,057	284	23
NonPoint	Biogenics	0	0	1,000	34,490	0
NonPoint	Construction Dust	93	0	0	0	0
NonPoint	Paved Road Dust	8	0	0	0	0
NonPoint	Unpaved Road Dust	217	0	0	0	0
NonPoint	Fires - Prescribed Fires	95,371	6,328	7,806	275,838	19,189
NonPoint	Fires - Wildfires	2,839	186	225	8,225	572
NonPoint	Fuel Comb - Residential - Wood	363	9	48	1,237	13
NonPoint	Fuel Comb - Residential - Other Space Heating	10	613	238	15	1
NonPoint	Waste Disposal - Municipal Landfills	0.47	5	3	0	212
NonPoint	Waste Disposal - Other	212	19	71	51	41
NonPoint	All Others	173	46	879	1,778	19
OnRoad	All	34	2	774	494	28
NonRoad	All	29	0	192	646	1
TOTALS		**99,562**	**9,022**	**15,292**	**323,060**	**20,100**

[45] https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-technical-support-document-tsd

[46] Personal communication, Elizabeth Whisenhant, Alaska Department of Environmental Conservation and Fairbanks South Cushman Landfill, November 4, 2024.

CONTROLLABLE SOURCE TOTALS	1,352	2,508	6,262	4,506	339

Thus, at the bottom of Table 3.1-10 totals of all and controllable emissions are shown, the latter excluding the shaded source categories. The source categories in Table 3.1-10 have also been expanded where needed to represent selective adjustments to 2020 NEI-based emissions. Overall, Middle Inventory emissions are generally similar to those for the FNSB within the 2020 NEI-based Outer Inventory, although NEI-based Residential Wood Combustions emissions are significantly higher than those estimated from the SIP. For example, NEI and SIP-based $PM_{2.5}$ emissions for FNSB are 8,859 tons/year and 316 tons/year, respectively. Waste Disposal $PM_{2.5}$ emissions in the Middle Inventory are also significantly lower than for FNSB in the Outer Inventory due to the correction to the apparent error in 2020 NEI emissions for the Municipal Landfill subcategory.

Beside these revisions, the other improvements to the Middle Inventory included spatially allocating emissions into two subareas within the FNSB: 1) the region inside the existing 24-hour $PM_{2.5}$ nonattainment area (NAA), and 2) that portion outside the 24-hour $PM_{2.5}$ NAA. These subareas within the FNSB Middle Inventory are shown below in Figure 3.1-2 along with key roadway system segments. The Inside NAA subarea highlighted in yellow comprises 234 square miles, or 3% of the total FNSB land area.

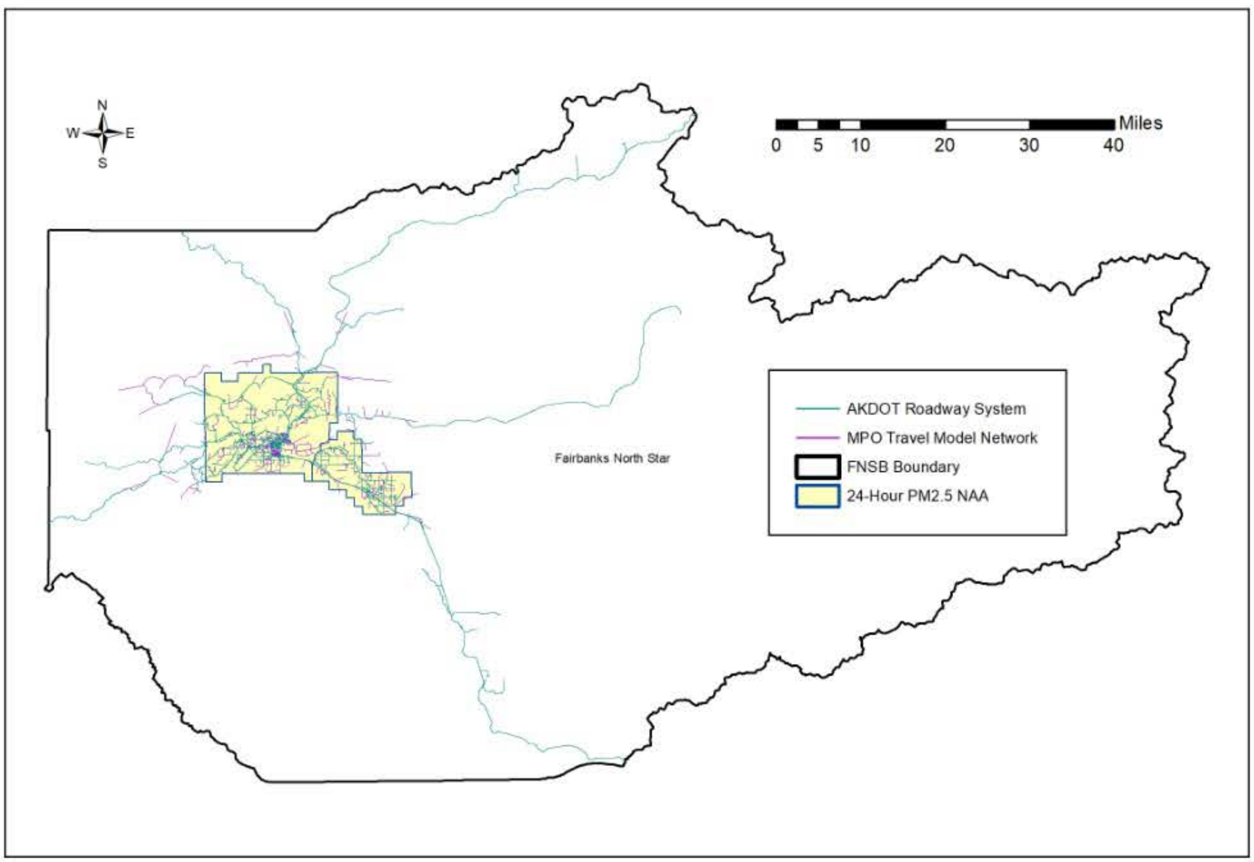


Figure 3.1-2: *FNSB Middle Inventory Area and Subareas*

Source category-specific activity surrogates were assembled and used to perform these subarea emissions allocations, and are summarized below in Table 3.1-11. For example, 2.3% of Biogenic emissions in the entire FNSB Middle Inventory were assumed to occur within the NAA, with the remaining 97.7% occurring outside the NAA based on the distribution of rural land area within the FNSB.

Table 3.1-11 *Middle Inventory Subarea Spatial Allocation Fractions by Source Category*

Sector	Source Category	Spatial Surrogate	Inside NAA %	Outside NAA %
Point	All	Source Location	Varies	Varies
NonPoint	Biogenics	Rural Land Area	2.3%	97.7%
NonPoint	Construction Dust	Population	87.3%	12.7%
NonPoint	Paved Road Dust	Paved Road VMT	82.1%	17.9%
NonPoint	Unpaved Road Dust	Unpaved Road VMT	83.2%	16.8%
NonPoint	Fires - Prescribed Fires	2020 Fire Locations	98.1%	Varies
NonPoint	Fires - Wildfires	2020 Fire Locations	0%	100%
NonPoint	Fuel Comb - Residential – Wood	Occupied Households	87.0%	13.0%
NonPoint	Fuel Comb - Residential - Other Space Heating	Occupied Households	87.0%	13.0%
NonPoint	Waste Disposal - Municipal Landfills	Source Location	100.0%	0.0%
NonPoint	Waste Disposal - Other	Population	87.3%	12.7%
NonPoint	All Others	Population	87.3%	12.7%
OnRoad	All	Roadway VMT	82.2%	17.8%
NonRoad	All	Rural Land Area	2.3%	97.7%

Summaries of each of the spatial surrogates and their sources are presented below, with the source categories they were applied to listed in parentheses.

<u>Source Location (Point Sources)</u> – Point sources were allocated either within or outside the nonattainment area using their latitude and longitude coordinates from the 2020 NEI or SIP inventory. As shown in subsequent tables, most of the point source emissions occur within the nonattainment area (75% or more, although it varies by pollutant).

<u>Rural Land Area (Biogenics, All Non-Road Mobile Sources)</u> – An urban vs. rural land area GIS shapefile from the 2020 Census for the FNSB was spatially merged with the NAA boundary to determine the fractions of Rural land area within and outside the NAA. It was used as a simple spatial surrogate to allocate Biogenic and Non-Road Mobile source emissions within the Middle inventory. Biogenic emissions occur in vegetated non-urbanized areas. Non-road NEI emissions in FNSB are dominated by recreational equipment that is typically operated in rural areas.

<u>Population (Construction, Waste Disposal-Other, All Other NonPoint Sources)</u> – A GIS shapefile containing 2020 Census population data by census block for the FNSB was spatially merged with the NAA boundary to calculate the population percentages within and outside the NAA. As shown

in Table 3.1-11, 87.3% of the FNSB population is located within the NAA, with the remaining 12.3% outside the NAA. These population percentages were used to allocate total FNSB emissions for Construction Dust, Other Waste Disposal and All Other Nonpoint sources to the Within NAA and Outside NAA subareas.

Paved Road VMT (Paved Road Dust) – As described earlier, GIS shapefiles were obtained from ADOT&PF containing the road surface type[42] (paved vs. unpaved) and 2021 AADT[43] for over 3,800 road segments across Alaska. These shapefiles were merged and filtered to produce estimates of 2021 Daily VMT for each segment within the FNSB, including identification of the road surface type for the segment. The resulting dataset was tabulated to determine the fractions of paved road VMT across the FNSB that occurred inside and outside the NAA and allocate paved road dust emissions to each subarea based on these fractions. As shown in Table 3.1-11, 82.1% of paved road dust emissions were allocated to the Inside NAA subarea, with the remaining 17.9% allocated to the Outside NAA subarea.

Unpaved Road VMT (Unpaved Road Dust) – The same spatial dataset was similarly used to calculate unpaved road VMT fractions inside and outside the NAA and allocate FMSB unpaved road dust emissions to each subarea. As listed in Table 3.1-11, 83.2% of total FNSB unpaved road dust emissions were allocated to the Inside NAA subarea, with the remaining 16.8% allocated to the Outside NAA subarea.

2020 Fire Locations (Prescribed Fires, Wildfires) – Supporting data compiled by EPA for the 2020 NEI includes wildland fire emissions and locations based on data submitted by state, local and tribal agencies. These data include data by individual fire event, latitude and longitude locations, the type of fire (RX=Prescribed Fire, WF=Wildfire) and emissions. The dataset for Alaska[47] was filtered to events within the FNSB and then spatially analyzed (using latitude/longitude coordinates for each fire event record) to separately determine Prescribed Fire and Wildfire emissions that occurred within and outside the NAA. Although the spatial emissions allocations vary by pollutant, between 98.1% and 98.7% of Prescribed Fire emissions occurred outside the NAA in 2020, with only 1.3% to 1.9% occurring within the NAA. All (100%) wildfire emissions were found to occur outside the NAA.

Occupied Households (Residential Wood Combustion, Other Residential Space Heating) – A GIS shapefile containing 2020 Census occupied household data by census block for the FNSB was spatially merged with the NAA boundary to calculate the population percentages within and outside the NAA. As shown in Table 3.1-11, 87.0% of the occupied households were located within the NAA, with the remaining 12.0% outside the NAA. These occupied household percentages were used to allocate total FNSB emissions for Residential Wood Combustion and Other Residential Space Heating sources to the Within NAA and Outside NAA subareas.

Source Location (Waste Disposal, Municipal Landfills) – As noted earlier, the single municipal landfill in the FNSB is the Fairbanks South Cushman Landfill, located south of downtown Fairbanks but within the NAA.

[47] https://gaftp.epa.gov/air/nei/2020/doc/supporting_data/events/2020FireLoc_Alaska.csv

Roadway VMT (All On-Road Mobile) – The merged 2021 Daily VMT roadway segment dataset developed from the ADOT&PF GIS shapefiles was tabulated to determine the amounts of total VMT (paved plus unpaved roads) that occurred within the Inside and Outside NAA subareas. As shown in Table 3.1-11, the Inside and Outside NAA roadway VMT fractions were 82.2% and 17.8%, respectively, and were used to allocate total FNSB on-road mobile source emissions to each subarea.

Using the source category-specific surrogate metrics described above, the Middle Inventory emissions for both direct $PM_{2.5}$ and each potential precursor pollutant were spatially distributed into the Within NAA and Outside NAA subareas. Table 3.1-12 and Table 3.1-13 present the results for the Inside and Outside NAA subareas, respectively. Both tables are structured similarly to the Middle Inventory summary for the entire FNSB provided earlier in Table 3.1-11 except they also include percentages of Controllable emissions within each subarea at the bottom of each table.

As seen in Table 3.1-12 and Table 3.1-13, most of the Middle Inventory emissions occur within the existing 24-hour nonattainment area. Except for VOC, Inside NAA Controllable emissions are 79% or more of total FNSB emissions.

As shown in Table 3.1-12, major sources of controllable $PM_{2.5}$ emissions within the NAA include Residential Wood Combustion (316 tons/year), Waste Disposal other than Landfill (185 tons/year), Unpaved Road Dust (181 tons/year) and Point Sources (156 tons/year). For SO_2 and NOx, the majority (roughly 70%) of controllable emissions within the NAA come from Point Sources.

Given that most of the Middle Inventory emission occur from sources within the existing 24-hour $PM_{2.5}$ nonattainment area, emissions within a third extent—the existing nonattainment area—were also examined further. This was termed the Inner Inventory and is discussed in the following subsection.

__Table 3.1-12__ Middle Inventory Emissions by Pollutant and Key Source Category – Inside NAA Portion

Sector	Source Category	Inside Nonattainment Area Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Point	All	156	1,534	3,250	8	22
NonPoint	Biogenics	0	0	23	803	0
NonPoint	Construction Dust	81	0	0	0	0
NonPoint	Paved Road Dust	6	0	0	0	0
NonPoint	Unpaved Road Dust	181	0	0	0	0
NonPoint	Fires - Prescribed Fires	1,275	97	152	3,591	250
NonPoint	Fires - Wildfires	0	0	0	0	0
NonPoint	Fuel Comb - Residential - Wood	316	8	42	1,076	11
NonPoint	Fuel Comb - Residential - Other Space Heating	9	533	207	13	1
NonPoint	Waste Disposal - Municipal Landfills	0.47	5	3	0	212
NonPoint	Waste Disposal - Other	185	17	62	44	36
NonPoint	All Others	151	40	767	1,552	17
OnRoad	All	28	2	636	406	23
NonRoad	All	1	0	4	15	0
TOTALS		**2,388**	**2,235**	**5,147**	**7,511**	**572**
CONTROLLABLE SOURCE TOTALS		**1,113**	**2,138**	**4,972**	**3,116**	**322**
PCT OF MIDDLE INVENTORY CONTROLLABLE EMISSIONS		**82%**	**85%**	**79%**	**69%**	**95%**

__Table 3.1-13__ Middle Inventory Emissions by Pollutant and Key Source Category – Outside NAA Portion

Sector	Source Category	Outside Nonattainment Area Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Point	All	58	281	807	276	1
NonPoint	Biogenics	0	0	977	33,687	0
NonPoint	Construction Dust	12	0	0	0	0
NonPoint	Paved Road Dust	1	0	0	0	0
NonPoint	Unpaved Road Dust	36	0	0	0	0
NonPoint	Fires - Prescribed Fires	94,096	6,230	7,654	272,246	18,939
NonPoint	Fires - Wildfires	2,839	186	225	8,225	572
NonPoint	Fuel Comb - Residential - Wood	47	1	6	160	2
NonPoint	Fuel Comb - Residential - Other Space Heating	1	79	31	2	0
NonPoint	Waste Disposal - Municipal Landfills	0	0	0	0	0
NonPoint	Waste Disposal - Other	27	2	9	6	5
NonPoint	All Others	22	6	112	226	2
OnRoad	All	6	0	138	88	5
NonRoad	All	29	0	187	631	1
TOTALS		**97,174**	**6,787**	**10,145**	**315,549**	**19,528**
CONTROLLABLE SOURCE TOTALS		**239**	**371**	**1,290**	**1,390**	**17**
PCT OF MIDDLE INVENTORY CONTROLLABLE EMISSIONS		**18%**	**15%**	**21%**	**31%**	**5%**

3.4 Inner Emissions Inventory Analysis

As explained in Section 3.1, the Inner Inventory extent is the existing 24-hour $PM_{2.5}$ Fairbanks NAA. Emissions within the Inner Inventory were spatially distributed into two subareas: 1) the Fairbanks portion of the NAA (which includes the Goldstream Valley), and 2) the North Pole portion of the NAA. Figure 3.1-3 shows each of these subareas within the Inner Inventory area as well as key roadways within the region. The Fairbanks and North Pole subareas are 175.60 square miles and 61.12 square miles in size, respectively. (The entire NAA encompasses 236.73 square miles.)

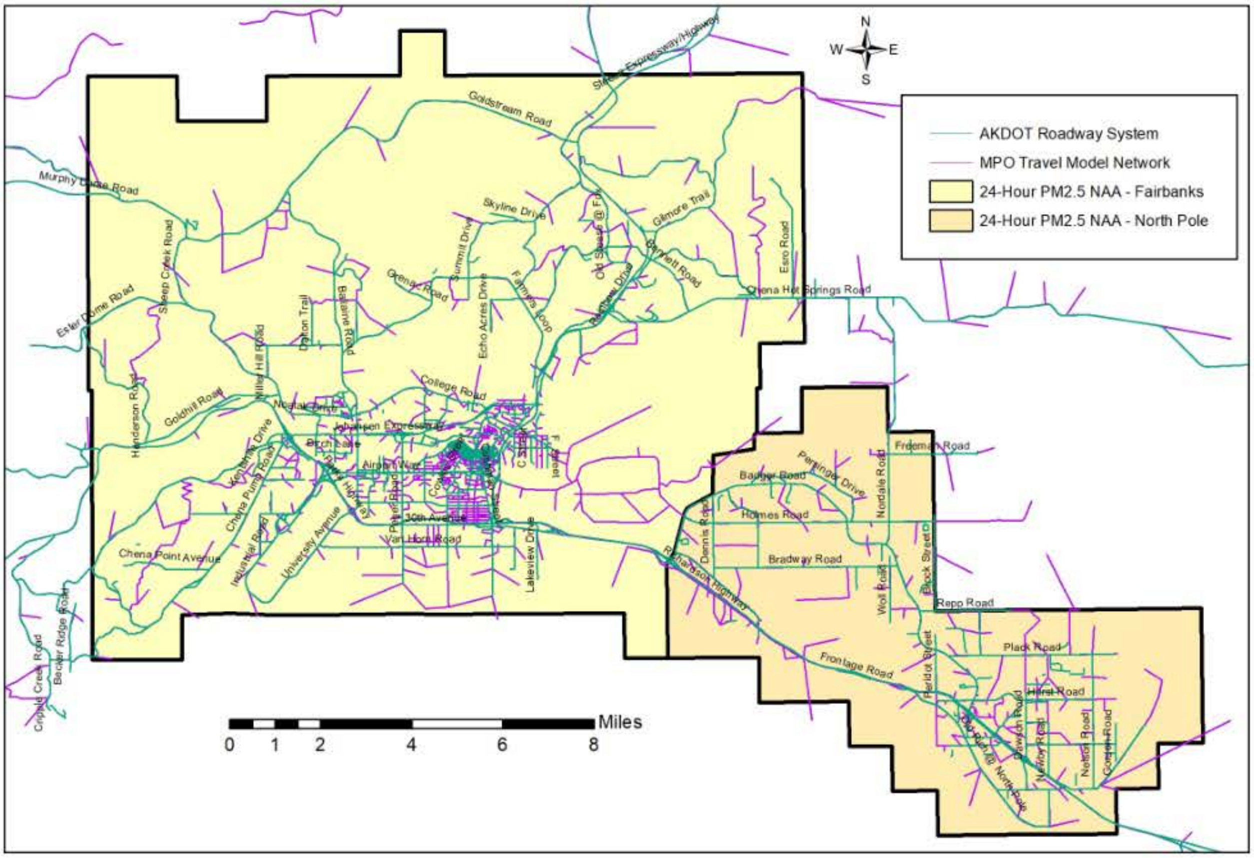


Figure 3.1-3: *24-Hour Nonattainment Inner Inventory Area and Fairbanks and North Pole Subareas*

Table 3.1-14 shows emissions for the Inner Inventory area, the existing 24-hour nonattainment area, by pollutant and source category. Since the Inner Inventory only reflects spatial refinements, not source activity or emission refinements, its emissions are identical to those presented earlier in Table 3.1.12 for the "Inside NAA" portion of the Middle Inventory. As with the earlier Middle Inventory tables, the Biogenics, Prescribed Fires, and Wildfires source categories were shaded to reflect the fact that due to either their natural origin or treatment as exceptional events, they are not included within the Controllable Emissions subtotals at the bottom of the table.

Table 3.1-14 *Inner Inventory Emissions by Pollutant and Key Source Category – Entire 24-Hour NAA*

Sector	Source Category	24-Hour Nonattainment Area Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Point	All	156	1,534	3,250	8	22
NonPoint	Biogenics	0	0	23	803	0
NonPoint	Construction Dust	81	0	0	0	0
NonPoint	Paved Road Dust	6	0	0	0	0
NonPoint	Unpaved Road Dust	181	0	0	0	0
NonPoint	Fires - Prescribed Fires	1,275	97	152	3,591	250
NonPoint	Fires - Wildfires	0	0	0	0	0
NonPoint	Fuel Comb - Residential - Wood	316	8	42	1,076	11
NonPoint	Fuel Comb - Residential - Other Space Heating	9	533	207	13	1
NonPoint	Waste Disposal - Municipal Landfills	0.47	5	3	0	212
NonPoint	Waste Disposal - Other	185	17	62	44	36
NonPoint	All Others	151	40	767	1,552	17
OnRoad	All	28	2	636	406	23
NonRoad	All	1	0	4	15	0
TOTALS		**2,388**	**2,235**	**5,147**	**7,511**	**572**
CONTROLLABLE SOURCE TOTALS		**1,113**	**2,138**	**4,972**	**3,116**	**322**

As performed with the Middle Inventory, a series of similar surrogate metrics were tabulated to spatially allocate total NAA emissions into the Fairbanks and North Pole subareas. Table 3.1-15 presents these Inner Inventory surrogates and allocations to the Fairbanks and North Pole subareas.

Table 3.1-15 *Inner Inventory Subarea Spatial Allocation Fractions by Source Category*

Sector	Source Category	Spatial Surrogate	Fairbanks NAA %	North Pole NAA %
Point	All	Source Location	Varies	Varies
NonPoint	Biogenics	Rural Land Area	77.5%	22.5%
NonPoint	Construction Dust	Population	84.3%	15.7%
NonPoint	Paved Road Dust	Paved Road VMT	76.8%	23.2%
NonPoint	Unpaved Road Dust	Unpaved Road VMT	36.0%	64.0%
NonPoint	Fires - Prescribed Fires	2020 Prescribed Fire Locations	100.0%	0.0%
NonPoint	Fires - Wildfires	2020 Wildfire Locations	0.0%	0.0%
NonPoint	Fuel Comb - Residential – Wood	SIP Gridded 2020 Inventory	Varies	Varies
NonPoint	Fuel Comb - Residential - Other Space Heating	SIP Gridded 2020 Inventory	Varies	Varies
NonPoint	Waste Disposal - Municipal Landfills	Source Location	100.0%	0.0%
NonPoint	Waste Disposal - Other	Population	84.3%	15.7%
NonPoint	All Others	Population	84.3%	15.7%
OnRoad	All	Roadway VMT	75.1%	24.9%
NonRoad	All	Rural Land Area	77.5%	22.5%

With the exception described below, the same spatial surrogates were analyzed to allocate Inner Inventory emissions into the Fairbanks and North Pole subareas as were used to allocate Middle Inventory emissions to the Inside NAA and Outside NAA areas. Although the resulting spatial allocation factors were different (comparing Table 3.1-11 to Table 3.1.15), the data sources and analysis approaches were the same.

The exception was for the Residential Wood Combustion and Other Residential Space Heating categories. As indicated in Table 3.1-15, the gridded emissions inventory from the SIP (based on 1.33 km square grid cells) was used to spatially allocate total NAA emissions for both space heating categories into the Fairbanks and North Pole subareas. Although the SIP gridded inventory represented winter episodic emissions, it was assumed that the change in space heating fuels between winter and summer (i.e., less relative wood use in summer) and resultant emissions was the same across the entire Inner Inventory nonattainment area. Thus, the winter spatial allocation factors were also applicable to the summer.

As indicated by the "Varies" entries in Table 3.1-15, the spatial allocation factors for the two residential space heating source categories are pollutant specific as the mixture of heating devices and fuels differs across the nonattainment area. For direct $PM_{2.5}$, 53% of the Inner Inventory emissions were allocated to the Fairbanks subarea (with the remaining 47% allocated to the North Pole subarea). The SO_2, NOx, VOC and NH_3 allocation factors for the Fairbanks subarea were 70%, 74%, 47% and 64%, respectively, with complementary percentages allocated to the North Pole subarea.

Table 3.1.16 and Table 3.1.17 contain the resulting Inner Inventory emissions for the Fairbanks and North Pole subareas, respectively.

As highlighted at the bottom of Table 3.1-16, most of the Controllable emissions of the Inner Inventory are estimated to occur within the Fairbanks subarea, with direct $PM_{2.5}$ emissions representing 66% of the Inner Inventory total. Allocated emissions in the Fairbanks subarea for the precursor pollutants range from 51% for NOx to 88% for NH_3.

The emissions by source category and resultant Controllable emissions percentages for the North Pole subarea are presented in Table 3.1-17 and expectedly reflect complementary lower fractions of Inner Inventory emissions. However, the lower Controllable emissions fractions in North Pole are a product of its size.

Table 3.1-18 compares Controllable emissions densities by pollutant (in tons/year per square mile) for the Fairbanks and North Pole subareas (along with the subarea size). As highlighted at the bottom of Table 3.1-18, Controllable source emission densities for all pollutants are higher in North Pole than Fairbanks, and by a significant margin for all pollutants except NH_3. Though not shown in Table 3.1-18, this is a product of higher residential wood burning emissions density in North Pole for $PM_{2.5}$ and higher point source emissions densities for SO_2 and NOx.

So, although emissions are greater in the Fairbanks subarea than the North Pole subarea, emissions of direct $PM_{2.5}$ and key precursor pollutants SO_2 and NOx are significantly more concentrated in North Pole based on these Controllable emissions density comparisons.

Table 3.1-16 Inner Inventory Emissions by Pollutant and Key Source Category – Fairbanks NAA Portion

Sector	Source Category	Fairbanks NAA Portion Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Point	All	118	888	1,170	7	1
NonPoint	Biogenics	0	0	18	623	0
NonPoint	Construction Dust	68	0	0	0	0
NonPoint	Paved Road Dust	5	0	0	0	0
NonPoint	Unpaved Road Dust	65	0	0	0	0
NonPoint	Fires - Prescribed Fires	1,275	97	152	3,591	250
NonPoint	Fires - Wildfires	0	0	0	0	0
NonPoint	Fuel Comb - Residential - Wood	168	5	31	502	7
NonPoint	Fuel Comb - Residential - Other Space Heating	5	375	153	6	1
NonPoint	Waste Disposal - Municipal Landfills	0.47	5	3	0	212
NonPoint	Waste Disposal - Other	156	14	52	37	30
NonPoint	All Others	127	34	646	1,308	14
OnRoad	All	21	1	478	305	17
NonRoad	All	1	0	3	12	0
TOTALS		**2,008**	**1,420**	**2,707**	**6,392**	**532**
CONTROLLABLE SOURCE TOTALS		**733**	**1,323**	**2,537**	**2,178**	**283**
PCT OF INNER INVENTORY CONTROLLABLE EMISSIONS		**66%**	**62%**	**51%**	**70%**	**88%**

Table 3.1-17 Inner Inventory Emissions by Pollutant and Key Source Category – North Pole NAA Portion

Sector	Source Category	North Pole NAA Portion Emissions (tons/year)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Point	All	39	645	2,080	1	21
NonPoint	Biogenics	0	0	5	180	0
NonPoint	Construction Dust	13	0	0	0	0
NonPoint	Paved Road Dust	1	0	0	0	0
NonPoint	Unpaved Road Dust	116	0	0	0	0
NonPoint	Fires - Prescribed Fires	0	0	0	0	0
NonPoint	Fires - Wildfires	0	0	0	0	0
NonPoint	Fuel Comb - Residential - Wood	147	2	11	574	4
NonPoint	Fuel Comb - Residential - Other Space Heating	4	158	54	7	0
NonPoint	Waste Disposal - Municipal Landfills	0	0	0	0	0
NonPoint	Waste Disposal - Other	29	3	10	7	6
NonPoint	All Others	24	6	121	244	3
OnRoad	All	7	0	158	101	6
NonRoad	All	0	0	1	3	0
TOTALS		**380**	**815**	**2,440**	**1,118**	**39**
CONTROLLABLE SOURCE TOTALS		**380**	**815**	**2,435**	**938**	**39**
PCT OF INNER INVENTORY CONTROLLABLE EMISSIONS		**34%**	**38%**	**49%**	**30%**	**12%**

Table 3.1-18 *Inner Inventory Controllable Emissions Density by Subarea and Pollutant*

Subarea	Subarea Size (sq mi)	Controllable Emissions Density (tons/year per sq mi)				
		$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Fairbanks	175.60	4.18	7.53	14.45	12.40	1.61
North Pole	61.12	6.21	13.33	39.84	15.34	0.65

3.5 Population Density and Degree of Urbanization

Population and Occupied Households - This subsection presents comparisons of population and household counts within the two sub-areas of the current $PM_{2.5}$ nonattainment area compiled from block-level data in the 2020 Census. Population and household counts compiled at the Census block level across the 24-Hour $PM_{2.5}$ NAA were examined within GIS maps that included base layers identifying the boundaries of the NAA and the Fairbanks and North Pole subareas. Because the size of the census blocks varies significantly across the FNSB $PM_{2.5}$ NAA, the Census data were plotted on a density basis (e.g., population per square mile).

Figure 3.1-4 and Figure 3.1-5 present spatial comparisons of 2020 population and occupied household density (per sq. mi), respectively for the entire FNSB Middle Inventory area. Within each figure, the Fairbanks and North Pole subareas are shown as separate, blue-edged boundaries that comprise the entire 24-Hour NAA. Population density (in Figure 3.1-4) and household density (in Figure 3.1-5) are plotted using successively dark color shading from yellow to brown, as denoted in the map legends.

As seen in both Figure 3.1-4 and Figure 3.1-5, population and occupied households are clustered within the 24-Hour NAA. Outside the NAA, population per square mile rarely exceeds 100 people. Thus, the regions outside the NAA are very sparsely populated.

Zooming in to the NAA, Figure 3.1-6 and Figure 3.1-7 show the 2020 population and occupied household densities over the Inner Inventory area. Within these figures, the Fairbanks subarea) is larger blue bounded polygon to the left; the North Pole areas is the smaller blue bounded polygon to the lower right within the NAA.

At this scale, population and occupied household densities vary more significantly across the NAA. As shown in Figure 3.1-6, the highest population densities (over 5,000 per square mile) are largely concentrated in and around downtown Fairbanks, also extending westward. Occupied household density exhibits similar spatial patterns as shown in Figure 3.1-7.

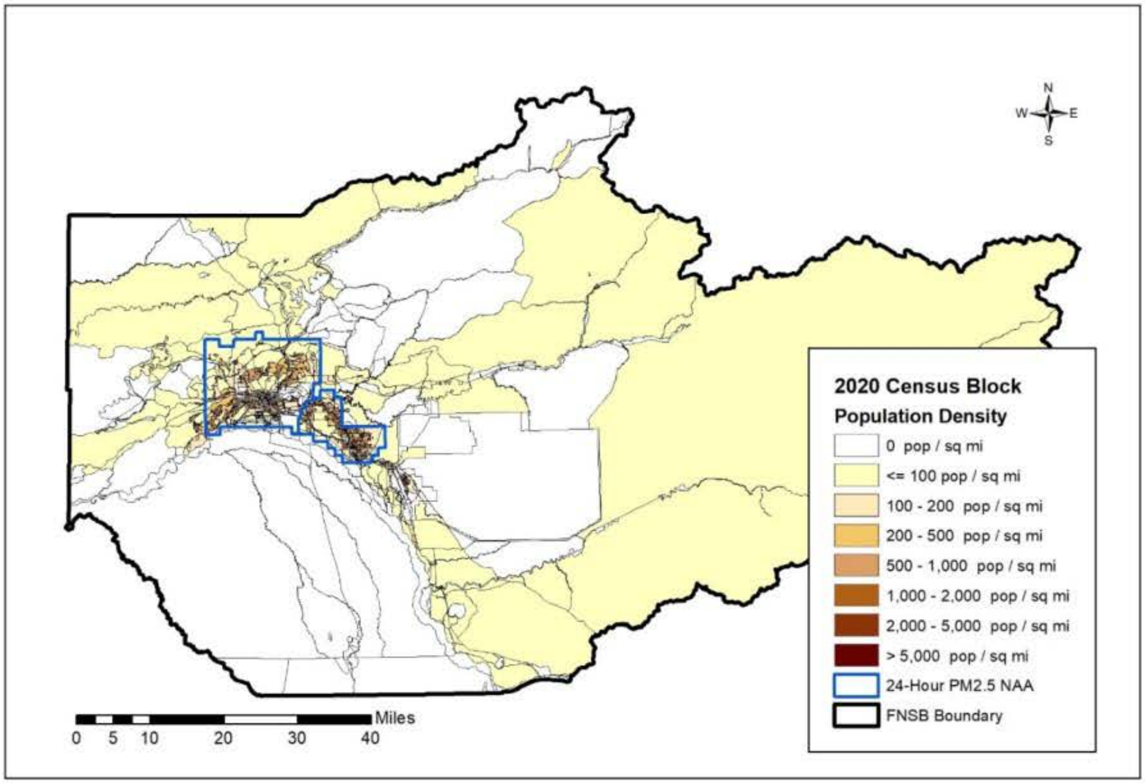


Figure 3.1-4: *2020 Census Population Density - FNSB Middle Inventory Area*

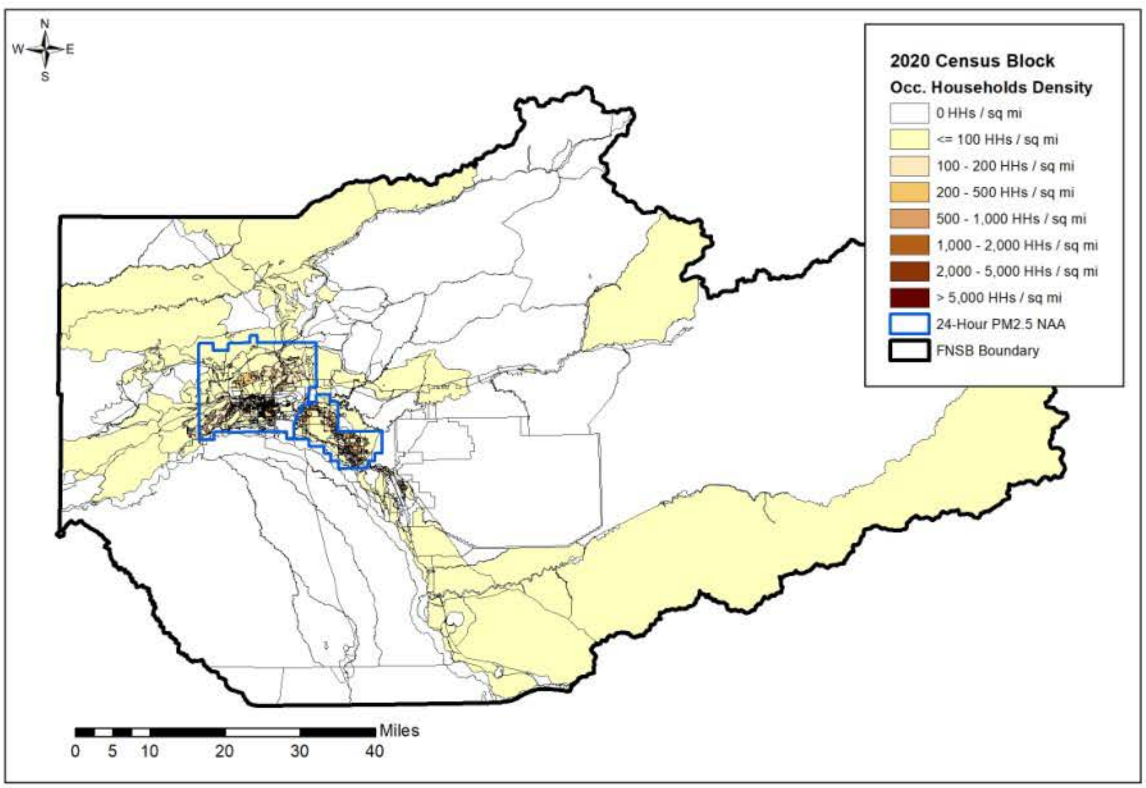


Figure 3.1-5: *2020 Census Occupied Households Density - FNSB Middle Inventory Area*

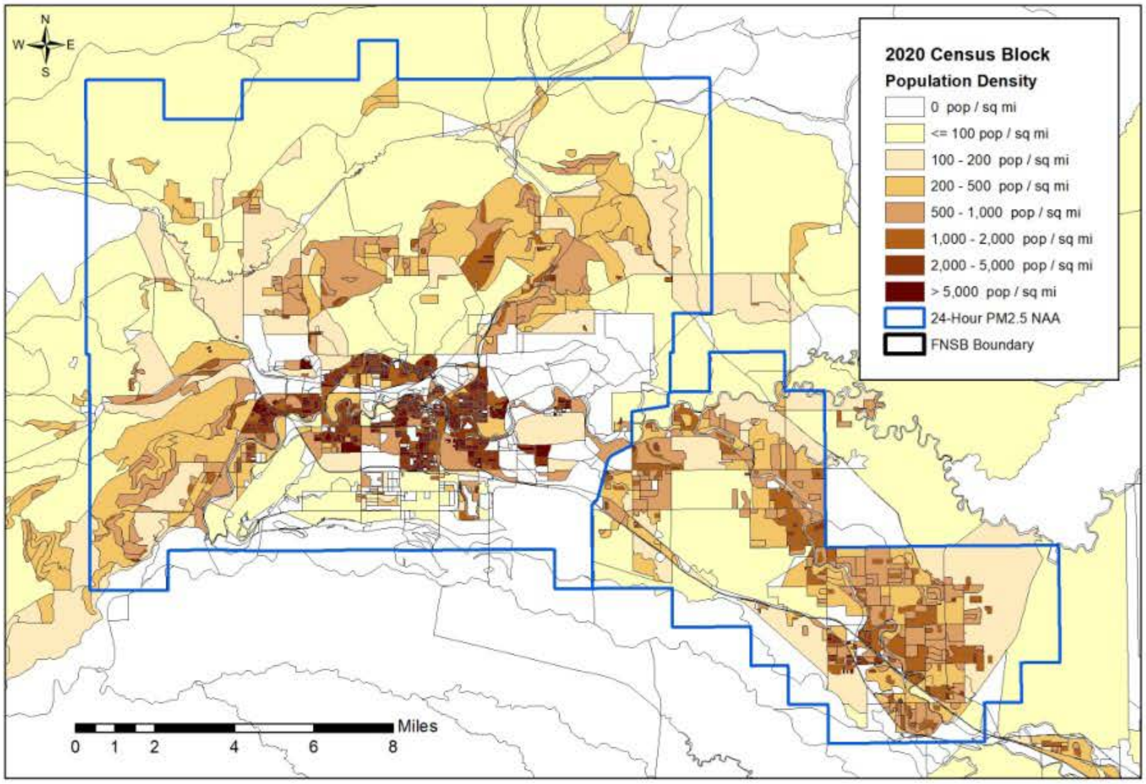


Figure 3.1-6: *2020 Census Population Density – 24-Hour NAA Inner Inventory Area*

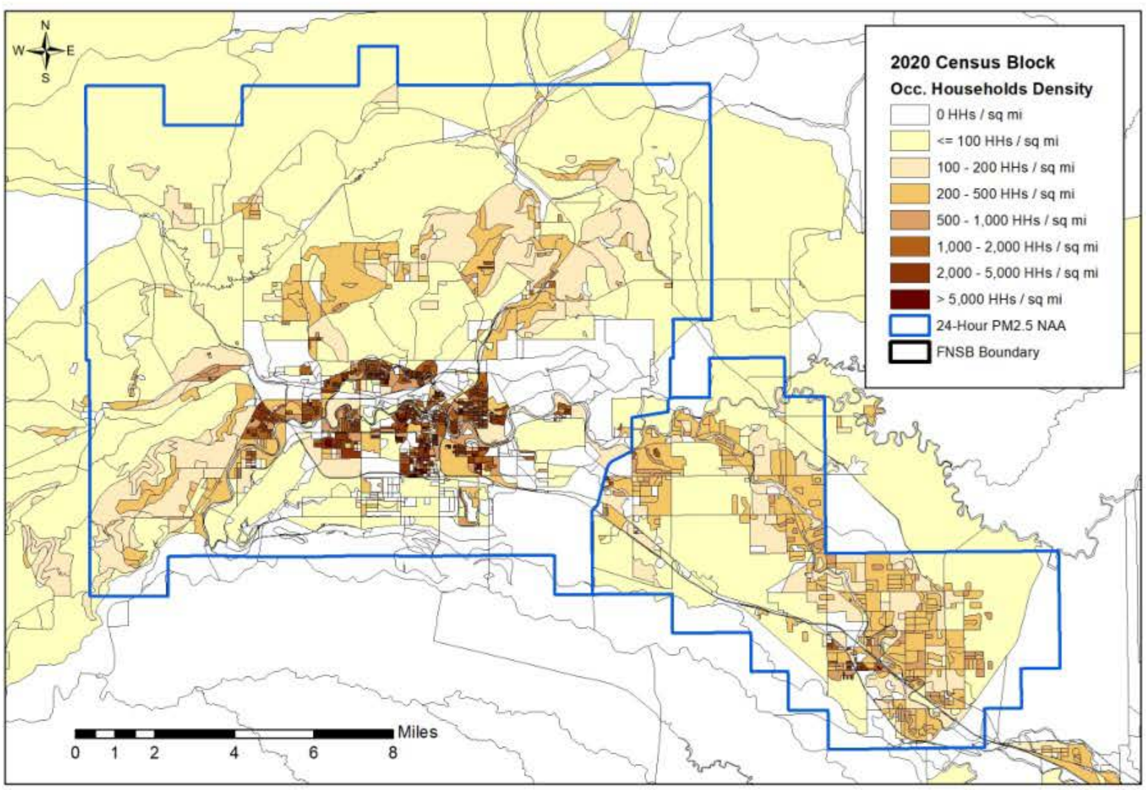


Figure 3.1-7: *2020 Census Occupied Households Density – 24-Hour NAA Inner Inventory Area*

Table 3.1-19 summarizes these FNSB spatial population and occupied household totals by subarea, showing 2020 totals of each within the Fairbanks and North Pole portions of the NAA, as well as totals outside the NAA. The rightmost two columns of Table 3.1-19 provide population and occupied households densities (per square mile) based on the subarea sizes also shown in the table.

Table 3.1-19 *FNSB 2020 Populations, Occupied Households and Densities by Subarea*

Subarea	Subarea Size (sq mi)	Totals		Density (per sq mi)	
		Population	Occ. Hhlds	Population	Occ. Hhlds
Fairbanks	175.60	70,380	26,919	**400.8**	**153.3**
North Pole	61.12	13,132	4,869	**214.9**	**79.7**
Outside NAA	7,098.08	12,143	4,733	**1.7**	**0.7**

On a subarea wide basis, Table 3.1-19 shows that the Fairbanks and North Pole portions of the NAA have population and occupied household densities that are more than two orders of magnitude higher than the region of the FNSB outside the NAA. Within the NAA, the Fairbanks subarea exhibits population and occupied household densities that are roughly double that of the North Pole subarea per the 2020 Census.

Degree of Urbanization – Finally, another relevant metric compiled under the 2020 Census consists of the spatial distribution and extent of urbanized areas (as classified under the Census) both across the entire FNSB (Middle Inventory) and NAA (Inner Inventory) areas.

Figure 3.1-8 and Figure 3.1-9 show these urbanized areas plotted over both the Middle and Inner Inventory areas, respectively. As seen in Figure 3.1-8, the only urbanized area outside the NAA is located to its southeast and includes the Moose Creek and Eielson Air Force Base areas.

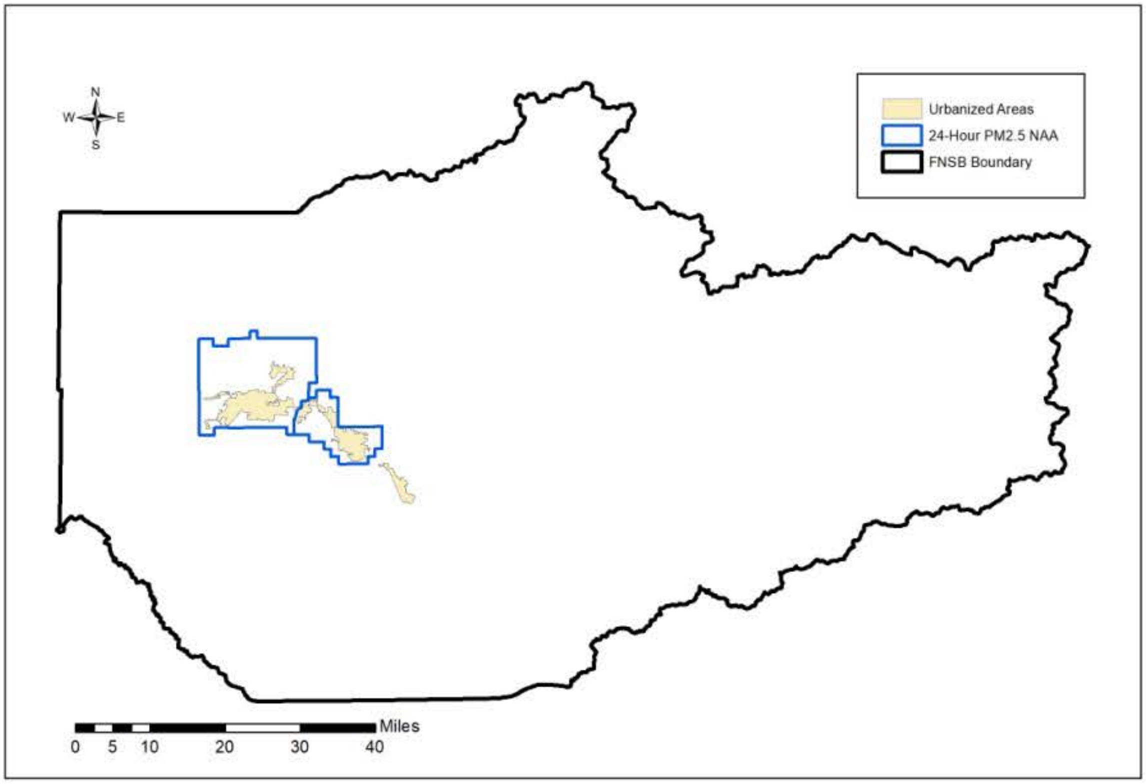


Figure 3.1-8: *2020 Census Urbanized Area - FNSB Middle Inventory Area*

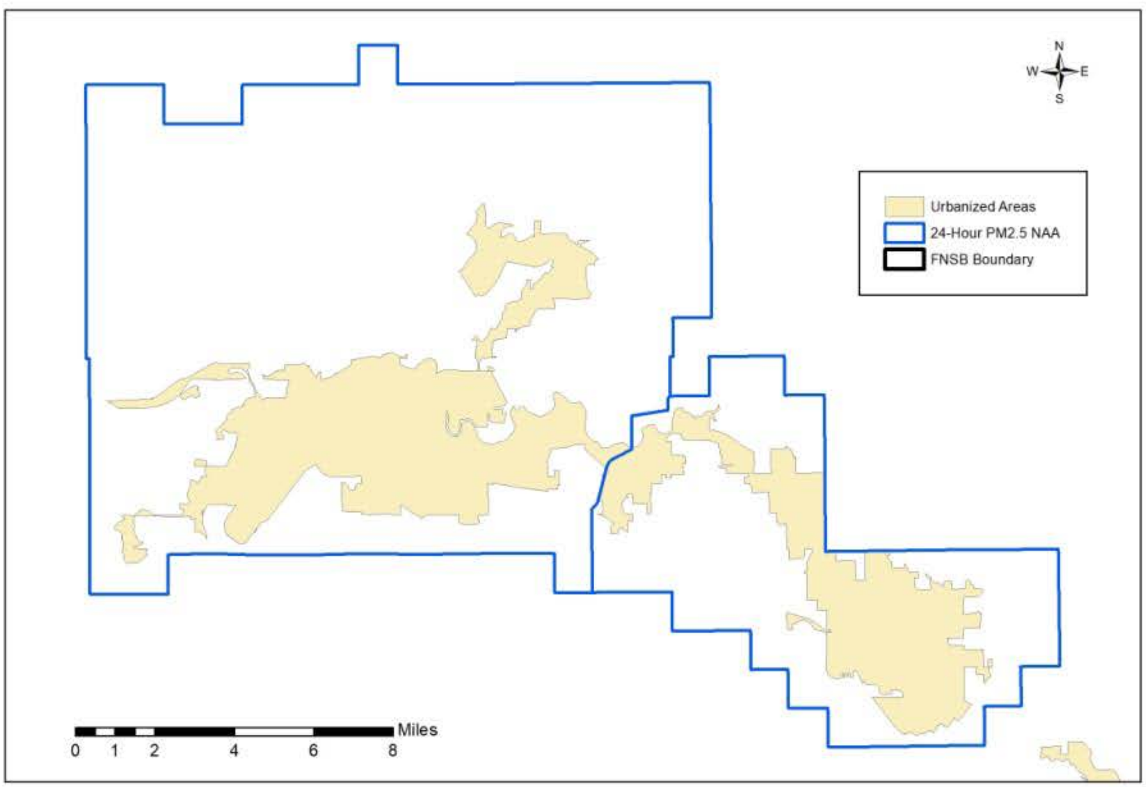


Figure 3.1-9: *2020 Census Urbanized Area - 24-Hour NAA Inner Inventory Area*

Table 3.1-20 compares the degree of urbanization (as total and fractional land area) across the regions of the entire FNSB: Entire NAA and Outside NAA, as well as the Fairbanks and North Pole subareas within the NAA.

Table 3.1-20 *FNSB 2020 Populations, Occupied Households and Densities by Subarea*

	Area Type (sq mi)		Area Type Fraction (%)	
Subarea	**Urban**	**Rural**	**Urban**	**Rural**
Fairbanks	44.51	131.09	25.3%	74.7%
North Pole	23.15	37.98	37.9%	62.1%
Entire NAA	67.66	169.07	28.6%	71.4%
Outside NAA	6.77	7091.31	0.1%	99.9%

As seen in Table 3.1-20, the degree of urbanization within and outside the NAA are dramatically different at 28.6% and 0.1% of land area, respectively. Within the NAA, urbanized area fractions within the Fairbanks and North Pole subareas are similar, although higher in North Pole (37.9%) than Fairbanks (25.3%).

3.6 Traffic and Commuting Patterns

Traffic and Vehicle Miles Traveled - Metrics related to traffic and commuting patterns across the Middle and Inner Inventory areas were also examined and are presented in this subsection. Over the entire Middle Inventory (FNSB) area, traffic patterns were based on 2021 Annual Average Daily Traffic (AADT) levels compiled by ADOT&PF and contained in a road segment spatial GIS database. Within the Inner Inventory (NAA) area, spatial traffic patterns were compiled from travel model outputs from the most recent 2045 MTP Update regional transportation conformity analysis[48] completed in March 2023 by FAST Planning. The Fairbanks Area Surface Transportation (FAST) Planning is the Metropolitan Planning Organization for the urbanized areas of the FNSB. The FAST Planning travel modeling network encompasses the entire NAA and just beyond.

Figure 3.1-10 shows AADT-based traffic levels across the Middle Inventory area. As shown, AADT levels outside the NAA are generally below 1,000 vehicles per day. Within the NAA, the large majority of the roadways exhibit AADT levels below 10,000 vehicles per day.

This can be seen more clearly in Figure 3.1-11, which shows traffic levels for the smaller NAA based on FAST Planning travel model outputs for calendar year 2021. As seen in Figure 3.1-11, the segments with traffic levels above 10,000 or 15,000 vehicles per day are the highway (Parks, Steese, Richardson) corridors or major arterial roadways.

[48] https://fastplanning.us/mtpupdate/

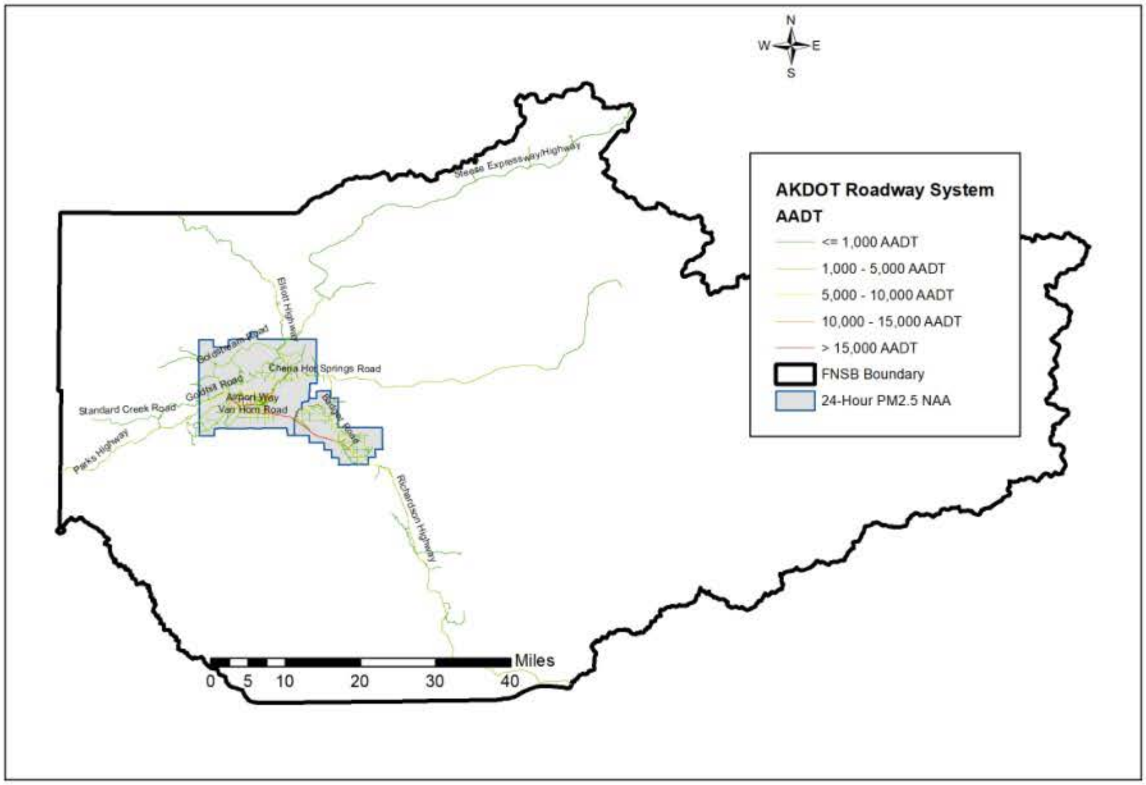


Figure 3.1-10: *2021 Annual Average Daily Traffic (AADT) – FNSB Middle Inventory Area*

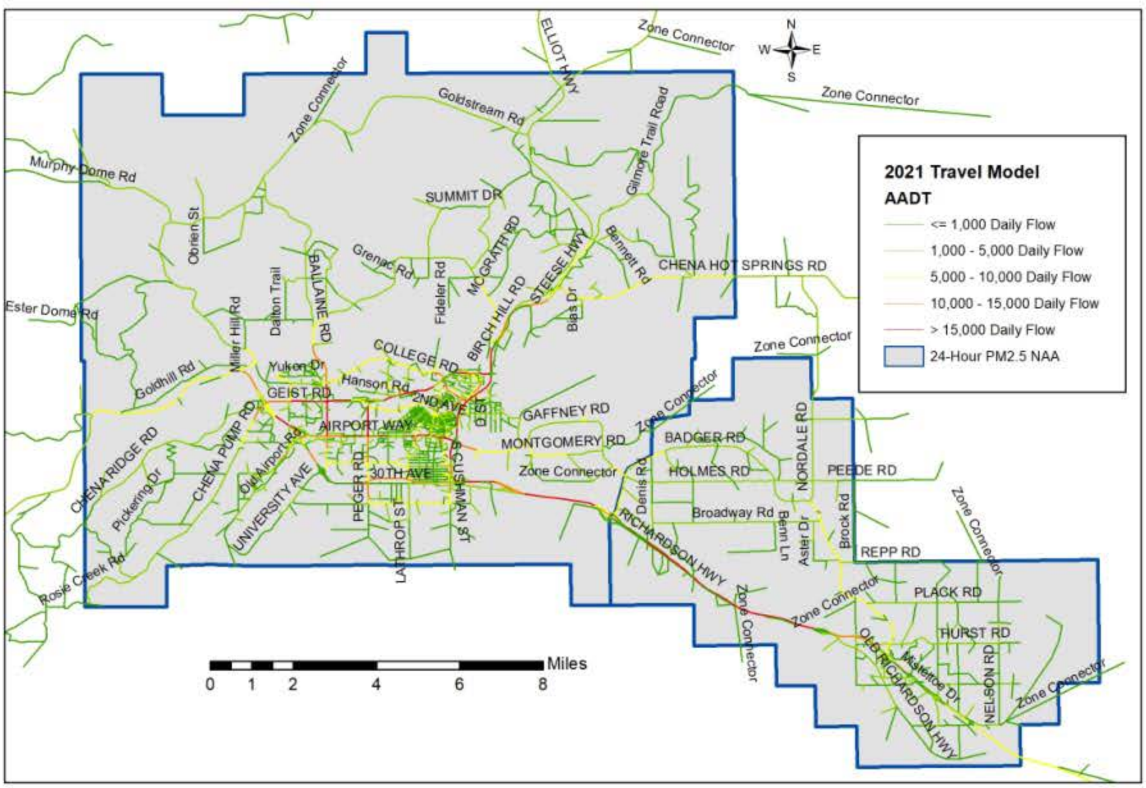


Figure 3.1-11: *2021 Annual Average Daily Traffic (AADT) – 24-Hour NAA Inner Inventory Area*

Vehicle miles traveled data for the NAA and Fairbanks and North Pole subareas by time of day from the travel model are tabulated in Table 3.1-21. As shown in Table 3.1-21, most of the VMT (81%) in the NAA occurs within the Fairbanks subarea.

Table 3.1-21 *Inner Inventory (NAA) 2021 Travel Model Daily VMT by Subarea and Time of Day*

	PM2.5 Nonattainment Area Daily VMT		
Daily Time Period	**Fairbanks**	**North Pole**	**Total**
AM 2-Hour	149,350	42,360	191,710
PM 3-Hour	295,126	42,345	337,471
Off Peak 19 Hours	800,588	199,142	999,730
TOTAL	**1,245,065**	**283,846**	**1,528,911**
NAA VMT Fraction (%)	**81.4%**	**18.6%**	**100%**

Traffic Congestion – Another characteristic of vehicle travel within both the Fairbanks and North Pole portions of the NAA that distinguishes it from other larger metropolitan areas is its lack of traffic congestion. Volume to capacity ratios (or V/C) are one of several metrics used in transportation planning to measure congestion levels across a roadway network. They are calculated by dividing traffic volumes by the traffic capacity of a road segment. V/C data from the FAST Planning 2021 travel model outputs were analyzed to characterize traffic congestion within the NAA. A V/C ratio of 1 indicates that traffic volume is equal to the design capacity of the roadway and generally reflects modest congestion. V/C ratios well below 1 indicate little or no congestion while V/C ratios over 1 reflect traffic congestion.

Histograms of V/C across all roadway segments within the Fairbanks and North Pole subareas were tabulated and are plotted in Figure 3.1-12 for the two-hour AM Peak period and in Figure 3.1-13 for the three-hour PM peak period.

As shown in both Figure 3.1.12 and Figure 3.1.13, an overwhelming majority of road segments in both the Fairbanks and North Pole subareas operate at V/C ratios less than 0.5, indicating little congestion in both subareas during both AM and PM peak commute traffic periods.

Comparing the histograms for the two subareas shows that the North Pole area experiences less congestion (based on V/C ratio distributions) than in Fairbanks.

Figure 3.1-12: *24-Hour NAA Volume to Capacity Ratios by Subarea – AM Peak*

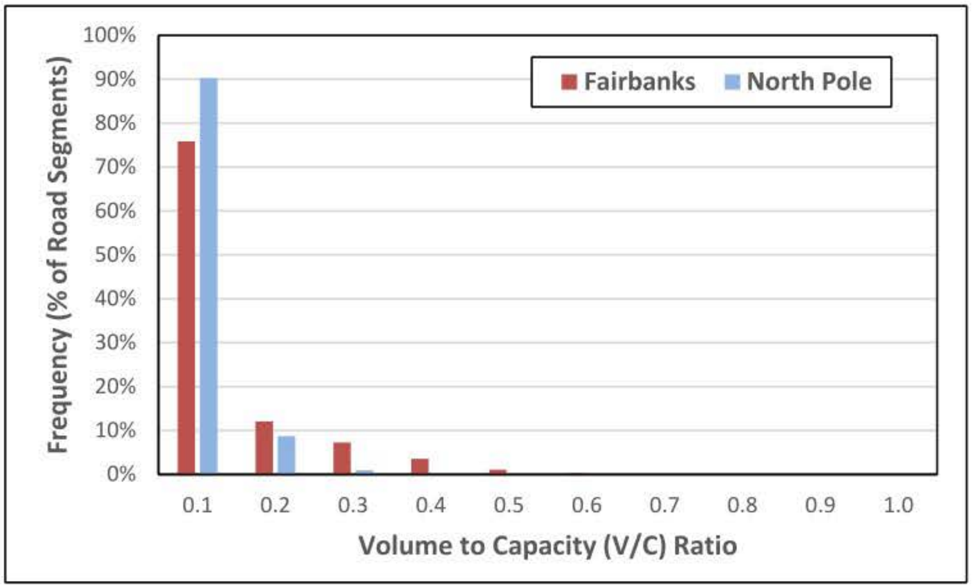
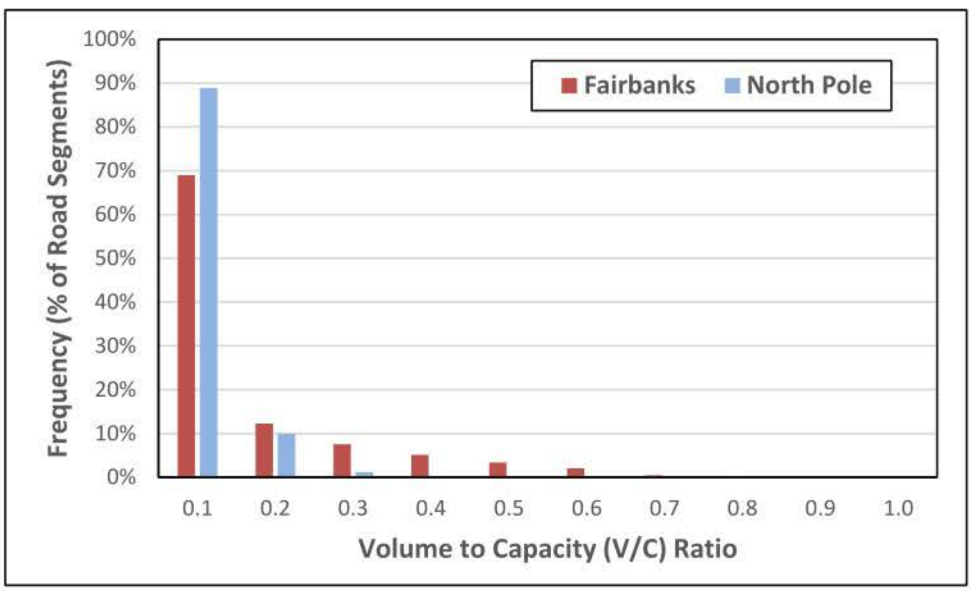


Figure 3.1-13: *24-Hour NAA Volume to Capacity Ratios by Subarea – PM Peak*



3.7 Summary

Annual emissions inventories were developed for three extents within Interior Alaska to provide insight into the levels and locations of directly emitted $PM_{2.5}$ and precursor pollutant emissions within each extent by source category under the Factor 2 analysis. The three extents were called the Outer, Middle, and Inner Inventories. The Outer Inventory included the Fairbanks North Star Borough (FNSB) and the three surrounding boroughs: Denali, Southeast Fairbanks, and Yukon-

Koyukuk. The Middle Inventory was defined as the FNSB and included spatial breakouts of emissions both within and outside the existing 24-hour $PM_{2.5}$ nonattainment area (NAA). Finally, the Inner Inventory represented the NAA and examined sources within both the Fairbanks and North Pole portions of the NAA.

Emissions data for the Outer Inventory were tabulated from EPA's 2020 NEI. Activity estimates and emissions were successively refined for key source categories for the Middle and Inner inventories where data from the 2024 Amendment to the Fairbanks Serious Area $PM_{2.5}$ SIP could be reasonable extrapolated from a winter episodic to an annual basis. Source categories that represent naturally occurring or exceptional event-based emissions included Biogenics, Prescribed and Wildfire Wildland Fires. Emissions were tabulated both with and without these source categories to provide insight as to which portion of total emissions originate from likely controllable emission sources. Moreover, a series of spatial surrogates were analyzed to estimate emissions by subarea within the Middle and Inner inventories.

These emissions analyses suggest that the nonattainment boundaries do not need to extend beyond the boundaries of the existing 24-hour NAA. Within the existing NAA, analysis of controllable source emissions densities (tons per square mile) found that the North Pole subarea exhibits emissions densities for $PM_{2.5}$ and precursor pollutants SO_2 and NOx that are 49%, 77% and 176% higher than the Fairbanks subarea, respectively. The Fairbanks and North Pole subarea emissions within the Inner Inventory can be examined in conjunction with ambient monitoring and meteorological data and modeling to assess further refinement to the boundaries for the annual $PM_{2.5}$ nonattainment area.

The Factor 2 evaluation also included analysis of population and occupied household densities, degree of urbanization and traffic and commuting patterns that strongly indicate that emission sources that spatially align with these metrics are largely contained within the existing 24-hour NAA.

4. FACTOR 3- METEOROLOGY

The Interior of Alaska, where the Fairbanks North Star Borough is located, annually experiences large temperature swings. Temperatures have been recorded as low as -78°F in mid-winter, and as high as 93°F in summer. Average annual precipitation is 11.3 inches, and ice fog is common during the winter. The extremes in day length in the FNSB range from 21 hours of direct sunlight between May 10 and August 2 to less than four hours of direct sunlight between November 18 and January 24. Extended solar radiation and variable winds during the summer result in good vertical and horizontal air mixing and pollutant dispersion. As mentioned in Chapter 2, summertime $PM_{2.5}$ concentrations are usually low unless impacted by wildland fire smoke.

Fairbanks North Star Borough winters are dominated by a pattern of cold, stable air that supports the buildup of air pollutants. Temperatures typically range between -20°F and +20°F, with several periods of -40°F each winter. Occasionally, temperatures can extend to much colder temperatures (e.g., -55°F in Jan 2012). A combination of high albedo and the low solar elevation that occurs in northern latitudes during the winter months creates little heating of the ground and weak vertical mixing between the surface and overlying air. Fairbanks and North Pole frequently experience ground-based inversions of considerable strength (40°F/100m) topped by weaker inversion zones such that the layer of inverted lapse rate often reaches as high as 1-2 kilometers. During strong inversions, the warm air cap/lid can be at a height of 300 feet above ground level. This condition, together with local emissions of $PM_{2.5}$, can cause episodes of significantly elevated $PM_{2.5}$ concentrations.

Meteorological parameters are measured at the three regulatory monitoring sites as well as the Fairbanks International Airport and the two military bases, Fort Wainwright and Eielson Air Force Base. Below is a discussion of the airflow patterns at the three regulatory monitoring sites from 2021 to 2023. The first section discusses the annual hourly wind patterns, followed by a discussion of the seasonal variation in wind patterns and an analysis of meteorology on days when daily $PM_{2.5}$ concentrations were above 9 $\mu g/m^3$.

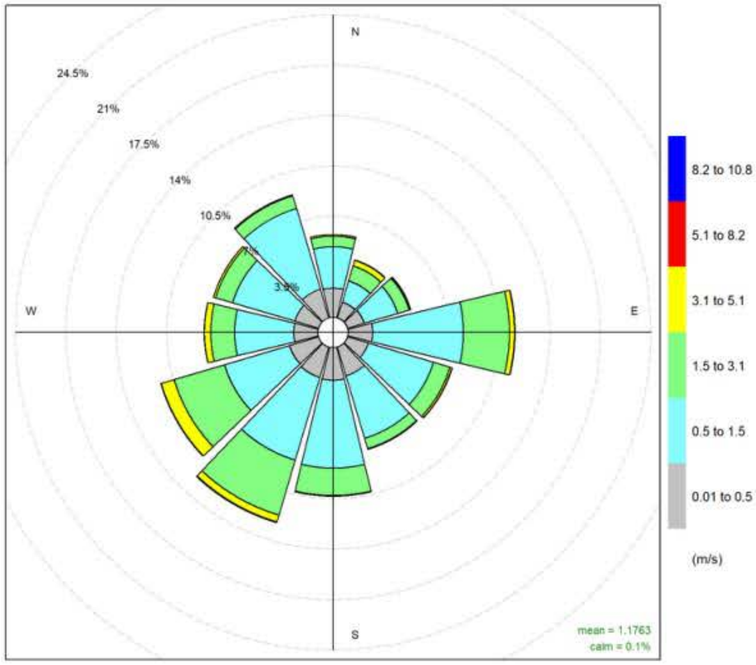
4.1 Annual Wind Patterns

In general, the wind regime in the FNSB $PM_{2.5}$ 24-hour nonattainment area is characterized by relatively low wind speeds year-round. During the winter months, low wind speeds combined with extreme low temperatures and stable atmospheric conditions lead to severe inversions, with the Fairbanks North Star Borough (FNSB) experiencing among the steepest lapse rates in the United States.

4.1.1 NCore Monitoring Site

Figure 4.1-1 illustrates the distribution of hourly wind speeds and directions measured at the FNSB NCore monitoring site in Fairbanks from 2021 to 2023. The radial lines indicate wind direction, while the concentric circles represent the percentage frequency of wind occurrences. The chart indicates that the most frequent wind direction is from the southwest (210°) accounting for 12.73% of the total observations, followed closely by a wind direction from the east (90°) with 11.58% of occurrences, and from the west (240°) with 11.42% of occurrences. These patterns suggest a prevailing wind flow from the eastern and southwestern quadrants of the area.

All Hourly Wind Speed (m/s) vs. Direction at the NCore Monitor 2021-2023



Frequency of counts by wind direction (%)

Figure 4.1-1 *Hourly Wind Rose for the NCore Monitoring Site, 2021-2023*

Wind speeds are color-coded, ranging from light gray representing calm conditions (0.01 to 0.5 m/s) to dark blue for the strongest winds (8.2 to 10.8 m/s). The average wind speed across all directions at NCore is approximately 1.2 m/s, with calm conditions occurring 0.1% of the time. Most of the wind speeds at NCore fall into the lower speed categories, predominantly between 0.5 to 3.1 m/s, as depicted by the light blue and green colors. Higher wind speeds occur occasionally, mostly from the west and southwest, with wind speeds in the range of 3.1 to 5.1 m/s as depicted by the yellow bands.

4.1.2 A-Street Monitoring Site

Figure 4.1-2 shows the three-year wind rose at the A-Street monitoring site in Fairbanks, indicating patterns that are similar to those observed at the NCore site but with notable distinctions that influence air quality in the A-Street area. The most frequent wind directions are from the east (90°) and southeast (120°), contributing 10.88% and 12.75% of the total wind observations, respectively. Winds from these directions are predominantly within the 0.5 to 1.5 m/s range, as indicated by the light blue sections of the wind rose. These light winds are often insufficient to disperse pollutants, particularly during temperature inversion conditions when $PM_{2.5}$ levels increase. As such, the relatively low wind speeds from the east and southeast play a significant role in the accumulation of pollutants at the A-Street Monitor site, which often experiences higher $PM_{2.5}$ concentrations than the NCore site. (The A-Street site is the maximum impact site for the Fairbanks Air Quality Control Zone.)

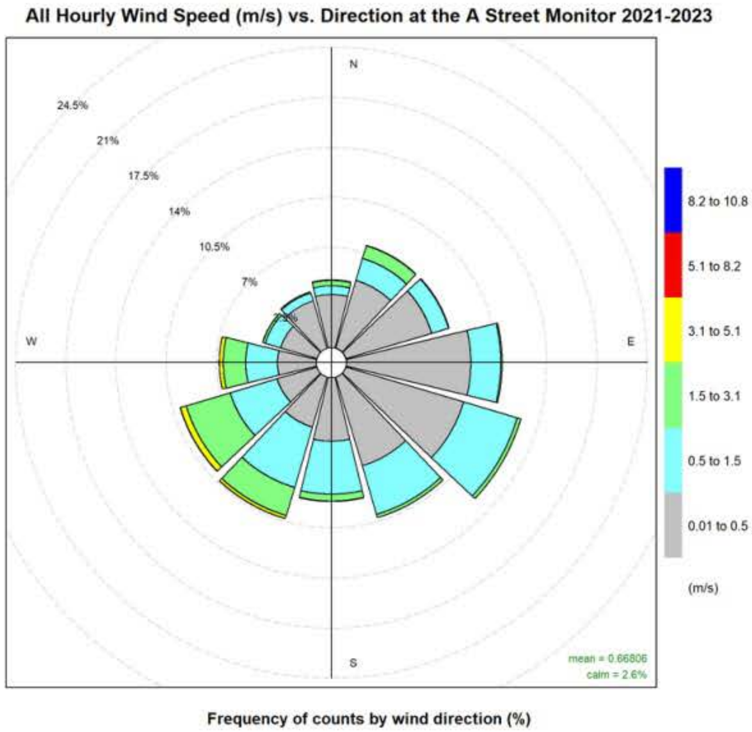


Figure 4.1-2 *Hourly Wind Rose for the A-Street Monitoring Site, 2021-2023*

Winds from the southwest (210°) and west (240°) also have a notable presence, with the west contributing 10.32% of the wind occurrences and the southwest accounting for 9.97%. Like the easterly winds, these western and southwestern winds tend to have low wind speeds, generally under 1.5 m/s, which further limits the dispersion of pollutants. These westerly winds tend to have slightly higher speeds, with some instances reaching above 3.1 m/s, but such events are relatively infrequent. West (270°) winds account for 6.78% of the observations, and like the westerly winds, they bring somewhat higher speeds. The mean wind speed at the A-Street Monitor is 0.67 m/s, with calm conditions occurring 2.6% of the time which reflects the slow-moving air patterns typical of the site.

4.1.3 Hurst Road Monitoring Site

Figure 4.1-3 depicts the hourly wind rose at the FNSB Hurst Road monitoring site in North Pole from 2021 to 2023. The most frequent wind directions recorded at the Hurst Road monitor sites are from the southeast (120°) and northeast (60°), with northeast winds being the most prominent, contributing approximately 14.69% to the overall wind distribution. Winds from the west (270°) and southwest (240°) also play a role in shaping behavior at the Hurst Road monitor with winds contributing 9.8% and 13.6% of the observed directions. Although less dominant than the easterly flows, winds from these directions still influence local wind patterns, particularly during shifts in regional airflow or changing weather conditions.

Wind speeds at the Hurst Road monitor are mainly concentrated in the 0.5 to 3.1 m/s range, with speeds above 3.1 m/s being rare. The mean wind speed observed at the Hurst Road monitor is 0.60 m/s, indicating predominantly low wind conditions, with calm periods accounting for 2.2% of the data. The southeast winds generally fall within this low-speed range, which limits their capacity to disperse pollutants effectively especially during inversion conditions. This dynamic makes the region more susceptible to $PM_{2.5}$ buildup, particularly during colder months, when low wind speeds prevent the efficient dispersal of airborne pollutants.

In the Hurst Road area, wind speeds above 1.5 m/s are crucial for reducing pollution levels, particularly $PM_{2.5}$ concentrations. However, most wind speeds recorded are below this critical threshold, thereby limiting dispersion of pollutants effectively (Figure 4.1-3). This issue is particularly pronounced during inversion periods, where stagnant air traps pollutants close to the surface. The fact that wind speeds above 1.5 m/s are relatively infrequent underscores the tendency of pollution buildup in the North Pole Air Quality Control Zone, particularly in the winter months when inversions are more common. These limited air movements make it difficult to clear pollutants, leading to elevated $PM_{2.5}$ levels, until stronger winds eventually break the inversion and clean out the area. Understanding this dynamic is critical when analyzing air quality issues in the North Pole area, as the relationship between low wind speeds and pollution accumulation is a defining feature of the wind patterns observed at the Hurst Road monitoring site.

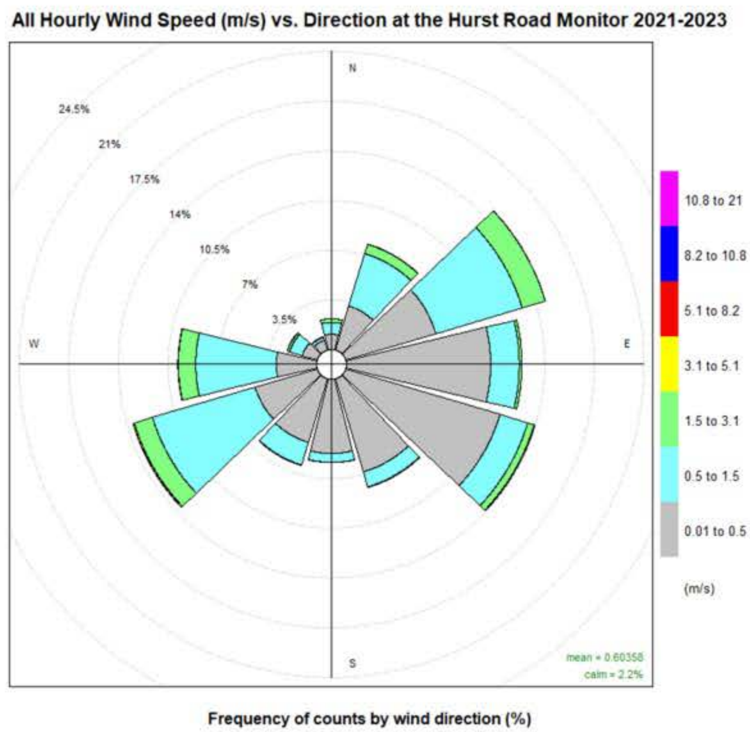


Figure 4.1-3 *Hourly Wind Rose for the FNSB Hurst Road Monitoring Site, 2021-2023*

The overall wind behavior in Figure 4.1-3 also reflects the significant influence of regional topography and drainage flows on wind patterns in North Pole. These patterns are essential for understanding how pollutants are trapped or dispersed under various weather conditions, especially during periods of low wind and temperature inversions.

4.2 Drainage Flow Patterns

The North Pole area is heavily influenced by regional drainage flows from the Upper Chena River and the Tanana River. The frequency of the prominent northeast winds at the Hurst Road monitor aligns well with the Upper Chena River drainage, which channels cold air down Angel Creek into the southeastern portion of North Pole. Similarly, prominent southeast winds in North Pole are likely to be influenced by the Tanana River drainage, which moves air from the southeast along the Tanana River Valley, contributing to the regional airflow (Figure 4.2-1).

In contrast to the North Pole area, the Fairbanks portion of the borough is affected by several drainage flows during the winter, as depicted in Figure 4.2-1. Cold air flows out of the Goldstream, Ester, and other valleys behind Cranberry and Chena Ridges into the University of Alaska Fairbanks area before emptying into the Tanana River valley. Relatively clean air comes from these directions, which helps to limit $PM_{2.5}$ concentrations in the western portion of Fairbanks during inversion periods. Cold air also drains off Birch Hill and Mt. Lulu into the eastern Fairbanks area.

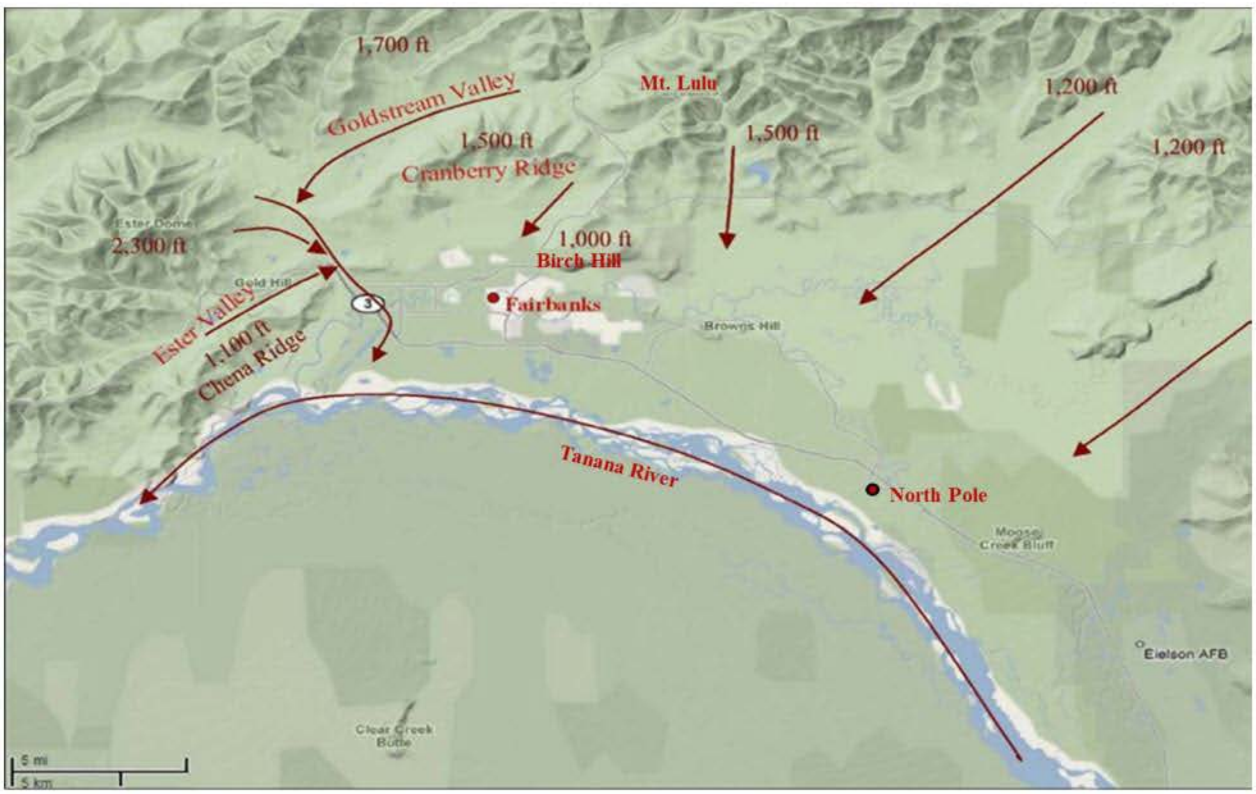


Figure 4.2-1 *Drainage Flow into Fairbanks North Star Borough Nonattainment Area*

4.3 Seasonal Wind Patterns

The section below contains a comparison of the wind patterns during the four calendar quarters at all three monitoring sites in the Fairbanks North Star Borough. As discussed in Factor 1: Air

Quality Data, $PM_{2.5}$ concentrations during the second and third calendar quarters are far below the annual standard and therefore do not contribute to elevated pollution levels at or above the annual standard. The wind roses below are separated into calendar quarters with Q1 representing January through March 2021- 2023; Q2 indicating April through June 2021-2023, Q3, July through August 2021-2023; and Q4, October through December 2021-2023.

4.3.1 NCore Monitoring Site

Figure 4.3-1 represents the hourly wind rose for the NCore monitoring site from Q1 to Q4 (2021-2023). The figure highlights the seasonal differences in wind behavior and is organized with Q1 and Q4 (representing the winter months) on the left, and Q2 and Q3 (representing the summer months) on the right. As mentioned previously, wind speeds greater than 1.1-1.5 m/s are necessary to begin reducing $PM_{2.5}$ concentrations at the NCore monitor, as speeds below this threshold tend to allow pollutants to accumulate, especially during inversion periods. During the winter months (October through March, Q1 and Q4), lower wind speeds and more frequent inversions typically trap pollutants near the surface, resulting in higher $PM_{2.5}$ levels. In contrast, the summer months (Q2 and Q3) tend to see more frequent winds exceeding this threshold, dispersing pollutants more effectively.

During Q1, the mean wind speed is 0.92 m/s, with most wind speeds falling below the critical 1.1-1.5 m/s range. This explains why pollution levels often remain elevated during the winter months, as these low speeds do little to disperse pollutants. Cold air drainage from the surrounding valleys provides some relief, bringing in cleaner air, but this effect is not enough to fully disperse $PM_{2.5}$. In Q2, wind speeds increase slightly, with a mean of 1.61 m/s, allowing for more frequent occurrences of speeds above the 1.1-1.5 m/s threshold. This results in better pollutant dispersion, reducing $PM_{2.5}$ levels more effectively during the spring months. As a result, pollution events are less frequent, though occasional inversions can still occur during periods of lower wind speeds, leading to daily concentrations in the moderate AQI range. The Q3 wind rose shows winds with slightly lower mean wind speeds than during Q2, at 1.28 m/s, with calm winds at 0.0% for the quarter. Higher overall temperatures and less frequent inversions ultimately lead to lower concentrations, although calm periods and low temperature in late fall can contribute occasionally to elevated pollution levels. In Q4, as the region transitions back into colder temperatures, wind speeds once again drop to an average of 0.93 m/s, similar to Q1. This results in frequent inversion conditions where pollutants are trapped near the surface, and wind speeds below the necessary threshold contribute to elevated pollution levels, especially in areas where local sources of $PM_{2.5}$ are significant.

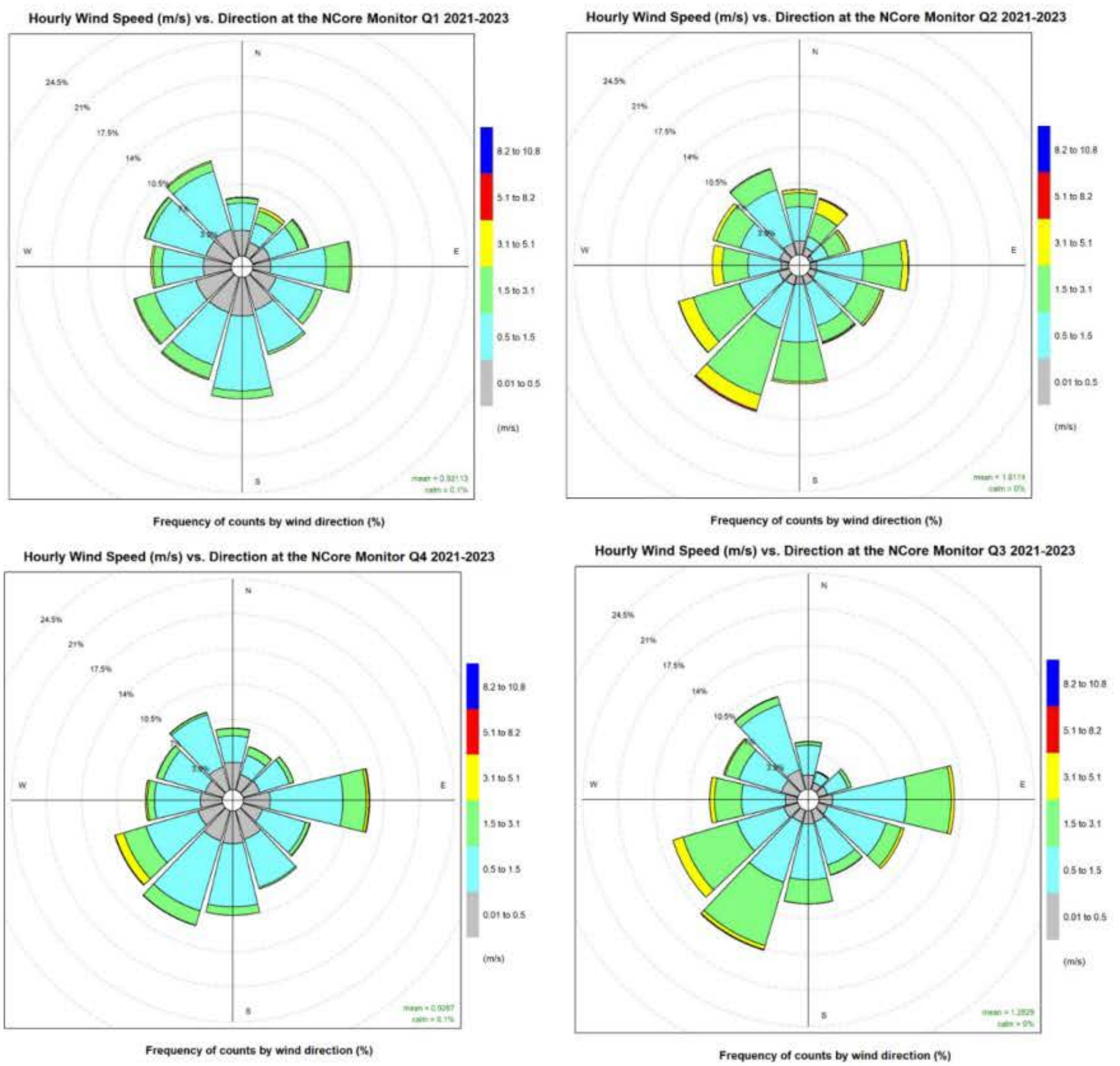


Figure 4.3-1 *Hourly Wind Roses for the NCore Monitoring Site by calendar quarters, 2021-2023*

Figure 4.3-2 shows the wind rose for the NCore monitoring site in Fairbanks from 2021 to 2023, for days when $PM_{2.5}$ concentrations exceeded 9 $\mu g/m^3$. The wind rose shows that on days with elevated $PM_{2.5}$ levels, the prevailing wind directions are primarily from a southerly component. This direction accounts for a significant portion of the wind distribution, with a frequency of 51%. Winds from the south (180°) have the highest individual frequency at 12.17% of the wind distribution. Winds from the southeast (120°) and southwest (240°) are notable but occur less frequently, with frequencies of 7.73% and 9.36%, respectively, indicating additional, though lesser, pollutant transport from these directions. These winds influence air quality at the NCore monitor, suggesting potential pollution sources to the south and southwest that increase $PM_{2.5}$ concentrations under low-wind conditions.

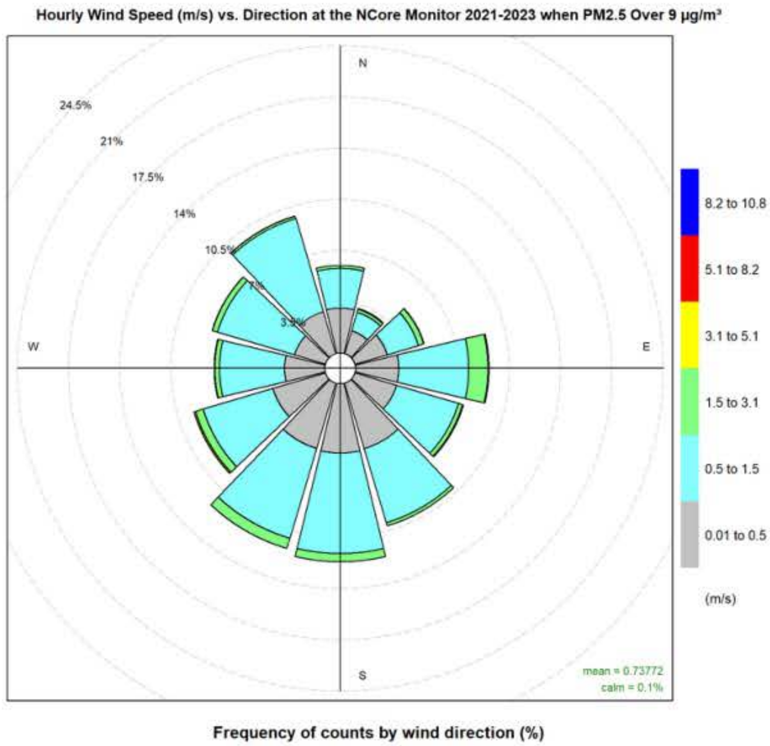


Figure 4.3-2. *Hourly Wind Rose for the NCore Monitoring Site when $PM_{2.5}$ > 9 µg/m³, 2021-2023*

The wind speeds at NCore on days when $PM_{2.5}$ concentrations exceeded the annual NAAQS are predominantly within the 0.5 to 1.5 m/s range. The mean wind speed for this dataset is 0.74 m/s, with calm conditions occurring about 0.1% of the time. This low average wind speed suggests that the dispersion of pollutants is generally insufficient on these days, contributing to the elevated $PM_{2.5}$ levels recorded at the monitor.

In comparing the NCore wind rose for Figure 4.3-2 (representing days when $PM_{2.5}$ concentrations exceeded 9 µg/m³) and the Q1 wind rose (January to March) in Figure 4.3-1, both wind roses share not only similar dominant wind directions from the south and southwest, but also exhibit comparable patterns across a wider range of directions. The overall distribution of low wind speeds suggest that the conditions present on days of elevated $PM_{2.5}$ concentrations closely mimic typical winter wind behavior in Fairbanks. The consistency across directions highlights the role of the winter season's impact on air quality, as both figures capture the same fundamental airflow patterns that lead to elevated $PM_{2.5}$ concentrations during inversion periods in Fairbanks.

4.3.2 A-Street Monitoring Site

Figure 4.3-3 represents wind patterns and highlights seasonal differences in wind behavior at the A-Street monitoring site in Fairbanks from 2021-2023 where Q1 and Q4 (representing the winter months) is shown on the left, and Q2 and Q3 (representing the summer months) is shown on the right. The winter months, covering Q1 (January to March) and Q4 (October to December), display consistently low wind speeds.

In Q1, the mean wind speed is 0.48 m/s with predominant wind directions from the east (90°) and southeast (120°), which account for 10.2% and 11.5% of the total wind occurrences, respectively. These winds are largely within the 0.5 to 1.5 m/s range, contributing to limited pollutant dispersion during the winter months, especially when inversion conditions are present. Calm conditions occur 1.4% of the time, reflecting the still air that can exacerbate $PM_{2.5}$ accumulation.

As the region transitions into Q2 (April to June), wind speeds slightly increase, with a mean of 1.02 m/s. Winds from the southwest (210°) and west (240°) become more prominent, contributing 13.2% and 13.5% of the total wind observations, while the southeast (120°) and east (90°) directions continue to play a significant role. Despite this slight increase in wind speed, most winds remain below 1.5 m/s, although the number of calm days decreases, indicating better airflow compared to Q1. This allows for some dispersion of pollutants, but lower speeds combined with low temperatures and inversions occassionaly could lead to elevated $PM_{2.5}$ concentrations in the moderate AQI range.

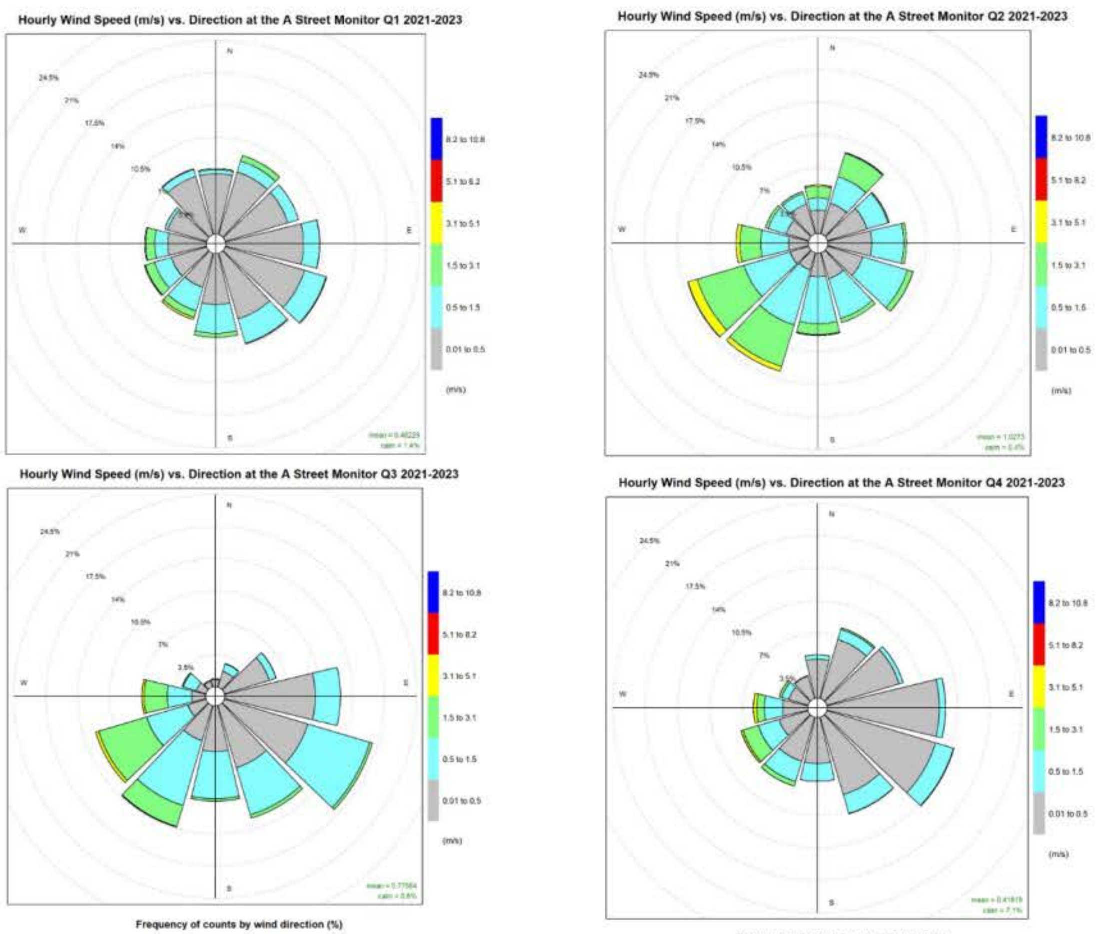


Figure 4.3-3 *Hourly Wind Roses for the A-Street Monitoring Site by calendar quarters 2021-2023*

Q3 (July to September) reflects the summer months, with the highest wind speeds observed across all quarters. The mean wind speed decreases to 0.78 m/s, even though there were more occurrences of winds exceeding 1.5 m/s, particularly from the southwest (210°) and west (240°), which dominate the wind distribution. These stronger winds contribute significantly to pollutant dispersion, reducing $PM_{2.5}$ levels more effectively during this period. Winds from the east (90°) and southeast (120°) remain notable but play a lesser role in Q3 as compared to Q1 and Q2. Calm conditions also increased slightly to 0.08%.

Finally, in Q4 (October to December), as temperatures drop again, wind patterns return to those seen in Q1. The mean wind speed falls back to 0.42 m/s, and winds from the east (90°) and southeast (120°) regain their dominance, contributing 12.75% and 14.29% of the total, respectively. Wind speeds remain predominantly within the 0.5 to 1.5 m/s range, similar to Q1, with calm conditions occurring around 7.1% of the time. The lower wind speeds and frequent calm periods in Q4 suggest that pollutant buildup into the moderate AQI range is likely, especially during inversion events.

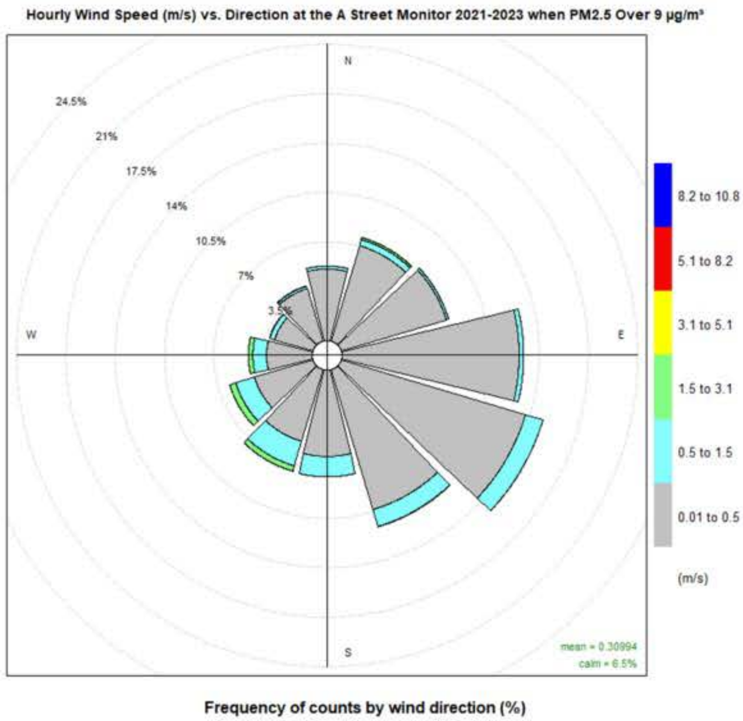


Figure 4.3-4. *Hourly Wind Rose for the A-Street Monitoring Site when $PM_{2.5} > 9$ µg/m³, 2021-2023*

Figure 4.3-4 depicts wind speeds and directions at the A-Street Monitor during high pollution events (when $PM_{2.5}$ levels exceed 9 µg/m³) from 2021 to 2023. The mean wind speed during these high pollution periods is 0.31 m/s, illustrating the dominance of stagnant air, which is typical during temperature inversions. Calm conditions, defined by wind speeds below 0.5 m/s, account for 6.5% of the observations, further emphasizing the inability of the wind to disperse accumulated pollutants effectively.

The most frequent wind directions during these high $PM_{2.5}$ events are from the southeast (120°) and east (90°), collectively accounting for over 27% of the wind observations. The southeast wind, in particular, is the most prevalent, contributing 14.9% of the total, while winds from the east contribute 12.9%. Both directions predominantly feature wind speeds within the 0.5 to 1.5 m/s range, which is insufficient to clear out pollutants, allowing $PM_{2.5}$ levels to rise. Winds from the south (150°) and southwest (210°) are also frequent, contributing 11.6% and 7.5%, respectively, but these winds remain below the 1.5 m/s threshold needed for effective pollutant dispersion.

When comparing Figure 4.3-4 to Figure 4.3-3, similarities to the typical winter wind patterns are apparent. This similarity suggests that during winter months, when inversion conditions are common, wind speeds below 1.5 m/s allow pollutants to accumulate, leading to elevated $PM_{2.5}$ concentrations in the moderate AQI range. The cold temperatures, combined with topographical influences such as cold air drainage from surrounding valleys, trap pollutants near the surface during these inversion events. In both figures, winds greater than 1.5 m/s are rare, reinforcing the conclusion that low wind speeds are a primary driver of moderate air quality events.

4.3.3 Hurst Road Monitoring Site

Figure 4.3-5 displays the hourly wind speeds and directions at the FNSB Hurst Road monitoring site in North Pole for Q1 through Q4 (2021-2023). The Hurst Road monitor is the only violating monitor in the State for the annual standard. The figure, organized by quarter, allows for a detailed analysis of wind patterns across different times of the year, with winter quarters (Q1 and Q4) on the left side and summer quarters (Q2 and Q3) on the right.

In Q1, representing the coldest months of the year (January to March), the mean wind speed at the Hurst Road monitoring site is 0.56 m/s, reflecting relatively low wind activity, with calm conditions accounting for 2.4% of the data. Winds from the southeast (120°) and northeast (60°) are the most frequent during this period, with contributions of 12.58% and 19.58%, respectively. These directions are heavily influenced by cold air drainage from the Upper Chena River and Tanana River valleys, creating patterns typical of inversion periods. Winds from the west (270°) and northwest (300°) also appear, but with much lower frequencies of 6.8% and 1.5%. Wind speeds tend to remain below 1.5 m/s, which is insufficient to clean out pollution during inversion periods.

In Q2 (April to June), representing the early summer period, there is a noticeable increase in wind activity, with a mean speed of 0.85 m/s and calm conditions making up 0.6% of the data. The southeast (120°) and northeast (60°) winds continue to dominate but show reduced frequencies compared to Q1, contributing 11.55% and 14.24%. This slight reduction aligns with the seasonal transition from winter to summer, where the regional drainage flows become less pronounced as temperatures rise. Winds from the west (270°) become more frequent in Q2, accounting for 13.34% of the data, indicating the increased influence of larger-scale weather systems during the summer months.

Figure 4.3-5. *Hourly Wind Roses for the Hurst Road Monitoring Site by calendar quarters 2021-2023*

By Q3 (July to September), the height of summer, wind speeds decrease slightly, with a mean of 0.5429 m/s and calm conditions contributing 1.1%. Winds from the northeast (60°) and southeast (120°) remain the dominant directions, contributing 10.68% and 15.51%, respectively. However, the data also shows increased frequencies of winds from the west (270°) and southwest (240°), contributing 12.17% and 13.92% of the total wind distribution. These changes suggest that regional drainage flows from the Upper Chena and Tanana Rivers still play a significant role but are now complemented by larger-scale synoptic systems that bring winds from a broader range of directions.

In Q4 (October to December), as temperatures drop and winter approaches, wind patterns begin to resemble those of Q1, with a mean wind speed of 0.44 m/s and calm conditions occurring 1.7% of the time. Winds from the southeast (120°) dominate this period, contributing 16.31% of the total wind distribution, followed by winds from the northeast (60°), which account for 13.95%. These patterns reflect the increased influence of cold air drainage from the Upper Chena and Tanana River valleys as inversion conditions become more frequent during the colder months. Winds from the west (270°) and southwest (240°) continue to contribute, but at lower frequencies than during the summer months, accounting for 7.11% and 11.81%, respectively.

Across all quarters, the southeast (120°) and northeast (60°) directions consistently dominate, reflecting the persistent influence of regional drainage flows on the wind patterns at the Hurst Road monitor. However, wind speeds rarely exceed 1.5 m/s, particularly during the winter months (Q1 and Q4), when inversion conditions are most common. These low wind speeds hinder the dispersion of pollutants, leading to the moderate to poor air quality during inversion events.

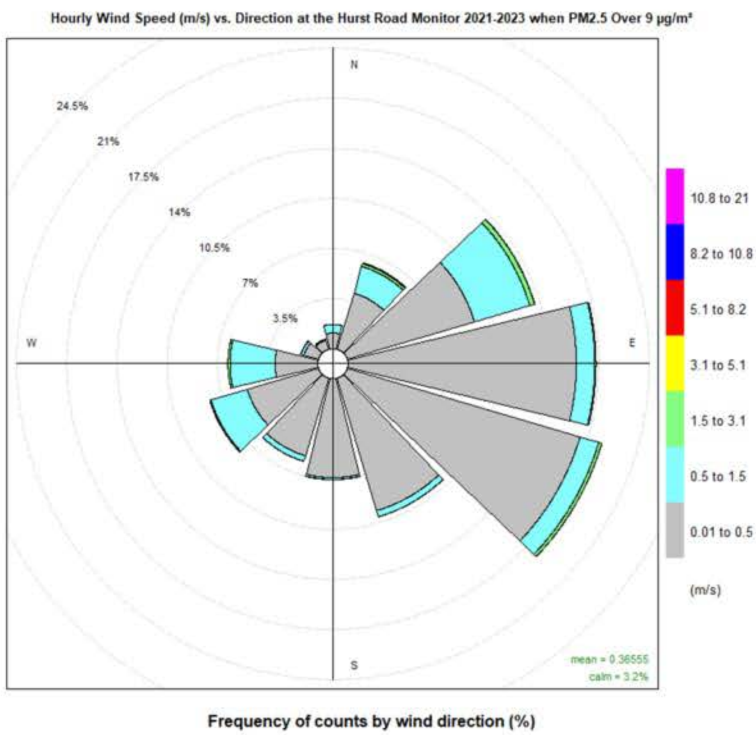


Figure 4.3-6 *Hourly Wind Rose for the Hurst Road Monitoring Site when $PM_{2.5} > 9$ µg/m³, 2021-2023*

Figure 4.3-6 illustrates the wind speeds and directions at the Hurst Road Monitor from 2021 to 2023, when daily $PM_{2.5}$ concentrations exceeded 9 µg/m³. The dominant wind directions during high $PM_{2.5}$ periods are from the southeast (120°) and east (90°), together accounting for a substantial portion of the wind occurrences. Winds from the southeast make up 13.9%, and from the east, they contribute 12.4%. These winds primarily fall within the 0.5 to 1.5 m/s range, a speed insufficient to clear out pollutants effectively, especially during inversion conditions when the atmosphere becomes stagnant. In addition to the southeast and east winds, the southern (150°) and southwestern (210°) directions also contribute to the overall wind patterns, though they remain less frequent and similarly low in speed. The mean wind speed during these high pollution events is 0.37 m/s, with calm conditions (wind speeds below 0.5 m/s) occurring 3.2% of the time. This low mean wind speed, along with the frequent calm periods, suggests a significant correlation with inversion conditions that often trap pollutants close to the surface, limiting their dispersion. Given the low average wind speeds and their distribution, it is evident that during periods of elevated $PM_{2.5}$, the area experiences limited air movement. This contributes to the persistence of poor air quality, preventing adequate pollutant dispersion.

In comparing Figure 4.3-6 to Q1 and Q4 of Figure 4.3-5, it is evident that these wind roses share many similarities, especially in terms of wind direction and speed at the Hurst Road monitor. All three wind roses display dominant wind directions from the southeast (120°) and east (90°), which reflect the consistent regional drainage flows from the Upper Chena River and Tanana River. However, the regional drainage flows are not sufficient to disperse local space heating emissions during elevated PM episodes. During the winter, empirical evidence—based on eight years of observations and forecasting air alerts by DEC air alert forecasting staff—shows that inversion conditions dominate the area and drainage flows tend to ride above the inversion layer rather than significantly impacting surface-level air quality. The wind speeds in these three wind roses tend to stay below 1.5 m/s, reinforcing the correlation between winter conditions and limited air movement. This leads to frequent inversions, trapping pollutants close to the surface. The consistency of these wind patterns across both Q1 and Q4 and Figure 4.2-6 supports the conclusion that the North Pole area experiences air quality challenges during the winter months, where inversion periods and low wind speeds exacerbate $PM_{2.5}$ concentration levels into the moderate to poor air quality range.

4.4 Summary

The analysis of airflow patterns and pollutant dispersion across the Fairbanks and North Pole areas reveals distinct seasonal and regional differences, influenced by topography and drainage flows. Meteorological conditions that lead to $PM_{2.5}$ concentration in the moderate air quality range occur predominantly during the winter months when temperatures are very low, and inversions can generate. During wintertime inversion periods, cold air drainage dominates both areas, but the origin and direction of the flows differ significantly between Fairbanks and North Pole. In Fairbanks, cold air flows out of the Goldstream and other valleys behind the Cranberry and Chena Ridges into the western part of the city, where it moves toward the Tanana River. This relatively clean air helps limit $PM_{2.5}$ concentrations in the western part of Fairbanks during inversion periods. In the eastern part, drainage off Birch Hill and from the Chena River brings air toward downtown Fairbanks. However, during inversions, this drainage tends to decouple and remain aloft, with surface drainage following the terrain and pushing pollutants into the Chena River basin.

Regional drainage flows during inversion periods provide the primary means of horizontal dispersion, particularly in Fairbanks, where air is moved out of the city to the west and southwest, along the Tanana River. The wind roses from the NCore and A-Street monitoring sites reflect this pattern, showing dominant winds from the southwest and west. Wind speeds greater than 1.1–1.5 m/s help raise the inversion layer, allowing for the mixing of pollutants with higher air masses, thereby diluting $PM_{2.5}$ concentrations.

In contrast, North Pole experiences regional drainage from the Upper Chena River to the northeast and the Tanana River to the southeast. During inversions, this air typically rides up and over the inversion layer rather than dispersing pollutants at ground level. The wind rose for the Hurst Road monitoring site shows a predominant southeast wind that, despite its sustained presence, is ineffective in clearing pollution. Instead, it pushes air towards the northwest, where there are open areas for limited pollutant dispersion. This suggests that airflows from North Pole do not significantly influence Fairbanks, and vice versa, supporting the observation that pollutants remain largely confined within their respective areas during inversion periods.

During the summer months, the inversion conditions that trap pollutants are less prevalent, and the region experiences higher wind speeds, particularly in Q2 and Q3. Wind roses for this period show increased variability in wind directions and speeds, which contributes to better air mixing and the dispersal of pollutants. Both Fairbanks and North Pole benefit from these dynamic wind patterns, which allow for more effective pollutant removal compared to the stagnant winter months. The differences in wind behavior between summer and winter highlight the seasonal variability in air quality, particularly in areas like North Pole, where inversion events lead to severe $PM_{2.5}$ pollution during winter months.

5. FACTOR 4- GEOGRAPHY AND TOPOGRAPHY

The state's proposed $PM_{2.5}$ nonattainment area boundaries surround the North Pole city limits and its neighboring residential areas. North Pole is located in the Fairbanks North Star Borough and lies approximately 20 miles southeast of the city of Fairbanks. The area is defined by the Tanana, Chena and Salcha River drainages and is surrounded by mountains and ridges, ranging in size from 1,000 ft to 2,500 ft, forming a semicircular barrier to the east, north and west of the Fairbanks and North Pole areas.

The city of North Pole sits at approximately 490 ft above sea level (ASL)[49] with the closest surrounding hills existing approximately 10 miles from city center to the north and to the east. These surrounding ridges rise to about 1,000 ft ASL while further away ridges reach as much as 2,500 ft ASL (Figure 5-1). The North Pole nonattainment area slopes upwards from west to east; the western border with the Fairbanks nonattainment area lies at approximately 460 ft while the eastern border along the Moose Creek Dam lies at 510 ft (Figure 5-2). The low elevation of the city center with respect to the distant surrounding ridges causes air pollution build up within the bowl during stagnant air conditions.

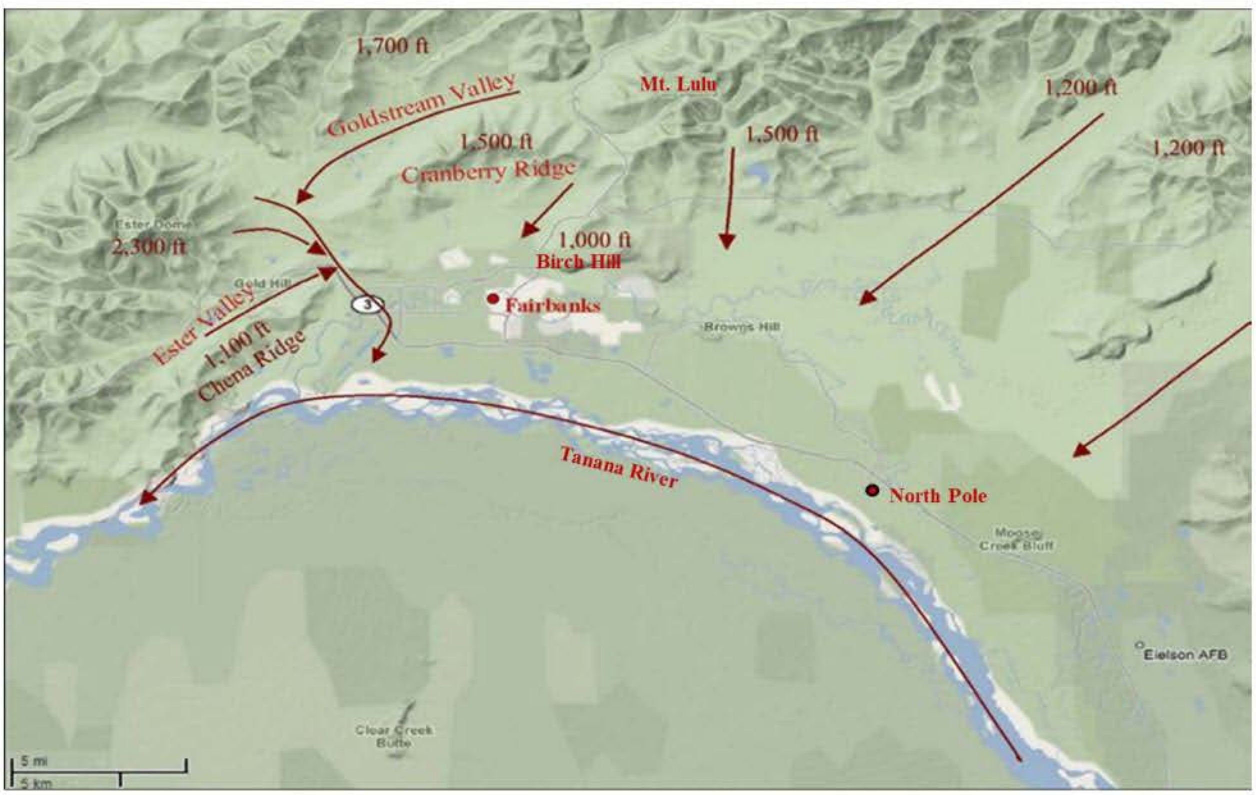


***Figure 5-1** Coarse topography and regional drainage flows in the Fairbanks and North Pole area.*

---

[49] https://en-us.topographic-map.com/map-p1t1mt/North-Pole/?center=64.77017%2C-147.27928&popup=64.74852%2C-147.39756

In comparison, Fairbanks experiences notable differences in topographical features; the city of Fairbanks sits approximately 50 ft lower than North Pole at its lowest point of 440 ft ASL. Ridges surround the urban center to the west, north, and east and reach a height of 1,000 to 2,500 ft ASL. The immediate enclosure of ridges around the Fairbanks bowl aids in the formation of the inversion layer during cold and calm conditions.

Highly resolved topographic maps show surface gradients that exist throughout much of the Fairbanks and North Pole portions of the current 24-hour $PM_{2.5}$ FNSB nonattainment area. Due to the extreme nature of the inversions that persist during high particulate concentration episodes (wintertime months), small elevation changes influence the direction and nature of bulk transport between the sub-areas of Fairbanks and North Pole (Figures 5-2 through 5-4).

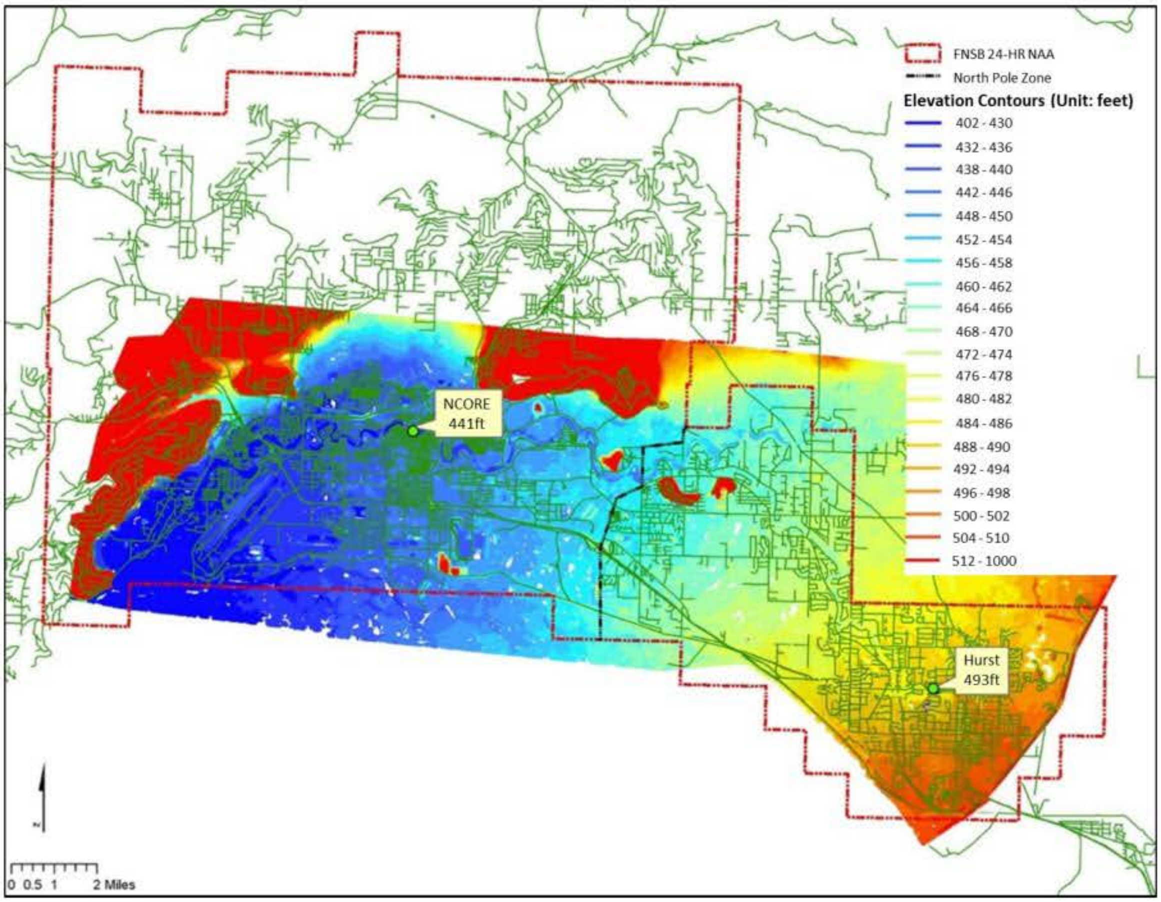


Figure 5-2 *FNSB $PM_{2.5}$ nonattainment area 2-ft contour topographic map.*

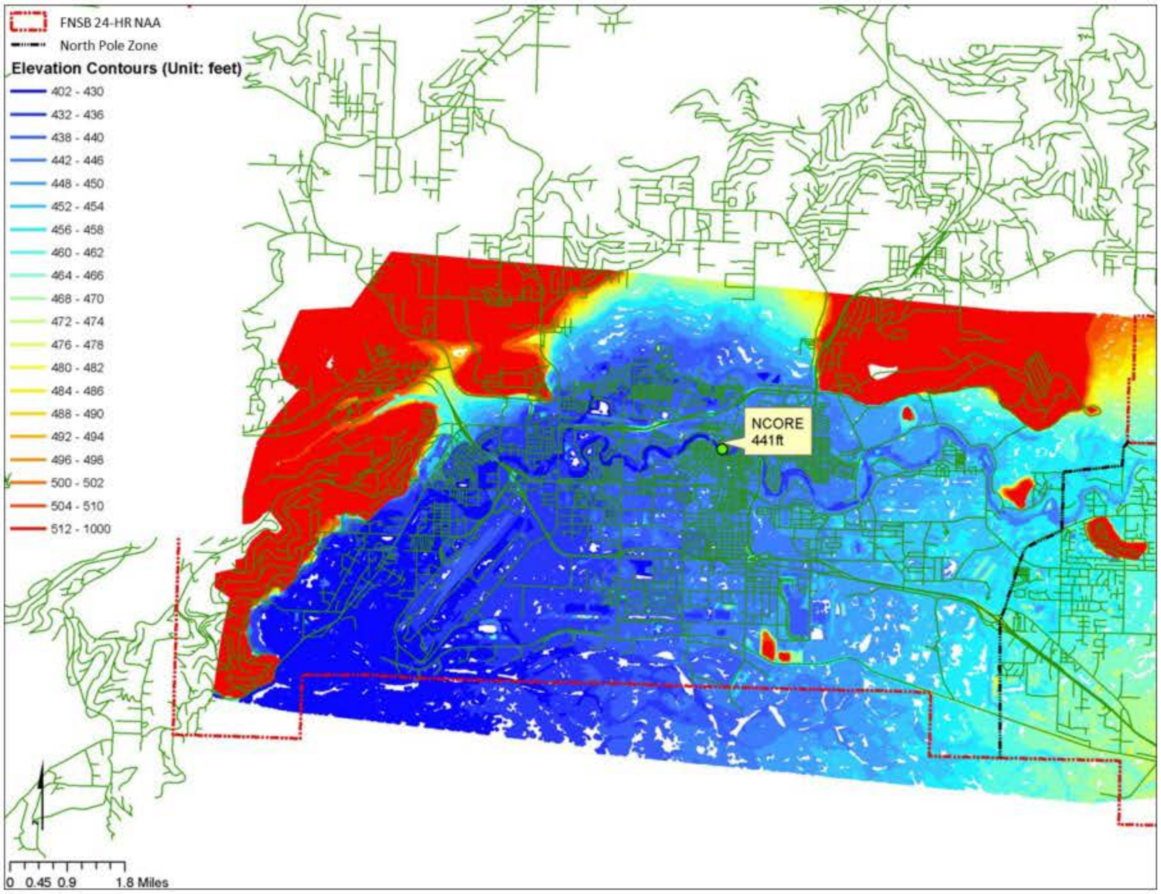


Figure 5-3 *Fairbanks nonattainment area southern portion 2-ft contour topographic map.*

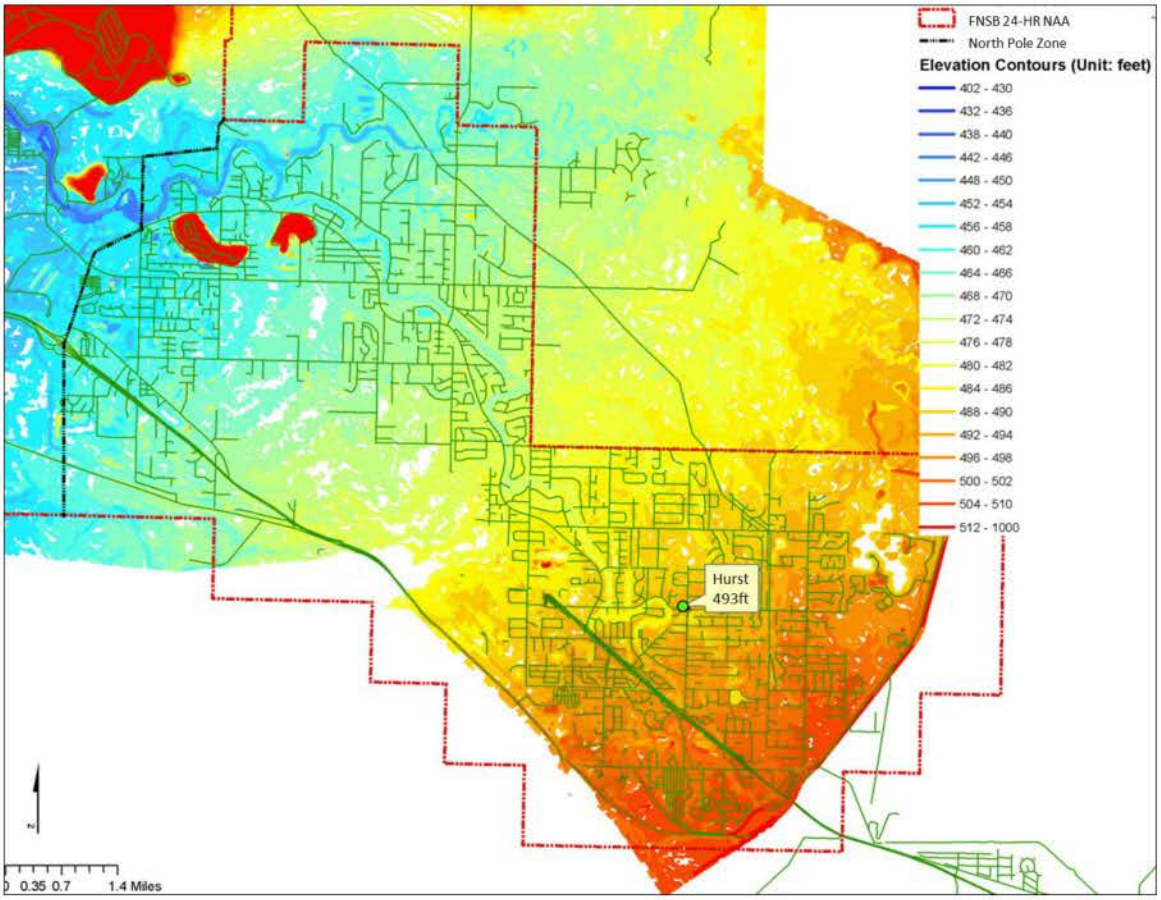


Figure 5-4 *North Pole nonattainment area portion 2-ft contour topographic map.*

In concert with geographic features, drainage flow patterns closely follow the topographic changes. The larger-scale flow patterns and topographic features are shown in Figure 5-1. Under cold and calm conditions, drainage flows originate from the south and southeast regions on the border with the Tanana River and follow the direction and gradient of the topography. Drainage flows may also form off the ridges surrounding the urban centers of Fairbanks and North Pole and follow the path of the valleys into the urban centers of Fairbanks and North Pole. These drainage patterns coupled with topographic slopes easily match with meteorological data presented in Factor 3. Wind speeds in these areas are extremely low and most frequently originate from the south and southeast direction, consistent with drainage patterns along the Tanana River drainage, and from the northeast in North Pole, which is consistent with the Upper Chena River drainage. Low wind speeds and the direction of transport limit the dispersion of pollutants effectively into the North Pole area, showing that emissions localized to Fairbanks have a minimal effect on the air quality levels in North Pole due to the patterns of bulk transport in the area.

5.1 Summary

The geographical and topographical features of Fairbanks and North Pole provide further insight into the air quality characteristics of the two regions and broadly explain how air quality levels may be subject to bulk transport patterns. The two urban areas are located in a valley surrounded by geographic features that aid in the generation of an inversion layer during cold and calm conditions that traps pollutants around the low-lying urban areas. Drainage flows that may form during extremely cold events, coupled with winter-time wind patterns, suggest that pollutants in Fairbanks would drain away from North Pole. Given the distance and direction of the North Pole drainage flow, the emissions from sources in North Pole are likely to disperse locally and follow the larger drainage patterns along the Tanana River. The topographical features, in combination with the extreme severe winter-time inversions and drainage patterns, serve to isolate the respective North Pole and Fairbanks nonattainment subareas during air quality episodes.

6. FACTOR 5- JURISDICTIONAL BOUNDARIES

The Fairbanks North Star Borough is located in the heart of Interior Alaska at approximately 64.833330° North Latitude and -147.716670° West Longitude (Figure 6-1). The area encompasses 7,338.0 sq. miles of land and 105 sq. miles of water. The Borough seat is located in the city of Fairbanks. A less densely urbanized area extends from Fairbanks along the Richardson Highway corridor through the city of North Pole to the southeast. The Borough also contains other smaller outlying residential areas (i.e., Ester, Fox, etc.) as well as two military bases (Fort Wainwright and Eielson Air Force Base). Fairbanks has a metropolitan planning organization, FAST, whose boundary includes both Fairbanks and North Pole and extends further into populated areas within the vicinity of both communities.

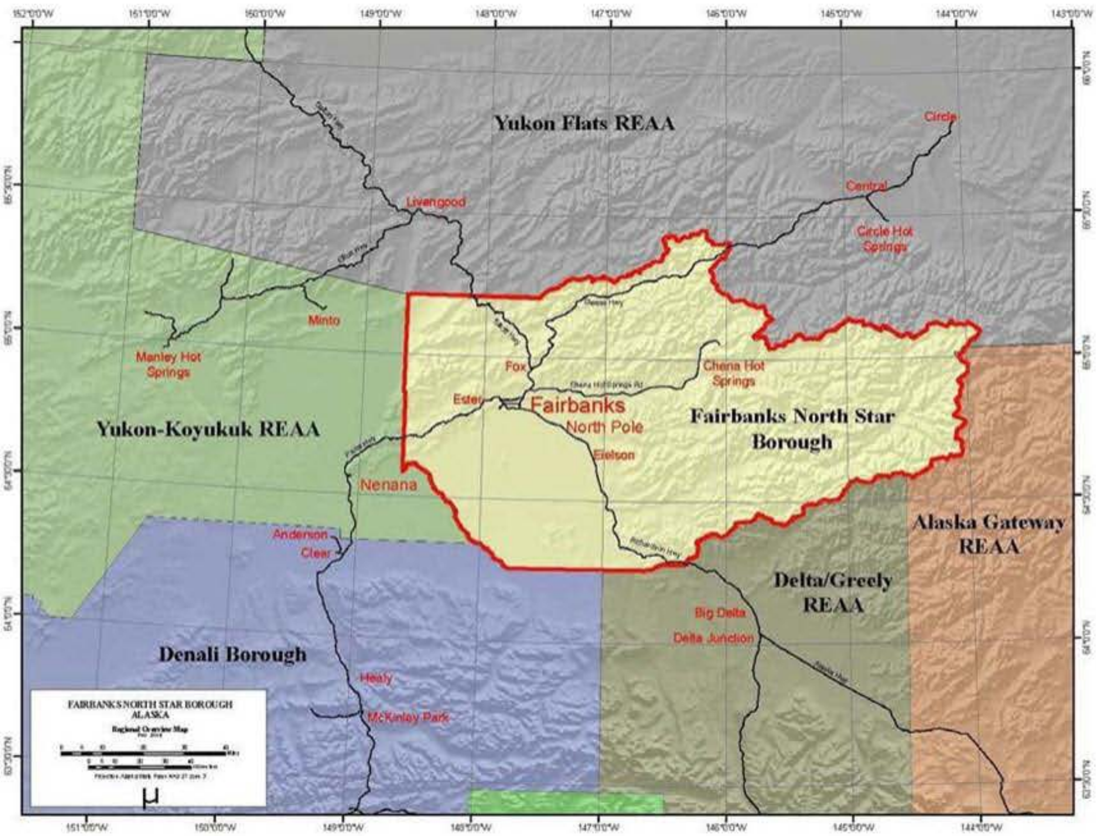


__Figure 6-1__ Fairbanks North Star Borough

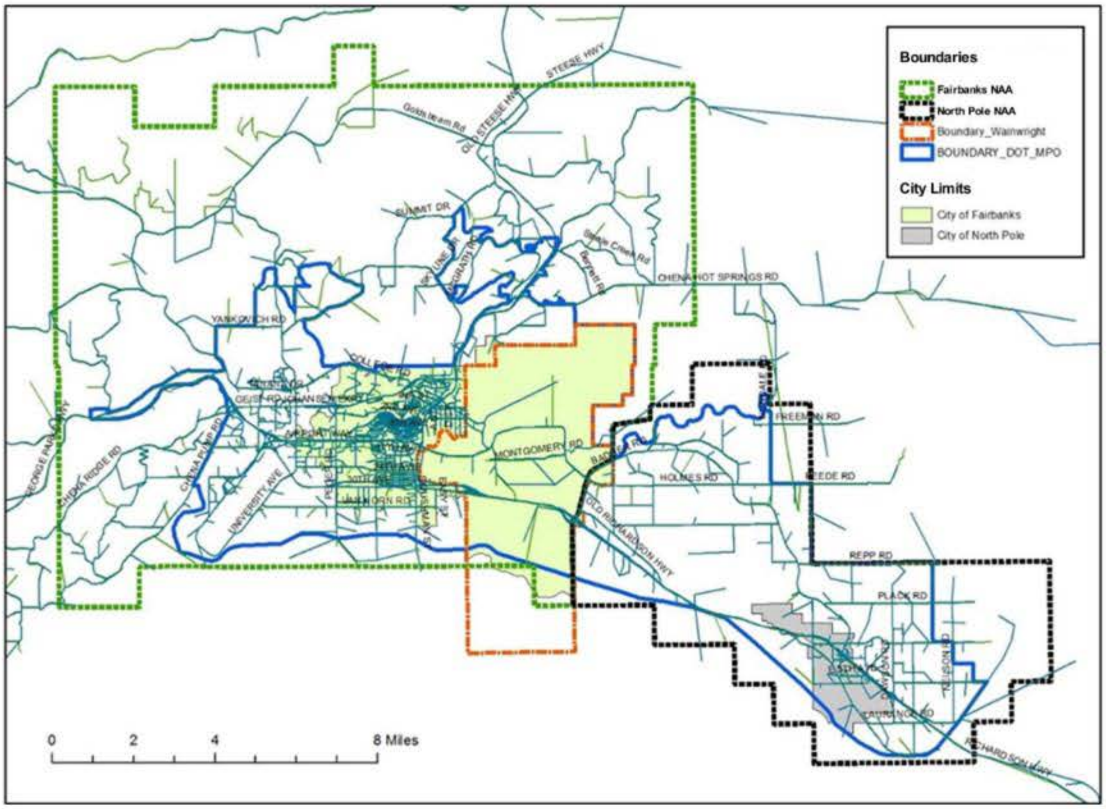


Figure 6-2 *Boundaries of Political Entities Located within the FNSB $PM_{2.5}$ Nonattainment Area.*

6.1 Presentation of Boundaries

Political entities located within the existing FNSB nonattainment area include the City of Fairbanks, the City of North Pole, Fairbanks Area Surface Transportation (FAST) Planning, and Fort Wainwright. Figure 6-2 and Figure 6-3 depicts the boundaries for each, which are described in more detail below.

- The *City of North Pole* is situated 13 miles (21 km) to the southeast of Fairbanks on the Richardson Highway. The city is about 1,700 mi (2,700 km) south of Earth's geographic North Pole. According to the U.S. Census Bureau, the city has a total area of 4.2 square miles (11 km^2), of which 4.2 square miles (11 km^2) is land and 0.04 square miles (0.10 km^2) (0.47%) is water. The city is located to the north and east of the Tanana River, although access to the river is not easily made due to the extensive system of levees. Beaver Springs Slough meanders through the heart of the city, emptying into Chena Slough.

- The *City of Fairbanks* is located in the central Tanana Valley, straddling the Chena River near its confluence with the Tanana River. Immediately north of the city is a chain of hills that rises gradually until it reaches the White Mountains and the Yukon River. The southern border of the city is the Tanana River. To the east and west are low valleys separated by ridges of hills up to 3,000 feet (910 m) above sea level.[50] According to the U.S. Census Bureau, the city has a total area of 32.7 square miles (85 km^2), 31.9 square miles (83 km^2) of which is land and 0.8 square miles (2.1 km^2) of which (2.48%) is water.

- *FAST (Fairbanks Area Surface Transportation)* is the local Metropolitan Planning Organization (MPO). FAST was established after the previous MPO, a consensus-based transportation policy-making body, was reorganized in September 2018 as an independent organization compatible with Section 501(c)(3) of the Internal Revenue Code.[51] The purpose of the FAST Nonprofit Corporation is to coordinate transportation planning and programs, serve as a state designated MPO, and undertake any other lawful acts or activities for which nonprofit corporations may engage under the Alaska Nonprofit Corporation Act[52]. The FAST Metropolitan Planning Organization Boundary Map was determined by the MPO and the Governor[53]. Per federal regulation, the MPO boundaries encompass, at a minimum, the entire existing urbanized area (as defined by the Bureau of the Census) plus the contiguous area expected to become urbanized within a 20-year forecast period for the metropolitan transportation plan (Figure 6-3)[54].

- *Fort Wainwright* is a U.S. Army Post that encompasses over one million acres and includes three separate areas: the Main Post is co-located with the City of Fairbanks and consists of 13,700 acres; the Tanana Flats Training Area is located south of the Main Post and covers over 655,000 acres; and the Yukon Training area is located 16 miles east-southeast of the City of Fairbanks and covers 247,952 acres. Figure 6-2, above, displays the boundaries of only the Main Post.

[50] https://en.wikipedia.org/wiki/Fairbanks,_Alaska#cite_note-USGS110-15.
[51] Resolution 4847, Fairbanks City Council (September 2018). https://www.fairbanksalaska.us/media/25796.
[52] FAST Planning Certificate of Incorporation, *State of Alaska Department of Commerce, Community, and Economic Development, Division of Corporations, Business, and Professional Licensing* (June 25, 2018). https://fastplanning.us/planning/operatingdocs/.
[53] FAST Planning, Operating Agreement at 8 (April 5, 2019). https://fastplanning.us/planning/operatingdocs/.
[54] FAST Planning, Metropolitan Planning Area Boundary Update Methodology, at 3 (December 2023), https://fastplanning.us/wp-content/uploads/2024/01/20231221_Boundary_Update_Methodology_FINAL.pdf.

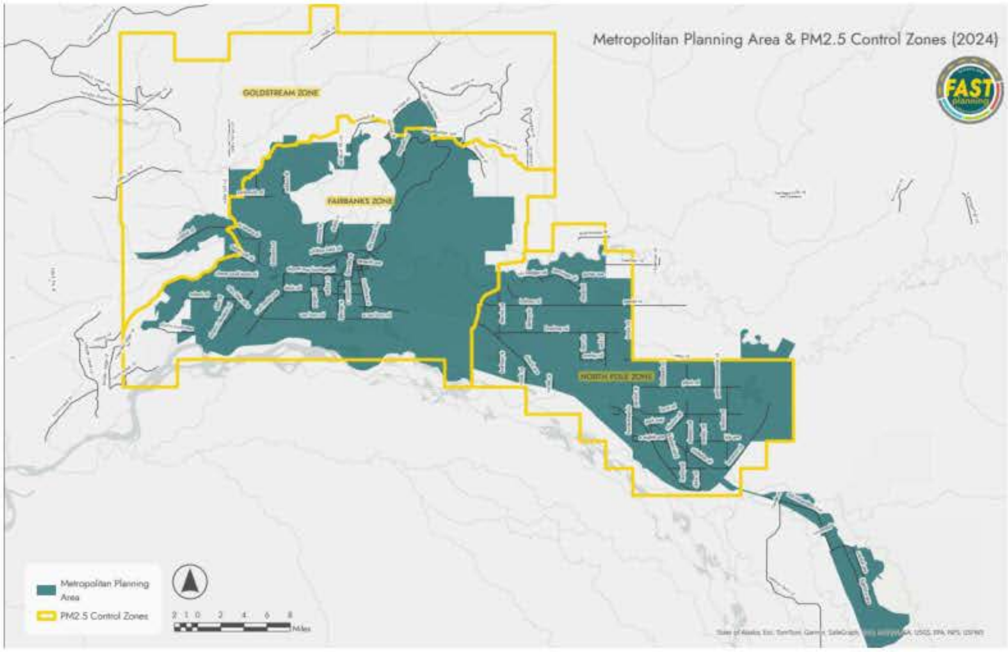


Figure 6-3 *Map of FAST metropolitan planning area and existing $PM_{2.5}$ air quality control zones.*

In 2018, residents of the Fairbanks North Star Borough voted to end the Borough's regulatory authority over home heating devices, thus transferring regulatory duties to the DEC[55]. DEC adopted 18 AAC 50.025(d), which established three "air quality control zones" within the current 24-hour $PM_{2.5}$ nonattainment area to allow sub-area specific control measures. The zones are based on an ordinance adopted by the Fairbanks North Star Borough and developed by the FNSB Air Quality Control Program, which sought to produce three nonattainment sub-areas expected to have different air quality levels during winter months[56]. These regulatory zones are known as the Goldstream zone, Fairbanks zone, and North Pole zone (Figure 6-4).

The air quality control zones were selected due to the large variety of residential, geographic, and jurisdictional areas within the larger nonattainment area and used public rights-of-way, subdivision boundaries, and individual lot boundaries to determine the zones, while following the intended geographic features as closely as possible.[57] The boundary between the Fairbanks and North Pole zones was established along jurisdictional boundaries on the eastern border of Fort Wainwright and includes residential areas to the east of the military establishment. The eastern boundary for Fairbanks largely follows the eastern boundary of Fort Wainwright and the City of Fairbanks (although two small areas of the City of Fairbanks extend into the recommended North Pole nonattainment area). The City of North Pole occupies a small portion of the requested North Pole

[55] Fairbanks North Star Borough, Proposition 4: Ordinance Enacting the Home Heating Reclamation Act (October 2, 2018).
[56] Fairbanks North Star Borough, Ordinance 2015-01. (February 27, 2015).
[57] SIP Appendix III D.7.03. (November 19, 2019). https://dec.alaska.gov/air/anpms/communities/fbks-pm2-5-serious-sip/.

annual $PM_{2.5}$ nonattainment area. The designated boundaries of the North Pole Air Quality Control Zone are identical to DEC's recommended annual $PM_{2.5}$ nonattainment boundary.

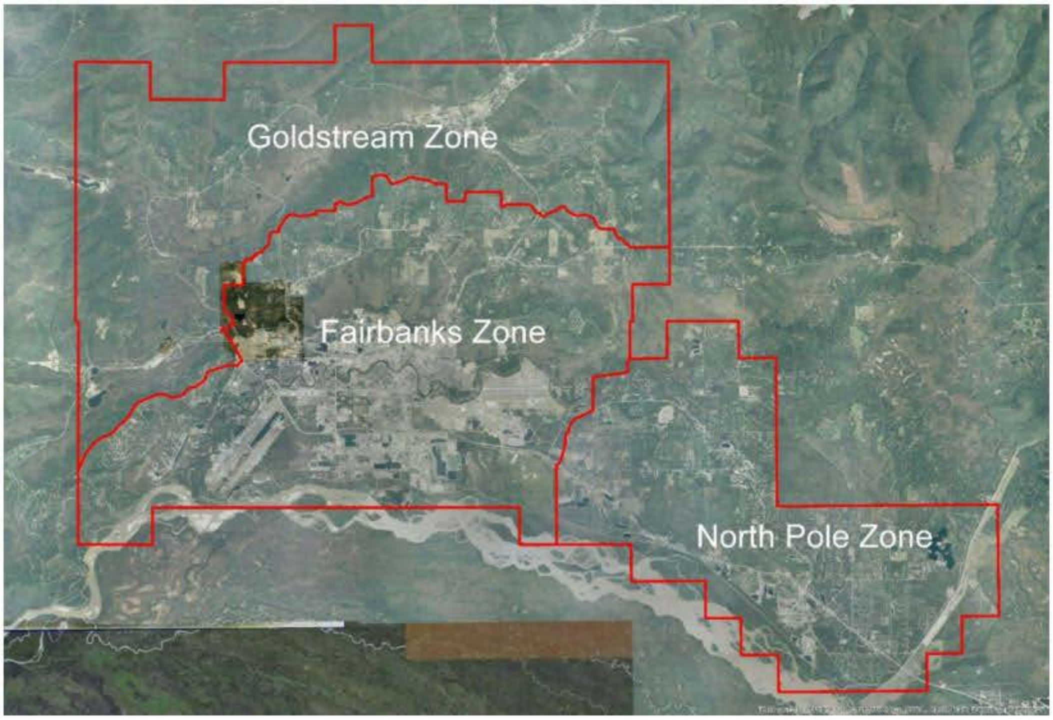


Figure 6-4 *Air Quality Control Zones within the existing PM2.5 Nonattainment Area. Designated areas include the Goldstream, Fairbanks and North Pole Zones.*

6.2 Summary

The boundaries requested to divide the Fairbanks North Star Borough 24-hr $PM_{2.5}$ nonattainment area was specified by Borough staff and approved by the FNSB Assembly, a local elected body, to separate the FNSB 24-hr $PM_{2.5}$ nonattainment area into three air quality control zones expected to have different air quality levels during winter months. These three areas currently act as three different regulatory control zones and are known as the North Pole Zone, Fairbanks Zone, and Goldstream Zone. The requested boundary for the annual $PM_{2.5}$ nonattainment area is coterminous with the North Pole Zone, an already established jurisdictional area.

7. SUMMARY

The combination of monitoring and modeling data; emissions and meteorology trends; as well as geography, topography and jurisdictional boundary information has provided DEC with a multi-dimensional analysis of air quality in the Fairbanks North Star Borough area for the purpose of recommending an annual $PM_{2.5}$ nonattainment boundary to EPA. DEC's data shows a violation of the revised annual $PM_{2.5}$ NAAQS by only one community, North Pole, and supports that the neighboring communities surrounding North Pole do not contribute to its violation. DEC recommends that the nonattainment area for the annual $PM_{2.5}$ NAAQS comprise the existing North Pole Air Quality Control Zone, which includes the North Pole urban center and nearby residential areas. Key findings from each evaluated factor aiding in this conclusion are included below.

Factor 1, Air Quality Data – Out of all $PM_{2.5}$ monitoring sites in Alaska, only one location is in violation of the revised annual $PM_{2.5}$ NAAQS of 9.0 $\mu g/m^3$. The Hurst Road monitoring unit in the City of North Pole exhibits a design value of 9.5 $\mu g/m^3$ over the three-year period between 2021 and 2023, while the two neighboring monitors in Fairbanks show three-year design values of 7.5 and 6.9 $\mu g/m^3$. Seasonal differences in design values are evident; violations of the annual NAAQS occur solely in the winter for both North Pole and Fairbanks when concentrations are highly impacted by inversion events. Additional analysis of chemical speciation of the $PM_{2.5}$ mass strengthens the differences between winter and summer air quality by showing that chemical profiles in colder months are distinct and can be traced to winter sources of pollution. Summer months have higher levels of organic carbon, while winter months have high levels of sulfate and organic carbon due to woodstove and fuel oil space heating. Lastly, monitors in the more rural area of Denali National Park help understand the possible impacts of rural $PM_{2.5}$ contributions. The rural areas show extremely low concentrations of $PM_{2.5}$ with low possibilities of bulk transport to the North Pole and Fairbanks areas due to wind patterns during days when annual NAAQS were violated. In sum, North Pole is the only location in the State of Alaska in violation of the annual NAAQS, with violations occurring in winter-time months and no contribution from outside areas.

Factor 2, Emissions and Emissions-Related Data – Annual emissions inventories were developed for three extents within Interior Alaska to provide insight into the levels and locations of directly emitted $PM_{2.5}$ and precursor pollutant emissions within each extent by source category. The three extents were called the Outer, Middle, and Inner Inventories. The Outer Inventory included the Fairbanks North Star Borough (FNSB) and the three surrounding boroughs: Denali, Southeast Fairbanks, and Yukon-Koyukuk. The Middle Inventory was defined as the FNSB and included spatial breakouts of emissions both within and outside the existing 24-hour $PM_{2.5}$ nonattainment area (NAA). Finally, the Inner Inventory represented the NAA and examined sources within both the Fairbanks and North Pole portions of the NAA.

Emissions analyses from the Outer and Middle Inventories demonstrate that the nonattainment boundaries need not extend beyond the boundaries of the existing 24-hour NAA. Although emissions are greater in the Fairbanks subarea than the North Pole subarea, emissions of direct

$PM_{2.5}$ and key precursor pollutants SO_2 and NOx are significantly more concentrated (i.e., have higher emissions per square mile) in North Pole.

The Factor 2 evaluation also included analysis of population and occupied household densities, degree of urbanization, and traffic and commuting patterns that strongly indicate that emission sources that spatially align with these metrics are largely contained within the existing 24-hour NAA.

Factor 3, Meteorology – Seasonal and regional differences exist in the North Pole and Fairbanks areas and are influenced by topography and drainage flows. Origin and direction of air flows during winter months differ significantly between North Pole and Fairbanks. During inversions in the North Pole/Fairbanks area, surface drainage flows tend to remain aloft and follow the terrain, which pushes pollutants into the Chena River basin. Regional drainage flows during inversion periods provide the primary means of horizontal dispersion, especially in Fairbanks, where air is moved out of the city to the west and southwest along the Tanana River. North Pole experiences regional drainage from the Upper Chena River to the northeast and the Tanana River to the southeast. During inversions, this air typically rides up and over the inversion layer rather than dispersing pollutants at ground level, further supporting the conclusion that high concentrations of $PM_{2.5}$ are largely from local sources in the North Pole area. Air flows from Fairbanks do not significantly influence North Pole, and vice versa. Pollutants remain largely confined within their respective areas during inversion periods and days when the annual $PM_{2.5}$ NAAQS is exceeded.

Factor 4, Geography and Topography – North Pole and Fairbanks are located in the interior of Alaska, approximately 20 miles apart. The area is defined by geographic features on all sides of the urban areas. North Pole and Fairbanks lie in a valley at approximately 440 - 490 ft ASL with immediate surrounding ridges rising to 1,000 - 2,500 ft ASL on the East, North and West borders of the valley, forming a semicircular barrier. The Tanana River forms a barrier to the south. Small topographic changes and geographic features aid in the generation of an inversion layer in the low-lying urban areas. Drainage flow patterns follow the topographic changes during cold and calm conditions, generally draining from the East to West direction along the Tanana River. Analysis of topographical contours confirms that hydrologic drainage flows are consistent with the wind speed and direction measurements recorded under cold-temperature inverted conditions at monitors located in North Pole and Fairbanks. This geography and topography helps to establish the conditions of transport patterns and inversion formations in the area, and further explains why air quality differences observed between North Pole and Fairbanks are likely driven by local emissions.

Factor 5, Jurisdictional Boundaries – A portion of the Fairbanks North Star Borough is currently in nonattainment status for the 24-hr $PM_{2.5}$ NAAQS, with the area split into three "Air Quality Control Zones" known as the Fairbanks Zone, the North Pole Zone and the Goldstream Zone. These regulatory zones were established based on geographical, residential, and current jurisdictional boundaries. Within this area are jurisdictional entities including the City of

Fairbanks, the City of North Pole, FAST Planning, and Fort Wainwright. DEC's recommended boundary for the annual $PM_{2.5}$ NAAQS is the same as the North Pole Air Quality Control Zone.

These findings demonstrate differences in conditions between neighboring communities and in different seasons throughout the year. The findings show significant differences between Fairbanks and North Pole in the conditions producing elevated $PM_{2.5}$ concentrations. North Pole's monitor violates the $PM_{2.5}$ revised annual NAAQS, while the monitor in Fairbanks does not. Furthermore, emissions density in North Pole is significantly higher than in Fairbanks. Additional analysis into meteorological and geographical patterns highlight that $PM_{2.5}$ concentrations in North Pole and Fairbanks are due to localized emissions. Finally, the North Pole area is a designated Air Quality Control Zone with already established jurisdictional boundaries. Collectively, these data and analyses support DEC's recommended nonattainment boundary for the revised annual $PM_{2.5}$ NAAQS to be the North Pole Air Quality Control Zone.

LANCE R. LEFLEUR
DIRECTOR

KAY IVEY
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

February 7, 2025

Ms. Jeaneanne Gettle
Acting Regional Administrator
U.S. Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

Dear Ms. Gettle:

As the designee of the Governor of the State of Alabama, I am writing to provide the State's designation recommendations for the 2024 Annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS).

I recommend that all areas of the State be designated as "Attainment" for the new NAAQS, based on ambient monitoring and a clear demonstration of certain exceptional events attributed to prescribed fires, international wildfires occurring in Canada and Mexico, Saharan dust from Africa, and local holiday fireworks displays. This recommendation is based on the statewide ambient air monitoring data included below and Exceptional Events Demonstrations that will be uploaded separately.

Should you have any questions regarding this matter, please contact Mr. Aubrey White at (334) 271-7868 or ahw@adem.alabama.gov.

Sincerely,

Lance R. LeFleur
Director

Birmingham Office
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Office
2715 Sandlin Road, S.W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Coastal Office
1615 South Broad Street
Mobile, AL 36605
(251) 450-3400
(251) 479-2593 (FAX)

Summary of 2021-2023 Annual PM2.5 Design Values

Statewide PM2.5 Monitors (Excluding Jefferson County)

	2021-2023 Annual PM2.5 Design Value	Design Value with EPA Concurrence on Removal of Exceptional Events
Ashland	7.3	
Chickasaw-Iroquois	8.1	
Crossville	7.8	
Decatur	7.8	
Fairhope	7.4	
Gadsden	8.8	
Huntsville	7.7	
Montgomery	8.6	
Phenix City	9.5*	9.0
Tuscaloosa	7.9	
Sumter (Ward)	6.2	

*Exceptional Events Demonstrations included in Appendix A

Jefferson County PM2.5 Monitors Only

	2021-2023 Annual PM2.5 Design Value	Design Value with EPA Concurrence on Removal of Exceptional Events
Leeds	8.4	
McAdory	8.4	
North Birmingham (NCore)	9.6*	9.0
Wylam	8.8	
Near-Road	9.5*	8.9

*Exceptional Events Demonstrations included in Appendix B

January 28, 2025

Ms. Cheree Peterson
Acting Regional Administrator
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, California 94105
Peterson.Cheree@epa.gov

Dear Acting Regional Administrator Peterson:

The California Air Resources Board (CARB) is submitting to the U.S. Environmental Protection Agency (U.S. EPA) recommendations including boundaries for area designations for the revised federal annual PM2.5 standard of 9.0 μg/m^3 as specified in the enclosed staff report.

CARB staff based these recommendations on PM2.5 concentrations measured from 2021 through 2023 by federal reference method and federal equivalent method (FEM) PM2.5 monitors in California. CARB staff excluded FEM data from Siskiyou County as formally requested by the local air district, submitted to U.S. EPA on January 22, 2025, and described in the enclosed staff report.

CARB recommends the following nine areas be designated nonattainment for the revised federal annual PM2.5 standard of 9.0 μg/m^3:

- San Joaquin Valley Air Basin;
- Plumas County (partial);
- South Coast Air Basin;
- Yuba City-Marysville;
- Mendocino County (partial);
- Imperial County (partial);
- Sacramento County;
- San Francisco Bay Area Air Basin; and
- San Diego County.

CARB recommends the remainder of the State be designated attainment or unclassifiable as detailed in the staff report. The boundary descriptions for the nonattainment areas are also contained in the staff report. While the boundaries may include tribal lands, it is U.S. EPA's responsibility to designate tribal areas separately. CARB is committed to working with tribal authorities to protect and enhance ambient air quality throughout the State.

If you have any questions, please contact Edie Chang, Deputy Executive Officer, at (916) 445-4383, or have your staff contact Michael Benjamin, Chief, Air Quality Planning and Science Division, at (916) 201-8968.

Sincerely,

Steven S. Cliff, Ph.D., Executive Officer

Enclosures (1)

cc:

Matt Lakin, Director, Air and Radiation Division, U.S. Environmental Protection Agency, Region 9
lakin.matthew@epa.gov

Samir Sheikh, Executive Director/Air Pollution Control Officer, San Joaquin Valley Air Pollution Control District
samir.sheikh@valleyair.org

Julie Hunter, Air Pollution Control Officer/Director, Northern Sierra Air Quality Management District
julieh@myairdistrict.com

Wayne Nastri, Executive Officer, South Coast Air Quality Management District
wnastri@aqmd.gov

Christopher Brown, Air Pollution Control Officer, Feather River Air Quality Management District
apco@fraqmd.org

Douglas Gearhart, Executive Officer, Mendocino County Air Quality Management District
gearhartd@mendocinocounty.gov

Belen Leon-Lopez, Air Pollution Control Officer, Imperial County Air Pollution Control District
belenleon@co.imperial.ca.us

Alberto Ayala, Air Pollution Control Officer, Sacramento Metropolitan Air Quality Management District
aayala@airquality.org

Philip Fine, Executive Officer / Air Pollution Control Officer, Bay Area Air Quality Management District
pfine@baaqmd.gov

Paula Forbis, Air Pollution Control Officer, San Diego County Air Pollution Control District
Paula.Forbis@sdapcd.org

James Smith, Air Pollution Control Officer, Siskiyou County Air Pollution Control District
jsmith@co.siskiyou.ca.us

Edie Chang, Deputy Executive Officer

Michael Benjamin, D.Env., Division Chief, Air Quality Planning & Science Division

Staff Report

PM2.5 Area Designation Recommendations for the 2024 Annual PM2.5 National Ambient Air Quality Standard

Release Date: December 13, 2024

Public Meeting Date: January 23, 2025

CALIFORNIA
AIR RESOURCES BOARD

This document has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the California Air Resources Board, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Electronic copies of this document are available for download from the California Air Resources Board's Internet site at *https://ww2.arb.ca.gov/our-work/programs/state-and-federal-area-designations/federal-area-designations/pm2-5*. Please contact Elizabeth Gonzalez, Office Technician, at *elizabeth.gonzalez@arb.ca.gov* if you need physical copies of the documents.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette, or computer disk. Please contact CARB's Disability Coordinator at (916) 323-4916 by voice or through the California Relay Services at 711, to place your request for disability services. If you are a person with limited English and would like to request interpreter services, please contact CARB's Bilingual Manager at (916) 323-7053.

For questions, contact:

Mark Hixson

Staff Air Pollution Specialist
Central Valley Air Quality Planning Section
California Air Resources Board
Phone: (916) 264-9682
Email: *mark.hixson@arb.ca.gov*

Or

Ali Kindred

Manager
Central Valley Air Quality Planning Section
California Air Resources Board
Phone: (279) 208-7154
Email: *alicia.adams@arb.ca.gov*

Executive Summary

The U.S. Environmental Protection Agency (U.S. EPA) revised the annual National Ambient Air Quality Standard (NAAQS or standard) for particulate matter 2.5 micrometers or less in diameter (PM2.5) from 12.0 $\mu g/m^3$ to 9.0 $\mu g/m^3$ on February 7, 2024. The State of California is required to submit recommendations for nonattainment area designations and boundaries to U.S. EPA by February 7, 2025. This report describes California Air Resources Board (CARB) staff's nonattainment area recommendations and supporting technical analysis. The deadline for U.S. EPA to finalize designations is February 6, 2026.

CARB staff have determined designations for areas throughout the State using an approach provided in U.S. EPA's guidance memorandum.[1] The attainment or nonattainment status of an area is based on comparing the design value, a three-year average of annual average concentrations, to the level of the standard. CARB staff recommendations are based on PM2.5 air quality monitoring data for the years 2021 to 2023.

Nonattainment areas must include the monitors exceeding the standard as well as contributing sources. To ensure that boundaries are sufficiently sized, recommendations rely on a weight of evidence approach described in U.S. EPA's guidance[2] and should consider the following information:

- Air quality data;
- Emissions and emission-related data;
- Meteorology;
- Geography/topography; and
- Jurisdictional boundaries.

After considering this information, CARB staff are recommending nine areas for nonattainment designations based on the 2021-2023 PM2.5 air quality monitoring data for the 9.0 $\mu g/m^3$ annual PM2.5 standard. These nonattainment areas are Mendocino County (partial), Plumas County (partial), Yuba City-Marysville, Sacramento County, San Francisco Bay Area, San Joaquin Valley, Los Angeles-South Coast Air Basin, San Diego County, and Imperial County (partial). For the remaining areas in California, CARB staff will be recommending that they be designated as attainment or unclassified dependent upon the availability of valid monitoring data as specified in Attachment 3.

[1] February 7, 2024, Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard, Memorandum from Joseph Goffman, Assistant Administrator, Office of Air and Radiation to Regional Administrators, Regions 1-10.

[2] Ibid.

California Nonattainment Area Designation Recommendations for the 9.0 μg/m^3 Annual PM2.5 Standard

Air Quality Analysis Summary

CARB staff relied on valid air quality data from Federal Equivalent Method (FEM) or Federal Reference Method (FRM) monitors meeting operating requirements of 40 CFR part 58 to determine the designation status of areas. Table 1 below lists the CARB recommended nonattainment areas along with their current 2023 design values for the 9.0 μg/m^{3}annual PM2.5 standard. Table 2 shows the 2023 PM2.5 design value for Siskiyou County when the impacts of wildfires are removed (Attachment 4). Appropriately, CARB is not recommending that Siskiyou County be designated nonattainment due to the impact of wildfires as allowed by the Clean Air Act. Wildfires impacted the PM2.5 levels at many areas across California including those listed in Table 1. However, CARB staff only documented those events when they made an impact on the attainment of the standard.

Table 1. Design values for 9.0 μg/m^3 annual PM2.5 nonattainment area recommendations

Area	**2023 Design Value (μg/m^3)**
San Joaquin Valley	16.2
Plumas County (partial)	14.0
South Coast	13.1
Yuba City – Marysville	11.2
Mendocino County (partial)	11.0
Imperial County (partial)	10.2
Sacramento County	9.9
San Francisco Bay Area	9.6
San Diego County	9.2

Table 2. Impact of wildfires in Siskiyou County

Area	Monitoring Site	**2021-2023 DV** No events removed ($\mu g/m^3$)	**2021-2023 DV** 2021 and 2022 events removed ($\mu g/m^3$)
Siskiyou	Yreka (06-093-2001)	11.6	8.4

Boundary Analysis Summary

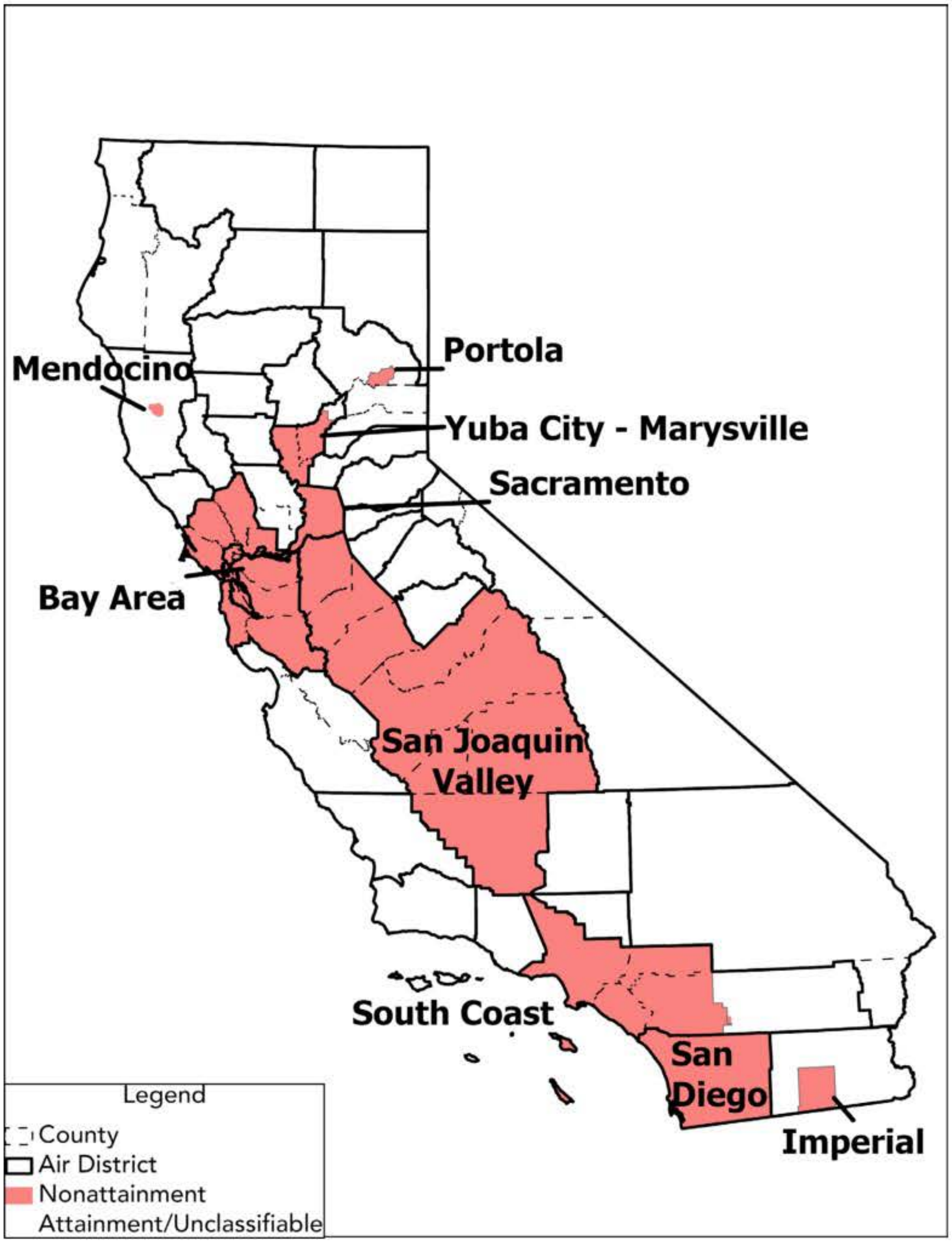
In California, if the pollution problem is regional in nature, the primary considerations for air quality planning boundaries are air basin and air district boundaries. Consistent with State law, California's air basin boundaries were established based on a scientific assessment of emissions, geography, and meteorology, with consideration of political jurisdictions. Air basin boundaries are formally adopted by CARB in regulation. Local air districts have been established, and their jurisdictions defined by State statute. CARB typically uses a combination of existing air basin and air district boundaries to identify boundaries for areas that violate air quality standards except in situations where a single city or community has a unique air pollution problem distinct from the region.

The Clean Air Act requires that a nonattainment area must include not only the area that is violating the standard, but also nearby areas that contribute to violations. Accordingly, CARB's recommended nonattainment boundaries are sufficiently large to include both the violating and contributing areas. U.S. EPA guidance recommends that in making boundary recommendations for nonattainment areas, states evaluate each area on a case-by-case basis in consideration of the following five factors:

- Air quality data;
- Emissions and emission-related data;
- Meteorology;
- Geography/topography; and
- Jurisdictional boundaries.

CARB staff reached out to the local air districts that included monitors recording values over the 9.0 $\mu g/m^3$ annual PM2.5 standard to discuss appropriate boundaries for this standard. Some of the local air districts conveyed that an existing boundary for a previous PM2.5 standard were appropriate for the 9.0 $\mu g/m^3$ annual PM2.5 standard. The Feather River Air Quality Management District and the Bay Area Air Quality Management District conveyed that the existing boundaries for the 2006 35 $\mu g/m^3$ 24-hour PM2.5 standard, Yuba City-Marysville and San Francisco Bay Area, respectively, were appropriate for the 9.0 $\mu g/m^3$ annual $PM_{2.5}$ standard. The South Coast Air Quality Management District, the San Joaquin Valley Air Pollution Control District, the Northern Sierra Air Quality Management District and the Imperial County Air Pollution Control District conveyed that the existing boundaries for the 12.0 μg/m^3 annual PM2.5 standard, the Los Angeles-South Coast Air Basin, San Joaquin Valley, Plumas County, and Imperial County, respectively, were appropriate for the 9.0 μg/m^3 annual PM2.5 standard. After discussion with the local air districts, boundaries for monitors recording values over the 9.0 μg/m^3 annual PM2.5 standard located in Mendocino, Sacramento, and San Diego Counties will be based on review of current air quality data along with considerations for emissions, meteorology, topography, and jurisdictional boundaries. After consulting with the local air districts, CARB staff determined that the county/local air district boundary was appropriate for monitors over the 9.0 μg/m^3 annual PM2.5 standard in Sacramento and San Diego Counties. For the monitor over the 9.0 μg/m^3 annual PM2.5 standard in Mendocino County, CARB developed a boundary that captured the populated area that included the monitor. Figure 1 shows CARB staff nonattainment area recommendations for the 9.0 μg/m^3 annual PM2.5 standard.

Figure 1. Map of PM2.5 Nonattainment Areas



Some of the recommended nonattainment areas for the 9.0 µg/m[3] annual PM2.5 standard include tribal lands. While we are recommending these nonattainment boundaries, we are not making recommendations for tribal lands.

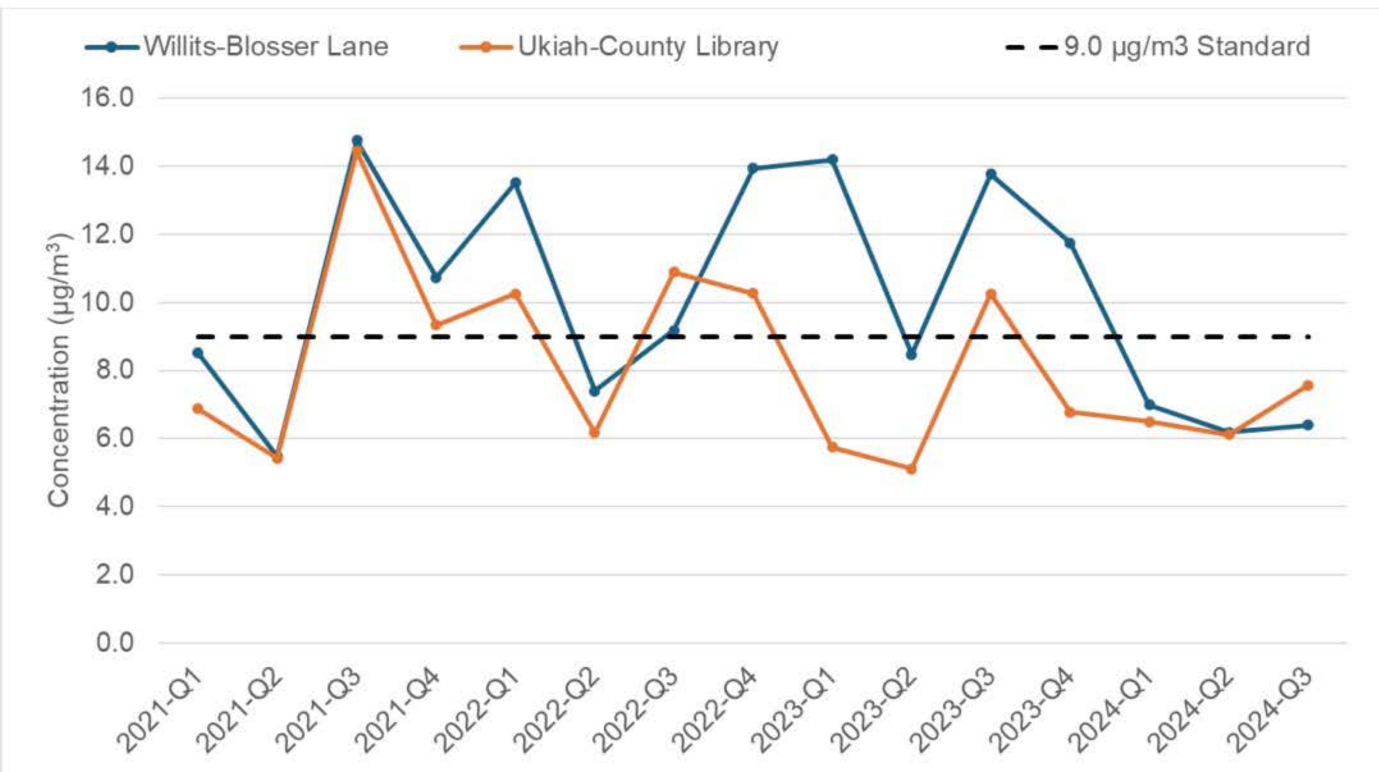
Designation Recommendations

CARB staff is recommending the following nonattainment area boundaries for the 9.0 µg/m³ annual PM2.5 standard based on consideration of the five factors described in U.S. EPA's guidance memorandum. These nonattainment areas are Mendocino County (partial), Plumas County (partial), Yuba City-Marysville, Sacramento County, San Francisco Bay Area, San Joaquin Valley, Los Angeles-South Coast Air Basin, San Diego County and Imperial County (partial).

Mendocino County (Partial)

Mendocino County has never been designated nonattainment for any of the previous PM2.5 standards. The Willits-Blosser Lane monitoring site exceeds the 9.0 µg/m³ annual PM2.5 standard with a 2023 design value of 11.0 µg/m³. The Blosser Lane monitor began collecting data on February 4, 2021; data from the 125 East Commercial Street monitor was combined with Blosser Lane to calculate the 2021 quarter 1 average concentration. Concentrations are generally lowest in the second quarter with high concentrations exceeding the standard observed through quarters 1, 3, and 4 (Figure 2). The Ukiah-County Library PM2.5 monitor is also located in Mendocino County with a 2023 PM2.5 annual design value of 8.5 µg/m³.

Figure 2. Mendocino County monitoring site quarterly concentrations



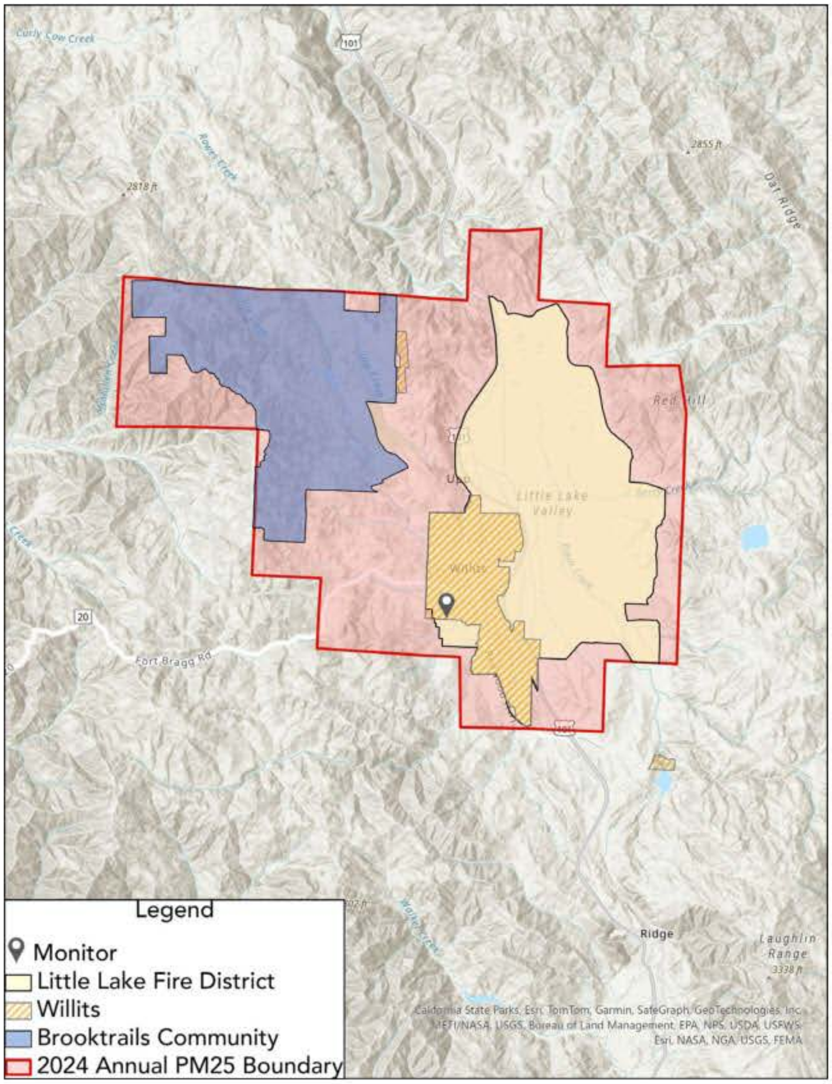
Willits has a population of 4,988 as of the 2020 Census. Brooktrails is a neighboring census-designated place, unincorporated community to the northwest of Willits and has a population of 3,632 as of the 2020 Census.

U.S. Route 101 passes North and South through the Little Lake Valley, and State Route 20 runs East and West through Willits. There are no major stationary sources identified that would influence the Willits-Blosser Lane monitor. Local sources of emissions include home heating and residential backyard burning for defensible space clearing.

Mendocino is a large county covering 3,878 square miles with a population of 91,601 as of the 2020 census. The city of Willits is located on the southwestern edge of the Little Lake Valley surrounded by the California Coast Range. The elevation of unincorporated Brooktrails community ranges from 1,634 ft on the east to 3,000 ft on the western edge. The California Coast Range effectively isolates the Little Lake Valley with higher elevation ridgelines in all directions thus justifying that the nonattainment area boundary exclude the rest of the county. Figure 3 shows the recommended nonattainment area boundary for Mendocino County. The boundary includes the Little Lake Valley, city of Willits, Brooktrails community, portions of State Route 20 to the west of Willits, and the Little Lake Fire District. This area is under the jurisdiction of the Mendocino County Air Quality Management District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, the area is in nonattainment of the 9.0 $\mu g/m^3$ annual standard with a design value of 11.0 $\mu g/m^3$ measured at the Willits-Blosser Lane monitoring site (Attachment 1).

Figure 3. Mendocino County PM2.5 Nonattainment Area Boundary



Plumas County (Partial)

In 2015, a portion of Plumas County was designated nonattainment for the 12.0 μg/m^3 annual PM2.5 standard. Consistent with analysis previously conducted for that PM2.5 standard in accordance with U.S. EPA's five factors, CARB recommends the 9.0 μg/m^3 annual PM2.5 nonattainment area coincide with the nonattainment area already in existence as established by U.S. EPA[3]. The recommended PM2.5 nonattainment area encompasses that portion of Plumas County that includes the City of Portola and surrounding

---

[3] Air Quality Designations for the 2012 Primary Annual Fine Particle (PM2.5) National Ambient Air Quality Standards (NAAQS). 80 Federal Register 2,206 (January 15, 2015). *https://www.govinfo.gov/content/pkg/FR-2015-01-15/pdf/2015-00021.pdf*

communities. This area is under the jurisdiction of the Northern Sierra Air Quality Management District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, the area is in nonattainment of the 9.0 µg/m^3 annual PM2.5 standard with a design value of 14.0 µg/m^3 measured at the Portola monitoring site (Attachment 1).

Yuba City-Marysville

In 2009, the Yuba City-Marysville area was designated nonattainment for the 2006 35 µg/m^3 24-hour PM2.5 standard. Consistent with analysis previously conducted for that PM2.5 standard in accordance with U.S. EPA's five factors, CARB recommends the 9.0 µg/m^3 annual PM2.5 nonattainment area coincide with the nonattainment area already in existence for Yuba City-Marysville for the 2006 35 µg/m^3 24-hour PM2.5 standard as approved by U.S. EPA[4]. The recommended PM2.5 nonattainment area includes Sutter County and a portion of Yuba County. This area is under the jurisdiction of the Feather River Air Quality Management District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, the area is in nonattainment of the 9.0 µg/m^3 annual PM2.5 standard with a design value of 11.2 µg/m^3 measured at the Yuba City monitoring site (Attachment 1).

Sacramento County

In 2009, the Sacramento area was designated nonattainment for the 2006 35 µg/m^3 24-hour PM2.5 standard. U.S. EPA designated an area that included Sacramento County as well as portions of El Dorado, Placer, Yolo, and Solano counties[5]. CARB originally recommended that the nonattainment area only include Sacramento County since no PM2.5 monitors were exceeding the 2006 35 µg/m^3 24-hour PM2.5 standard in the surrounding counties. However, U.S. EPA designated the larger area instead. For the 9.0 µg/m^3 annual PM2.5 standard, CARB again is recommending a boundary that only includes Sacramento County based on the assessment of air quality data and sources influencing the monitors exceeding the standard.

For the 2023 PM2.5 design value, the Bercut Drive near road monitoring site recorded a PM2.5 annual average value of 9.9 µg/m^3. The Del Paso Manor monitoring site has a 2023 PM2.5 annual average design value of 9.6 µg/m^3. The neighboring monitors outside of Sacramento County in Yolo and Placer Counties are below the 9.0 µg/m^3 PM2.5 annual average standard with 2023 PM2.5 annual average design values of 8.2 µg/m^3 and

---

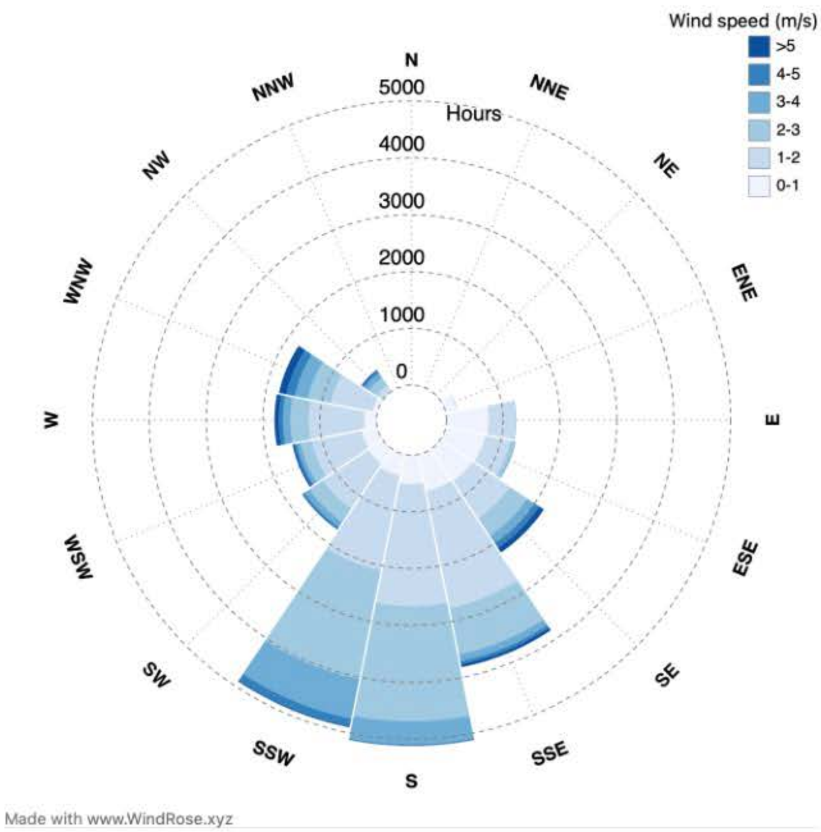
[4] Air Quality Designations for the 2006 24-Hour Fine Particle (PM2.5) National Ambient Air Quality Standards. 74 Federal Register 58,688 (November 13, 2009). *https://www.govinfo.gov/content/pkg/FR-2009-11-13/pdf/E9-25711.pdf*

[5] Ibid.

8.9 μg/m³, respectively. These 2023 PM2.5 annual design values do include the impacts of wildfires that occurred in 2021 and would likely be lower if the impacts were excluded. Further, the eastern Sacramento County PM2.5 monitor in Folsom recorded a 2023 PM2.5 annual average value of 7.8 μg/m³ indicating that the elevated values do not cross into the adjacent country, El Dorado County. Further, Bercut Drive, Del Paso Manor sites show higher annual average concentrations through 2022 and 2023 compared to their neighboring monitors in Yolo and Placer Counties.

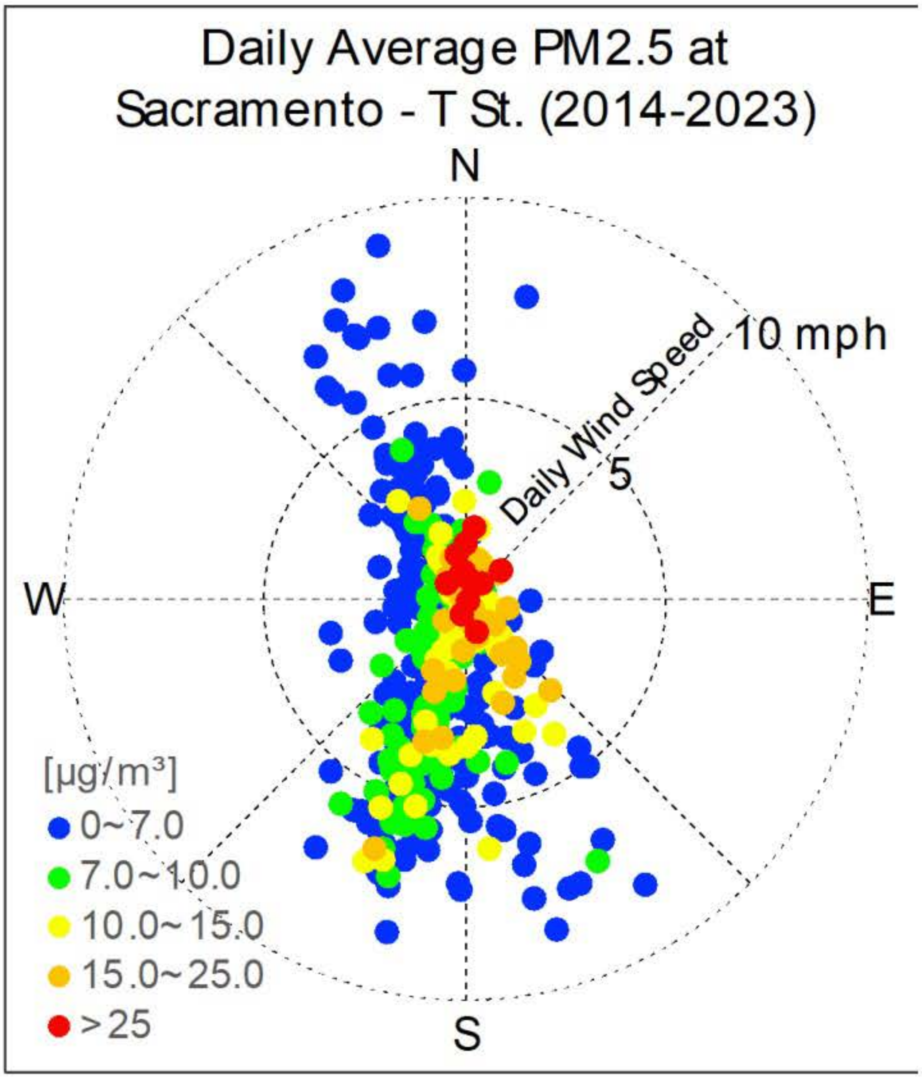
The Bercut Drive PM2.5 monitor was installed to meet the PM2.5 near road monitor requirements that are microscale in nature. The higher concentrations at the Bercut Drive near road monitor are driven in part by the proximity to on-road motor vehicles. Figure 4 shows the predominate observed wind direction for the Bercut Drive monitoring site is south, south-southwest, and south-southeast from the center of downtown Sacramento.

Figure 4. Wind Rose for Sacramento Bercut Drive monitoring site



Filter-based PM2.5 data at the Sacramento T Street monitor from 2014 to 2023 shows higher concentration days (15-25 μg/m³) coincide with stagnant wind conditions (Figure 5). Moderate PM2.5 concentrations (7-15 μg/m³) were observed with winds up to 7 mph from the south-southwest. This data excludes regionally concurred exceptional events. The T Street monitor is located less than 2 miles southeast of the Bercut Drive monitor.

Figure 5. 2014-2023 PM2.5 Daily Average Concentrations at Sacramento T Street by wind direction



No major stationary sources (100 tons per year of direct PM2.5 or precursors) were identified outside of Sacramento County that would influence the exceeding monitors. The recommended PM2.5 boundary is Sacramento County. This area is under the jurisdiction of the Sacramento Metropolitan Air Quality Management District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, the area is in nonattainment of the 9.0 µg/m³ annual PM2.5 standard with a design value of 9.9 µg/m³ measured at the Bercut Drive monitoring site (Attachment 1).

San Francisco Bay Area

In 2009, the San Francisco Bay Area was designated nonattainment for the 2006 35 µg/m³ 24-hour PM2.5 standard. Consistent with analysis previously conducted for that 24-hour standard in accordance with U.S. EPA's five factors, CARB recommends the PM2.5 nonattainment area coincide with the nonattainment area already in existence for the San Francisco Bay Area for the 2006 35 μg/m^3 24-hour PM2.5 standard as approved by U.S. EPA[6]. The recommended PM2.5 nonattainment area includes the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara, and portions of Solano and Sonoma. This area is under the jurisdiction of the Bay Area Air Quality Management District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, the San Francisco Bay Area is in nonattainment of the 9.0 μg/m^3 annual PM2.5 standard with a design value of 9.6 μg/m^3 measured at the San Pablo monitoring site (Attachment 1).

San Joaquin Valley

In 2005, the San Joaquin Valley was designated nonattainment for the annual PM2.5 standard of 15.0 μg/m^3, and in 2013 was designated nonattainment of the lowered 12.0 μg/m^3 annual standard. Consistent with analysis previously conducted for those PM2.5 standards in accordance with U.S. EPA's five factors, CARB recommends the 9.0 μg/m^3 annual PM2.5 nonattainment area coincide with the nonattainment area already in existence for previous PM2.5 standards as approved by U.S. EPA[7][8]. The recommended PM2.5 nonattainment area includes the counties of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare, and western Kern. This area is under the jurisdiction of the San Joaquin Valley Air Pollution Control District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 air quality monitoring data, the San Joaquin Valley is in nonattainment of the 9.0 μg/m^3 annual PM2.5 standard with a design value of 16.2 μg/m^3 measured at the Bakersfield-Planz monitoring site. In addition to data recorded at this high site, other monitors distributed throughout the San Joaquin Valley are over the standard (Attachment 1).

Los Angeles-South Coast Air Basin

In 2005, the Los Angeles-South Coast Air Basin (South Coast) was designated nonattainment for the annual PM2.5 standard of 15.0 μg/m^3, and in 2013 was designated nonattainment of the lowered 12.0 μg/m^3 annual PM2.5 standard. Consistent with analysis previously conducted for those PM2.5 standards in accordance with U.S. EPA's five factors,

---

[6] Ibid.

[7] Air Quality Designations and Classifications for the Fine Particles (PM2.5) National Ambient Air Quality Standards. 70 Federal Register 944 (January 5, 2005). *https://www.govinfo.gov/content/pkg/FR-2005-01-05/pdf/05-1.pdf*

[8] Air Quality Designations for the 2012 Primary Annual Fine Particle (PM2.5) National Ambient Air Quality Standards (NAAQS). 80 Federal Register 2,206 (January 15, 2015). *https://www.govinfo.gov/content/pkg/FR-2015-01-15/pdf/2015-00021.pdf*

CARB recommends the 9.0 µg/m^3 annual PM2.5 nonattainment area coincide with the nonattainment area already in existence for previous PM2.5 standards as approved by U.S. EPA[9][10]. The recommended PM2.5 nonattainment area includes Orange County, southwestern San Bernardino County, western Riverside County, and western Los Angeles County (excluding Catalina and San Clemente Islands). This area is under the jurisdiction of the South Coast Air Quality Management District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, the South Coast is in nonattainment of the 9.0 µg/m^3 annual PM2.5 standard with a design value of 13.1 µg/m^3 measured at the Ontario-Route 60 monitoring site. In addition to data recorded at the high site, other monitors distributed throughout the South Coast are over the standard (Attachment 1).

San Diego County

In 2012, San Diego County (San Diego) was designated nonattainment for the 75 parts per billion (ppb) 8-hour ozone standard, and in 2018 was designated nonattainment for the 70 ppb 8-hour ozone standard. Consistent with analysis previously conducted for those ozone standards in accordance with U.S. EPA's five factors, CARB recommends the 9.0 µg/m^3 annual PM2.5 nonattainment area coincide with the nonattainment area already in existence for the ozone standards as approved by U.S. EPA[11]. The recommended PM2.5 nonattainment area comprises the entirety of San Diego County. This area is under the jurisdiction of the San Diego County Air Pollution Control District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, San Diego is in nonattainment of the 9.0 µg/m^3 annual PM2.5 standard with a design value of 9.2 µg/m^3 measured at the San Diego Sherman Elementary monitoring site. One other site, El Cajon Lexington Elementary, in San Diego County is also over the standard (Attachment 1).

Imperial County (Partial)

In 2015, Imperial County was designated nonattainment for the 12.0 µg/m^3 annual PM2.5 standard. Consistent with analysis previously conducted for that PM2.5 standard in accordance with U.S. EPA's five factors, CARB recommends the 9.0 µg/m^3 annual PM2.5 nonattainment area coincide with the nonattainment area already in existence for the

[9] Air Quality Designations and Classifications for the Fine Particles (PM2.5) National Ambient Air Quality Standards. 70 Federal Register 944 (January 5, 2005). *https://www.govinfo.gov/content/pkg/FR-2005-01-05/pdf/05-1.pdf*

[10] Air Quality Designations for the 2012 Primary Annual Fine Particle (PM2.5) National Ambient Air Quality Standards (NAAQS). 80 Federal Register 2,206 (January 15, 2015). *https://www.govinfo.gov/content/pkg/FR-2015-01-15/pdf/2015-00021.pdf*

[11] Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards. 83 Federal Register 25,776 (June 4, 2018). *https://www.govinfo.gov/content/pkg/FR-2018-06-04/pdf/2018-11838.pdf*

12.0 μg/m^3 annual PM2.5 standard as approved by U.S. EPA[12]. The recommended PM2.5 nonattainment area includes a portion of Imperial County. This area is under the jurisdiction of the Imperial County Air Pollution Control District. The official recommended boundary is provided in Attachment 2.

Based on 2021-2023 monitoring data, Imperial is in nonattainment of the 9.0 μg/m^3 standard with a design value of 10.2 μg/m^3 measured at the Calexico-Ethel monitoring site (Attachment 1).

[12] Air Quality Designations for the 2012 Primary Annual Fine Particle (PM2.5) National Ambient Air Quality Standards (NAAQS). 80 Federal Register 2,206 (January 15, 2015). *https://www.govinfo.gov/content/pkg/FR-2015-01-15/pdf/2015-00021.pdf*

Attachment 1: 2021-2023 Annual Averages and 2023 PM2.5 Design Values for California Regulatory Monitoring Sites

Table 3: 2021-2023 annual averages and 2023 PM2.5 design values for California regulatory monitoring sites by air basin

3a. Great Basin Valleys Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060270002	Inyo	WMRC - Owens Valley Lab	7.8	3.6	3.3	4.9
060271003	Inyo	Keeler	9.7	6.2	6.4	7.4
060510001	Mono	Mammoth	10.1	6.9	7.0	8.0
060510005	Mono	Lee Vining		4.0	3.2	

3b. Lake County Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060333002	Lake	Lakeport-S. Main Street	6.3	4.3	4.1	4.9

3c. Mountain Counties Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060090001	Calaveras	San Andreas-Gold Strike Road	8.4	6.1	5.5	6.7
060570005	Nevada	Grass Valley-Litton Building	8.7	6.0	4.7	6.5
060571001	Nevada	Truckee-Fire Station				
060631006	Plumas	Quincy-N Church Street			7.0	
060631010	Plumas	Portola	16.5	13.7	11.9	14.0

3d. Mojave Desert Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060290018	Kern	Ridgecrest-Ward	8.3	4.0	4.5	5.6
060290020	Kern	Mojave-Pat Avenue	7.5	5.2		6.0
060379035	Los Angeles	Lancaster - Fairgrounds	8.1	7.5	3.4	6.3
060710306	San Bernardino	Victorville-Park Avenue	10.3	9.0	7.9	9.0

3e. North Coast Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060231004	Humboldt	Jacobs	6.9	6.8	7.0	6.9
060450006	Mendocino	Ukiah-Library	9.0	9.4	7.0	8.5
060452003	Mendocino	Willits-Blosser Lane	9.9	11.0	12.1	11.0

3f. North Central Coast Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060530002	Monterey	Carmel Valley	3.5	3.6	4.1	3.7
060530008	Monterey	King City 2	6.7	5.2	4.5	5.5
060531003	Monterey	Salinas 3	4.8	5.1	7.7	5.9
060690002	San Benito	Hollister	5.6	5.0	4.0	4.9
060870007	Santa Cruz	Santa Cruz	4.9	5.5	5.1	5.1

3g. Northeast Plateau Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060932001	Siskiyou	Yreka	14.6	9.4	11.0	11.7[13]

3h. South Coast Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060371103	Los Angeles	Los Angeles-North Main Street	12.9	11.0	10.3	11.4
060371201	Los Angeles	Reseda	10.1	8.8	8.8	9.2
060371302	Los Angeles	Compton	13.4	12.1	11.1	12.2
060371602	Los Angeles	Pico Rivera #2	13.1	11.3	10.4	11.6
060372005	Los Angeles	Pasadena	10.7	9.1	9.1	9.6
060374002	Los Angeles	Long Beach (North)	10.9			
060374004	Los Angeles	Long Beach (South)	11.5			
060374008	Los Angeles	Long Beach-Route 710 Near Road	13.0	11.9	10.9	11.9

[13] Following the removal of exceptional events in 2021 - 2022 the design value is 8.4 µg/m³.

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060374009	Los Angeles	Signal Hill (LBSH)			9.6	
060590007	Orange	Anaheim	11.5	9.9	9.2	10.2
060592022	Orange	Mission Viejo	9.3			
060658001	Riverside	Rubidoux	12.7	10.8	10.6	11.4
060658005	Riverside	Mira Loma (Van Buren)	14.5	11.5	11.8	12.6
060710027	San Bernardino	Ontario-Route 60 Near Road	14.7	12.2	12.3	13.1
060712002	San Bernardino	Fontana	12.1	10.9	11.2	11.4
060718001	San Bernardino	Big Bear	7.0	8.3	6.0	7.1
060719004	San Bernardino	San Bernardino	11.9	11.3	10.5	11.2

3i. South Central Coast Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060792004	San Luis Obispo	Mesa2	6.5	6.6	4.7	6.0

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060792007	San Luis Obispo	CDF	8.0	9.1	6.8	8.0
060792020	San Luis Obispo	SLO Roberto	5.9	6.5	4.1	5.5
060798002	San Luis Obispo	Atascadero	6.7	6.1	3.8	5.5
060830011	Santa Barbara	Santa Barbara	6.7	8.0	8.0	7.5
060831009	Santa Barbara	Santa Maria			4.1	
060832004	Santa Barbara	Lompoc H Street	5.8	5.6	4.6	5.3
060832011	Santa Barbara	Goleta	5.7	5.2		5.5
060839001	Santa Barbara	Carpinteria				
061110007	Ventura	Thousand Oaks	7.6	8.2	6.5	7.5
061110009	Ventura	Piru - Pacific	7.0	6.7	5.4	6.4
061111004	Ventura	Ojai - East Ojai Ave	6.2	5.6	4.2	5.3
061112002	Ventura	Simi Valley-Cochran Street	8.7	7.2	5.9	7.3
061113001	Ventura	El Rio-Rio Mesa School #2	6.8	6.5	6.1	6.5

3j. San Diego County Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060730001	San Diego	Chula Vista	9.5		8.9	
060731006	San Diego	Alpine			5.9	
060731008	San Diego	Camp Pendleton			7.9	
060731014	San Diego	Donovan			12.5	
060731016	San Diego	San Diego - Kearny Villa Rd.	7.7	6.9	7.1	7.2
060731017	San Diego	San Diego - Rancho Carmel Drive	8.5	7.7	6.9	7.7
060731022	San Diego	El Cajon - Lexington Elementary School	9.7	9.0	8.5	9.1
060731026	San Diego	San Diego - Sherman Elementary School	9.7	8.8	9.0	9.2

3k. San Francisco Bay Area Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060010007	Alameda	Livermore-793 Rincon Avenue	8.0	7.5	6.4	7.3
060010009	Alameda	Oakland	8.0	8.3	6.4	7.6
060010011	Alameda	Oakland West	7.5	8.1	6.8	7.5
060010012	Alameda	Laney College	8.7	9.4	8.7	8.9
060010013	Alameda	Berkeley-Aquatic Park	10.5*	n/a	5.9*	8.2**
060010015	Alameda	Pleasanton - Owens Ct	8.4	7.6	7.0	7.7
060130002	Contra Costa	Concord	8.0	7.0	6.2	7.1
060131004	Contra Costa	San Pablo	9.1	9.9	9.9	9.6
060410001	Marin	San Rafael	7.0	6.9	5.4	6.4
060550004	Napa	Napa Valley College	7.4	n/a	n/a	7.4**
060750005	San Francisco	San Francisco	7.2	6.8	5.4*	6.5**
060811001	San Mateo	Redwood City	6.1	6.8	8.0	7.0
060850002	Santa Clara	Gilroy	5.5	5.5*	4.7	5.7
060850005	Santa Clara	San Jose - Jackson	8.9	10.1	8.2	9.1

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060850006	Santa Clara	San Jose - Knox Avenue	10.9	8.8	6.9	8.9
060950004	Solano	Vallejo	8.4	7.7	5.9	7.3
060970004	Sonoma	Sebastopol	7.1*	6.4	5.0	6.2

* Does not meet completeness requirements in 40 CFR part 50, Appendix N 4.1(b). If completeness requirements are not met, the 3-year design value shall still be considered valid if it passes data substitution tests described in 40 CFR part 50, Appendix N 4.1(c)

** Design value does not pass data substitution tests described in 40 CFR part 50, Appendix N 4.1(c) and is invalid.

3l. San Joaquin Valley Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060190011	Fresno	Fresno - Garland	15.6	12.9	10.5	13.0
060192009	Fresno	Tranquility	8.9	6.7	4.8	6.8
060192016	Fresno	Fresno-Foundry	17.2	14.8	12.5	14.8
060195001	Fresno	Clovis-Villa	15.1	10.5	8.6	11.4
060195025	Fresno	Fresno-Pacific	13.8	13.5	12.6	13.3
060290010	Kern	Bakersfield-Golden / M St	17.9	16.6	13.6	16.0

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060290014	Kern	Bakersfield-California	16.6	15.8	12.0	14.8
060290016	Kern	Bakersfield-Airport (Planz)	20.0	16.1	12.5	16.2
060310004	Kings	Corcoran-Patterson	14.8	14.7	10.1	13.2
060311004	Kings	Hanford-Irwin	15.6	14.2	12.5	14.1
060392010	Madera	Madera-City	12.4	10.4	9.9	10.9
060470003	Merced	Merced-Coffee	11.3	9.8	8.4	9.8
060472510	Merced	Merced-M St	11.1	10.5	9.6	10.4
060771003	San Joaquin	Stockton - University Park	12.8	10.2	10.7	11.2
060772010	San Joaquin	Manteca	11.7	9.0	7.9	9.5
060990005	Stanislaus	Modesto-14th Street	15.0	13.4	10.5	13.0
060990006	Stanislaus	Turlock	12.8	10.8	10.1	11.3
061072003	Tulare	Visalia-W. Ashland Avenue	20.7	14.9	11.7	15.7

3m. Salton Sea Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060250005	Imperial	Calexico-Ethel Street	10.3	11.0	9.5	10.2
060250007	Imperial	Brawley-220 Main Street		8.7	8.6	
060251003	Imperial	El Centro-9th Street	8.4	8.9		
060652002	Riverside	Indio	9.9			
060655001	Riverside	Palm Springs	6.2	6.3	5.9	6.1

3n. Sacramento Valley Air Basin

AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060070008	Butte	Chico-East Avenue	11.1	7.7	7.8	8.9
060111002	Colusa	Colusa-Sunrise Blvd	12.1	7.2	7.4	8.9
060610003	Placer	Auburn-Atwood	9.7	7.4	5.4	7.5
060610006	Placer	Roseville-N Sunrise Ave	11.3	7.9	7.5	8.9
060670006	Sacramento	Sacramento-Del Paso Manor	10.2	10.1	8.5	9.6

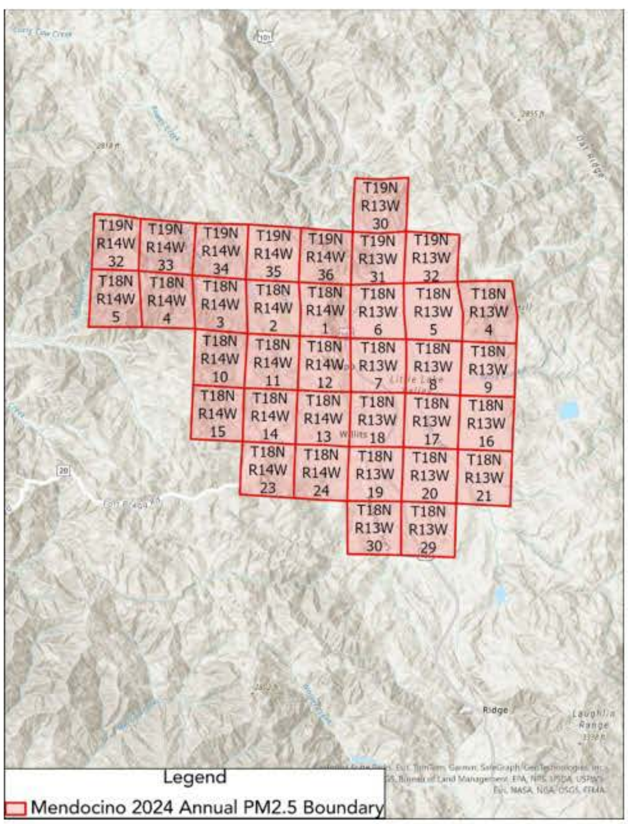
AQS ID	County	Site Name	2021 Annual Avg. (µg/m³)	2022 Annual Avg. (µg/m³)	2023 Annual Avg. (µg/m³)	2023 Annual PM2.5 Design Value (µg/m³)
060670010	Sacramento	Sacramento-1309 T Street	9.4	8.6	7.1	8.3
060670012	Sacramento	Folsom-Natoma St.	10.4	6.4	6.6	7.8
060670015	Sacramento	Sacramento-Bercut Drive	10.9	9.4	9.4	9.9
060675003	Sacramento	Sloughhouse		5.7	6	6.9
060890004	Shasta	Redding - Health Department			6.8	
061010003	Sutter	Yuba City	14.5	10.7	8.4	11.2
061030007	Tehama	Red Bluff-Walnut St. District Office	10.7	5.8	6.1	7.5
061131003	Yolo	Woodland-Gibson Road	8.9	8.3	7.4	8.2

Attachment 2: Boundaries for Recommended Nonattainment Areas

Mendocino County (Partial)

The portion of Mendocino County that is contained within the following township range section boundaries. Beginning with western, northern, and eastern boundaries of T19N range R13W section 30. The northern, and eastern boundaries of T19N range R13W section 32. The northern and eastern boundary defined by township T18N range R13W section 4. The eastern boundary defined by township T18N range R13W 9, 16, and 21. Next the southern boundary of township T18N range R13W section 21, the eastern boundary and southern boundary of township T18N range R13W section 29. The southern boundary and western boundary of township T18N range R13W section 30. The southern boundary of township T18N range R14W sections 24 and 23. The western boundary of township T18N range R14W section 23. The southern boundary of township T18N range R14W section 15. The western boundary of township T18N range R14W sections 15 and 10. The southern boundary of township T18N range R14W sections 4 and 5. The western boundary of T19N range R14W section 32. The northern boundary of township T19N range R14W sections 32. 32, 33, 34, 35, and 36. Figure 6 shows the township range sections defining the boundary of the Mendocino PM2.5 nonattainment area boundary.

Figure 6. Township range sections within the Mendocino PM2.5 nonattainment boundary



Plumas County (Partial)

- Plumas County (Partial)

The recommended Plumas County Nonattainment Area includes the portion of Plumas County within the boundaries as described below:

That portion of Plumas County within the following Super Planning Watersheds (SPWS), as defined by the State of California's Department of Conservation Statewide Watershed Program[14]: Humbug Valley (#55183301), Sulpher Creek (#55183302), Frazier Creek (#55183303), and Eureka Lake (#55183304).

Yuba City-Marysville

- Sutter County
- Yuba County (Partial)

The recommended Yuba City-Marysville Nonattainment Area includes Sutter County and the portion of Yuba County that lies within the boundaries as described below:

Yuba County

That portion of Yuba County which lies west of the line described as follows: (Mount Diablo Base and Meridian) Beginning at the intersection of the Yuba-Nevada county line and the range line common to ranges R7E and R8E, north to the southeast corner of township T18N R7E, then west along the township line common to T17N and T18N, then north along the range line common to ranges R6E and R7E, then west along the township line common to T19N and T18N to the Yuba-Butte County boundary.

Sacramento County

- Sacramento County

San Francisco Bay Area

- Alameda County
- Contra Costa County
- Marin County
- Napa County
- San Francisco County
- San Mateo County
- Santa Clara County
- Solano County (Partial)

[14] https://gispublic.waterboards.ca.gov/portalserver/rest/services/Hosted/CalWater/FeatureServer

- Sonoma County (Partial)

The recommended Bay Area Nonattainment Area includes the entirety of the counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara and portions of Solano County and Sonoma County within the boundaries as described below:

Solano County

That portion of Solano County which lies south and west of a line described as follows: Beginning at the intersection of the westerly boundary of Solano County and the 1/4 section line running east and west through the center of Section 34, Township 6 North, Range 2 West, Mount Diablo Base and Meridian, thence east along said 1/4 section line to the east boundary of Section 36, Township 6 North, Range 2 West, thence south 1/2 mile and east 2.0 miles, more or less, along the west and south boundary of Los Putos Rancho to the northwest corner of Section 4, Township 5 North, Range 1 West thence east along a line common to T5N and T6N to the northeast corner of Section 3, T5N, R1E, thence south along section lines to the southeast corner of Section 10, T3N, R1E, thence east along section lines to the south 1/4 corner of Section 8, T3N, R2E, thence east to the boundary between Solano and Sacramento Counties.

Sonoma County

That portion of Sonoma County which lies south and east of a line described as follows:

Beginning at the southeasterly corner of the Rancho Estero Americano, being on the boundary line between Marin and Sonoma Counties, California;

thence running northerly along the easterly boundary line of said Rancho Estero Americano to the northeasterly corner thereof, being an angle corner in the westerly boundary line of Rancho Canada de Jonive;

thence running along said boundary of Rancho Canada de Jonive westerly, northerly and easterly to its intersection with the easterly line of Graton Road;

thence running along the easterly and southerly line of Graton Road, northerly and easterly to its intersection with the easterly line of Sullivan Road;

thence running northerly along said easterly line of Sullivan Road to the southerly line of Green Valley Road;

thence running easterly along the said southerly line of Green Valley Road and easterly along the southerly line of State Highway 116, to the westerly line of Vine Hill Road;

thence running along the westerly and northerly line of Vine Hill Road, northerly and easterly to its intersection with the westerly line of Laguna Road;

thence running northerly along the westerly line of Laguna Road and the northerly projection thereof to the northerly line of Trenton Road;

thence running westerly along the northerly line of said Trenton Road to the easterly line of Trenton-Healdsburg Road;

thence running northerly along said easterly line of Trenton-Healdsburg Road to the easterly line of Eastside Road;

thence running northerly along said easterly line of Eastside Road to its intersection with the southerly line of Rancho Sotoyome;

thence running easterly along said southerly line of Rancho Sotoyome to its intersection with the Township line common to Townships 8 and 9 North, M.D.M.;

thence running easterly along said township line to its intersection with the boundary line between Sonoma and Napa Counties.

San Joaquin Valley

- Fresno County
- Kern County (Partial)
- Kings County
- Madera County
- Merced County
- San Joaquin County
- Stanislaus County
- Tulare County

The recommended San Joaquin Valley Nonattainment Area includes the entirety of the counties of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare, and the portion of Kern County as described below:

Kern County

That portion of Kern County which lies west and north of a line described as follows: Beginning at the Kern-Los Angeles County boundary and running north and east along the northwest boundary of the Rancho La Libre Land Grant to the point of intersection with the range line common to Range 16 West and Range 17 West, San Bernardino Base and Meridian; north along the range line to the point of intersection with the Rancho El Tejon Land Grant boundary; then southeast, northeast, and northwest along the boundary of the Rancho El Tejon Land Grant to the northwest corner of Section 3, Township 11 North, Range 17 West; then west 1.2 miles; then north to the Rancho El Tejon Land Grant boundary; then northwest along the Rancho El Tejon Land Grant boundary line to the southeast corner of Section 34, Township 32 South, Range 30 East, Mount Diablo Base and Meridian; then north to the northwest corner of Section 35, Township 31 South, Range 30 East; then northeast along the boundary of the Rancho El Tejon Land Grant to the southwest corner of Section 18, Township 31 South, Range 31 East; then east to the southeast corner of Section 13, Township 31 South, Range 31 East; then north along the range line common to Range 31 East and Range 32 East, Mount Diablo Base and Meridian, to the northwest corner of

Section 6, Township 29 South, Range 32 East; then east to the southwest corner of Section 31, Township 28 South, Range 32 East; then north along the range line common to Range 31 East and Range 32 East to the northwest corner of Section 6, Township 28 South, Range 32 East, then west to the southeast corner of Section 36, Township 27 South, Range 31 East, then north along the range line common to Range 31 East and Range 32 East to the Kern-Tulare County boundary.

Los Angeles South Coast Air Basin

- Los Angeles County (Partial)
- Orange County
- Riverside County (Partial)
- San Bernardino County (Partial)

The recommended South Coast Nonattainment Area includes the entirety of Orange County and portions of Los Angeles, Riverside, and San Bernardino counties as described below:

Los Angeles County

That portion of Los Angeles County which lies south and west of a line described as follows: Beginning at the Los Angeles-San Bernardino County boundary and running west along the Township line common to Township 3 North and Township 2 North, San Bernardino Base and Meridian; then north along the range line common to Range 8 West and Range 9 West; then west along the Township line common to Township 4 North and Township 3 North; then north along the range line common to Range 12 West and Range 13 West to the southeast corner of Section 12, Township 5 North and Range 13 West; then west along the south boundaries of Sections 12, 11, 10, 9, 8, and 7, Township 5 North and Range 13 West to the boundary of the Angeles National Forest which is collinear with the range line common to Range 13 West and Range 14 West; then north and west along the Angeles National Forest boundary to the point of intersection with the Township line common to Township 7 North and Township 6 North (point is at the northwest corner of Section 4 in Township 6 North and Range 14 West); then west along the Township line common to Township 7 North and Township 6 North; then north along the range line common to Range 15 West and Range 16 West to the southeast corner of Section 13, Township 7 North and Range 16 West; then along the south boundaries of Sections 13, 14, 15, 16, 17, and 18, Township 7 North and Range 16 West; then north along the range line common to Range 16 West and Range 17 West to the north boundary of the Angeles National Forest (collinear with the Township line common to Township 8 North and Township 7 North); then west and north along the Angeles National Forest boundary to the point of intersection with the south boundary of the Rancho La Liebre Land Grant; then west and north along this land grant boundary to the Los Angeles-Kern County boundary.

Riverside County

That portion of Riverside County which lies to the west of a line described as follows: Beginning at the Riverside-San Diego County boundary and running north along the range line common to Range 4 East and Range 3 East, San Bernardino Base and Meridian; then east along the Township line common to Township 8 South and Township 7 South; then north along the range line common to Range 5 East and Range 4 East; then west along the Township line common to Township 6 South and Township 7 South to the southwest corner of Section 34, Township 6 South, Range 4 East; then north along the west boundaries of Sections 34, 27, 22, 15, 10, and 3, Township 6 South, Range 4 East; then west along the Township line common to Township 5 South and Township 6 South; then north along the range line common to Range 4 East and Range 3 East; then west along the south boundaries of Sections 13, 14, 15, 16, 17, and 18, Township 5 South, Range 3 East; then north along the range line common to Range 2 East and Range 3 East; to the Riverside-San Bernardino County Line (excluding the lands of the Santa Rosa Band of Cahuilla Mission Indians, and excluding the lands of the Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation).

San Bernardino County

That portion of San Bernardino County which lies south and west of a line described as follows: Beginning at the San Bernardino-Riverside County boundary and running north along the range line common to Range 3 East and Range 2 East, San Bernardino Base and Meridian; then west along the Township line common to Township 3 North and Township 2 North to the San Bernardino-Los Angeles County boundary.

San Diego County

- San Diego County

Imperial County (Partial)

- Imperial County (Partial)

That portion of Imperial County which lies within the line described as follows: (San Bernardino Base and Meridian) Beginning at the intersection of the United States-Mexico border and the southeast corner of Township 17 South, Range 11 East, then north along the range line of the eastern edge of Range 11 East, then east along the township line of the southern edge of Township 12 South to the northeast corner of Township 13 South, Range 15 East, then south along the range line common to Range 15 East and Range 16 East, to the United States-Mexico border.

Attachment 3: Attainment and Unclassifiable Areas

Table 4: Attainment (A) and Unclassifiable (U) Areas by Air Basin and County

Area	Designations
GREAT BASIN VALLEYS AIR BASIN	
Siskiyou County[15]	A
Remainder of Air Basin	U
LAKE COUNTY AIR BASIN	A
LAKE TAHOE AIR BASIN	U
MOJAVE DESERT AIR BASIN	A
MOUNTAIN COUNTIES AIR BASIN	
Calaveras County	A
Nevada County	A
Plumas County (portion)[16]	U
Remainder of Air Basin	U
NORTH CENTRAL COAST AIR BASIN	A
NORTH COAST AIR BASIN	
Humbolt County	A
Mendocino County (portion)[17]	A
Remainder of Air Basin	U
NORTHEAST PLATEAU AIR BASIN	A
SACRAMENTO VALLEY AIR BASIN	
Butte County	A
Colusa County	A
Glenn County	A
Placer County (portion)[18]	A
Tehama County	A
Yolo County	A
Yuba County (portion)[19]	U
Remainder of Air Basin	U
SALTON SEA AIR BASIN	
Imperial County (portion)[20]	U
Remainder of Air Basin	A
SOUTH CENTRAL COAST AIR BASIN	A

[15] Attainment is based on the removal of exceptional events.

[16] The portion of Plumas County outside the recommended PM2.5 nonattainment area.

[17] The portion of Mendocino County outside the recommended PM2.5 nonattainment area.

[18] The portion of Placer County within the Sacramento Valley Air Basin.

[19] The portion of Yuba County outside the recommended Yuba-City Marysville PM2.5 nonattainment area.

[20] The portion of Imperial County outside the recommended PM2.5 nonattainment area.

Attachment 4: Siskiyou Justification 2021-2022

CARB staff's recommendation of attainment for Siskiyou County is based on our assessment of exceptional events in both 2021 and 2022. The Siskiyou County Air Pollution Control District submitted an Initial Notification Information form on August 12, 2024, for 2021 through 2023 data collected at the Yreka (06-093-2001) monitor. The days and concentrations included in the Initial Notification Information form for 2021 and 2022 are listed in Table 5 below.

While CARB and the Siskiyou County Air Pollution Control District believe that the 2021 exceedance days at the Yreka monitor were likely influenced by wildfire smoke to a degree that might otherwise trigger regulatory significance, formal exceptional events demonstrations for such events were not submitted because CARB does not anticipate that events in 2021 will have regulatory significance as indicated in the U.S. EPA's memorandum, *Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard*, issued on February 7, 2024. In the unlikely circumstance that events in 2021 are determined to have regulatory significance for final designations decisions for the 2024 revised primary annual PM2.5 NAAQS, CARB will work with the U.S. EPA to provide additional information consistent with the requirements of the *EPA's Exceptional Events Rule*.

The Siskiyou County Air Pollution Control District has noticed on their website a formal exceptional event demonstration for the 2022 exceedance days listed in Table 5 below. This demonstration will be submitted to U.S. EPA prior to February 7, 2025.

Table 5: Exceedances at the Yreka PM2.5 monitor (AQS ID 06-093-2001) excluded from designation recommendation

Date of Event	$PM_{2.5}$ Daily Average Concentration (µg/m³)	Event Description
7/1/2021	17.7	Wildfire smoke from Tennant and Salt Fires
7/2/2021	16.9	Wildfire smoke from Tennant and Salt Fires
7/11/2021	22.6	Wildfire smoke from fires in central and southern Oregon
7/12/2021	21.4	Wildfire smoke from fires in central and southern Oregon
7/13/2021	29	Wildfire smoke from fires in central and southern Oregon
7/14/2021	18.9	Wildfire smoke from fires in central and southern Oregon
7/24/2021	19.6	Wildfire smoke from Beckwourth Complex as well as fires in central and southern Oregon
7/25/2021	21.1	Wildfire smoke from Beckwourth Complex as well as fires in central and southern Oregon
7/26/2021	15.2	Wildfire smoke from Beckwourth Complex as well as fires in central and southern Oregon
7/28/2021	15	Wildfire smoke from Beckwourth Complex as well as fires in central and southern Oregon

Date of Event	$PM_{2.5}$ Daily Average Concentration (µg/m^3)	Event Description
8/3/2021	57.5	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/4/2021	106.8	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/5/2021	62.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/7/2021	32.1	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/9/2021	45.5	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/10/2021	66.3	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/11/2021	100.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/12/2021	90.5	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/13/2021	98.3	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/14/2021	111.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/15/2021	134.2	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/16/2021	33	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/18/2021	39.2	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/19/2021	47.5	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires

Date of Event	$PM_{2.5}$ Daily Average Concentration (μg/m³)	Event Description
8/20/2021	41.8	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/21/2021	15.7	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/22/2021	56.8	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/23/2021	73.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/24/2021	105.2	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/25/2021	106.4	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/26/2021	15.8	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/27/2021	29.2	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/28/2021	49.8	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/29/2021	74.2	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/30/2021	43.5	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
8/31/2021	24.4	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/1/2021	62	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/2/2021	57.2	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires

Date of Event	$PM_{2.5}$ Daily Average Concentration (µg/m^3)	Event Description
9/3/2021	67.3	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/4/2021	111.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/5/2021	134.5	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/6/2021	105.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/7/2021	134.6	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/8/2021	103.8	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/9/2021	94.7	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/10/2021	93.3	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/11/2021	27.7	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/12/2021	21.1	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/14/2021	20.9	Smoke impacts from numerous fires in northern California and Oregon, including Antelope, Monument, McFarland and River Complex Fires
9/25/2021	22	McCash Fire smoke impacts
7/30/2022	96.6	McKinney Fire smoke impacts
7/31/2022	302.5	McKinney Fire smoke impacts
8/1/2022	74	McKinney Fire smoke impacts
8/2/2022	68.6	McKinney Fire smoke impacts
8/3/2022	48.2	McKinney Fire smoke impacts
8/4/2022	91.4	McKinney Fire smoke impacts
8/5/2022	52.6	McKinney Fire smoke impacts

GILA RIVER INDIAN COMMUNITY

Executive Office of the Governor & Lieutenant Governor

"Gila River Strong"

Stephen Roe Lewis
Governor

Regina Antone
Lieutenant Governor

February 11, 2025

Cheree Peterson,
Acting Regional Administrator
U.S. EPA Region IX
75 Hawthorne Street
San Francisco, CA 94105

RE: Designation Recommendation for the Gila River Indian Community under the 2024 Revised Primary Annual Fine Particulate Matter (PM2.5) National Ambient Air Quality Standard (NAAQS)

Dear Acting Regional Administrator,

On February 7, 2024, the United States Environmental Protection Agency (U.S. EPA) finalized the 2024 revised primary annual fine particulate matter (PM2.5) National Ambient Air Quality Standard (NAAQS) of 9 $\mu g/m^3$ averaged over a three-year period. U.S. EPA intends to promulgate final PM2.5 area designations by no later than February 6, 2026. According to Section 107(d) and Section 301 (d) of the Clean Air Act (CAA), GRIC is given an opportunity to submit to EPA the geographic areas that attain the standard, do not attain the standard, or are otherwise unclassifiable based on available information. Therefore, in response to U.S. EPA's February 7, 2024, memorandum entitled "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard," the Gila River Indian Community (GRIC or Community) is providing its designation recommendations for both the contiguous reservation boundaries and the additional trust land internally identified as Parcel M that is adjacent to the Phoenix-Mesa Gateway Airport and the Arizona State University East Polytechnic Campus in Maricopa County.

The Community requests EPA set the area boundaries consistent to the boundaries stated within the Community's Treatment as the State ("TAS") for purposes of administering the Air Quality Management Plan and other Clean Air Act authorities on October 21, 2009. This request is consistent with the EPA's September 20, 2011 memorandum titled, "Policy for Establishing Separate Air Quality Designations for Areas of Indian Country". In the memorandum, EPA states that Tribes may recommend that EPA designate areas of Indian Country separately from the adjacent state areas. Furthermore, separately designated areas of Indian Country will be identified using appropriate information included in an EPA decision on a Tribe's TAS application, if one exists, for designations or other purposes, or from other appropriate sources.

525 West Gu u Ki · P.O. Box 97 · Sacaton, Arizona 85147
Telephone: 520-562-9841 · Fax: 520-562-9849 · Email: executivemail@gric.nsn.us

Contiguous Reservation Boundaries

For the main Reservation boundaries, the Community requests a separately designated **attainment/unclassified** area from the adjacent proposed State of Arizona areas for the 2024 revised primary annual PM2.5 NAAQS, based on the available information.

Based on available information, GRIC DEQ continues to determine that an initial designation of "attainment/unclassified" is appropriate for GRIC since there continues to be no significant growth in population and PM2.5 sources on the Community. GRIC has no regulatory monitor or non-regulatory monitor with a complete data set for the 2021-2023 design value period since the initial monitoring and assessment of PM2.5 in 2002-2004 (Table 1 attachment) on the Community. The designation and boundary determination process that is presented in EPA guidance (December 2011 guidance memorandum) and policy (May 2011 Tribal Consultation Policy) documents is resource intensive and complex. GRIC has revealed to EPA the details of how the air program can use a CAA planning section to pursue these thorough evaluations and analysis to prove practicality, but that process is not necessary for GRIC. Thus, the Community believes it can make its recommendation now.

The Community's recommendation is based on the following undisputed facts:

- On September 21, 2004, EPA concurred with the Community's decision to discontinue monitoring of PM2.5 concentrations within the external boundaries of the Community because PM2.5 concentrations "are well below the NAAQS for PM2.5" (of 15.0 μg/m^3 at the time). See Table 1 below.

Table 1. GRIC $PM_{2.5}$ Summary from July 2002 to Sept 2004.

Year	Site	24hr Avg. Max (μg/m3)	24hr Avg. 2nd High (μg/m3)	24hr Avg. 3rd High (μg/m3)	24hr Avg. 4th High (μg/m3)	Number of Exceedances	Annual Avg. (μg/m3)	Number of Samples	Notes
2002 *	Sacaton	20.5 12/4/02	19.9 12/22/02	13.0 10/20/02	12.5 12/25/02	0	8	60 of 62	*Start Date: 7/1/2002 1 in 3 day sampler
	St Johns	25.0 12/4/02	19.7 7/31/02	15.4 12/22/02	11.0 9/5/02	0	8	44 of 47	1 in 3 sampler, 1 of 6 starting Oct 8
2003	Sacaton	22.1 10/30/03	13.7 7/14/03	13.5 12/2/03	13.5 12/14/03	0	6	113 of 121	1 in 3 day sampler
	St Johns	22.6 10/30/03	17.3 1/15/03	15.1 5/15/03	13.1 12/5/03	0	7	59 of 60	1 in 6 day sampler
2004**	Sacaton	8.4 1/28/04	8.1 1/7/04	8.1 1/19/04	7.9 2/18/04	0	5	52 of 56	started as 1 in 3 sampler; changed to 1 in 6 on 4/27/04
	St Johns	9.7 1/28/04	9.0 2/15/04	8.1 4/27/04	7.4 4/21/04	0	5	41 of 45	1 in 6 day sampler **Close Date: 9/30/2004

- The PM2.5 sample concentrations in Table 1 were collected under an EPA-approved Quality Assurance Project Plan (QAPP) for regulatory purposes. Based on the values in Table 1, there are no measured concentrations of PM2.5 above the revised annual fine particulate NAAQS of 9.0 $\mu g/m^3$ during the three-year period of concern.
- On November 26, 2012, EPA designated all of the Gila River Indian Community reservation "unclassifiable/attainment" for the 2006 24-hour PM2.5 NAAQS (77 Fed. Reg. 65310, November 26, 2012).
- On January 15, 2015, EPA designated all counties in the State of Arizona, including areas of Indian country located in each county or area, "unclassifiable/attainment" for the 2012 annual PM2.5 NAAQS (80 Fed. Reg. 2213, January 15, 2015).
- There continues to be no significant sources of PM2.5 on Community land -- no major combustion sources and no other significant sources of PM2.5. There are non-metallic mineral operations (sand and gravel mines, concrete batch plants, etc.), but the emissions from these activities are generally of much larger particles than PM2.5 and these activities have not significantly changed since 2006.
- No GRIC-controllable activity or source on Community land is capable of making any significant contribution to elevated PM2.5 levels measured at the Maricopa County and Pinal County air monitors reportedly violating the 2024 revised annual PM2.5 NAAQS.

Parcel M

Since the TAS submittal, the Community has placed new land into trust, increasing the acreage of the Reservation. The additional 158 acres of trust land is identified internally as "Parcel M" and is adjacent to the Phoenix-Mesa Gateway Airport and the Arizona State University East Polytechnic Campus. At the time of this letter, Parcel M contains an 18-hole golf course, hotel, and gas station. Parcel M is not adjacent to the main Reservation boundaries, is small in size compared to the main reservation, encompasses no Community residents, and contains no regulatory monitors or sources that contribute significantly to the surrounding nonattainment area. The Community recommends that Parcel M be classified **attainment/unclassified.** However, the Community also recognizes that Parcel M is located in the extreme southeast portion of, and is completely surrounded by, the State of Arizona's proposed Maricopa County 2024 Annual PM2.5 Nonattainment Area. While the Community does not necessarily agree with the extent of the State of Arizona's proposed Maricopa County 2024 Annual PM2.5 Nonattainment Area, if the surrounding area is classified as nonattainment as proposed, then for designation purposes, the Community requests that Parcel M be separately listed under the surrounding Nonattainment Area. This would signify that Parcel M is located within, but GRIC is not responsible for, the proposed Maricopa County 2024 Annual PM2.5 Nonattainment Area. The Community requests EPA recognize the Reservation boundaries when listing Parcel M under the surrounding nonattainment area.

Emissions Inventory

In addition to the above-mentioned facts, GRIC is currently in the process of hiring a contractor to complete a revision to the Community's 2007 Emissions Inventory (EI) for criteria pollutants. The revision to the EI will include PM2.5 emissions from both anthropogenic and non-anthropogenic sources, which were not included in the 2007 EI. The largest source of emissions in the 2007 EI was from vehicle traffic on the Federal, State, and County highways that bisect the Community. Based on vehicle miles traveled (VMT) information in the 2007 EI and 2022 VMT obtained from the Maricopa Association of Governments (MAG), VMT per day increased from approximately 2.4 million in 2007 to over 3.1 million in 2022.

Conclusion

In summary, there are no directly measured exceedances of the annual fine particulate NAAQS on the Community and no evidence to support a finding that sources or activities on the Community are contributing to off-Community measurements of elevated levels of PM2.5 in the adjoining counties. For the foregoing reasons, the undersigned, on behalf of the Gila River Indian Community, is providing these recommendations for the Revised Primary Annual Fine Particle (PM2.5) NAAQS (89 Fed. Reg. 16202, February 06, 2024).

Sincerely,

Stephen R. Lewis, Governor
Gila River Indian Community

Cc: Lisa Gover, Director, GRIC Department of Environmental Quality

COLORADO
Department of Public Health & Environment
Dedicated to protecting and improving the health and environment of the people of Colorado

January 23, 2025

Mark Smith
Regional Administrator
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, Colorado 80202-1129

RE: Colorado Designation Recommendations for 2024 Primary Annual PM2.5 NAAQS

Dear Administrator Becker:

Pursuant to the provisions of section 107(d)(1) of the Clean Air Act, the state of Colorado submits to the Environmental Protection Agency (EPA) the attached area designations for the Primary Annual PM2.5 National Ambient Air Quality Standard (NAAQS), as revised on February 7, 2024. Federal law requires that the state of Colorado submit the recommended designations for the revised Primary Annual PM2.5 NAAQS to the EPA by February 7, 2025, and this letter provides the designations of "attainment" and "attainment/unclassifiable" as applicable for all air quality control regions (AQCRs) in Colorado.

The enclosed table and map describes each Air Quality Control Regions (AQCR) and its designation recommendation along with an enclosed technical support document. The attainment designation for four Colorado AQCRs (02, 03, 04, and 11) and attainment/unclassifiable designations for those areas with limited monitoring are based on validated air quality monitoring data for the 2021-2023 time period. The attainment/unclassifiable designations for areas without representative monitoring are based on the State's estimation that annual PM2.5 levels in these AQCRs are in compliance with the Primary Annual PM2.5 NAAQS based on the analysis tools currently available. The enclosed area classifications for the 2024 Primary Annual PM2.5 NAAQS were approved by the Colorado Air Quality Control Commission during a public hearing held on January 15, 2025.

The materials have been entered into EPA's CDX for your review. The Office of the Commission may submit any additional technical support documentation and administrative information needed for review directly to your staff. Should there be any questions regarding these materials, please contact the Commission Office at cdphe.aqcc@state.co.us

Sincerely,

Jill Hunsaker Ryan

Jill Hunsaker Ryan, MPH
Executive Director
Colorado Department of Public Health and Environment

cc: Jojo La, CDPHE Air Quality Control Commission
Michael Ogletree, CDPHE Air Pollution Control Division
Abby Fulton, EPA Region 8

Enclosures
Air Quality Control Regions Designations 2024 Annual PM2.5 NAAQS Table
2024 Primary Annual PM2.5 Standard Designation Recommendations Technical Support Document

2024 Colorado Designation Recommendations Primary Annual PM2.5 NAAQS (2021-2023 Design Values)	
Air Quality Control Region (AQCR)	PM2.5 NAAQS Designation
State AQCR 01 Logan County Morgan County Phillips County Sedgwick County Washington County Yuma County	Attainment/Unclassifiable
State AQCR 02 Larimer County Weld County	Attainment
State AQCR 03 Adams County Arapahoe County Boulder County Broomfield County Clear Creek County Denver County Douglas County Jefferson County Gilpin County	Attainment
State AQCR 04 El Paso County Park County Teller County	Attainment
State AQCR 05 Cheyenne County Elbert County Kit Carson County Lincoln County	Attainment/Unclassifiable
State AQCR 06 Baca County Bent County Crowley County Kiowa County Otero County Prowers County	Attainment/Unclassifiable
State AQCR 07 Huerfano County Las Animas County Pueblo County	Attainment/Unclassifiable

2024 Colorado Designation Recommendations Primary Annual PM2.5 NAAQS (2021-2023 Design Values)	
Air Quality Control Region (AQCR)	PM2.5 NAAQS Designation
State AQCR 08 Alamosa County Conejos County Costilla County Mineral County Rio Grande County Saguache County	Attainment/Unclassifiable
State AQCR 09 Archuleta County (part) excluding Southern Ute Indian Tribe (SUIT) lands Dolores County La Plata County (part) excluding SUIT and Ute Mountain Ute Tribe lands Montezuma County (part) excluding SUIT and Ute Mountain Ute Tribe lands San Juan County	Attainment/Unclassifiable
State AQCR 10 Delta County Gunnison County Hinsdale County Montrose County Ouray County San Miguel County	Attainment/Unclassifiable
State AQCR 11 Garfield County Mesa County Moffat County Rio Blanco County	Attainment
State AQCR 12 Eagle County Grand County Jackson County Pitkin County Routt County Summit County	Attainment/Unclassifiable
State AQCR 13 Chaffee County Custer County Fremont County Lake County	Attainment/Unclassifiable

State of Colorado

Technical Support Document

2024 Primary Annual PM2.5 Standard Designation Recommendations

January 2025

Colorado Department of Public Health and Environment
Air Pollution Control Division
4300 Cherry Creek Drive South
Denver, Colorado 80246

Contents

Colorado Analysis for 2024 Primary Annual PM2.5 Attainment

Designation Recommendation

The State recommends that the entire state of Colorado be designated as attainment or attainment/unclassifiable for the 2024 Primary Annual PM 2.5 standard. This recommendation is based on monitoring information that indicates the region is in compliance with the revised Primary Annual PM2.5 standard promulgated by EPA.

Overview

On February 7, 2024, the U.S. Environmental Protection Agency (EPA) signed final rulemaking that revised the Primary Annual Particulate Matter (PM2.5) National Ambient Air Quality Standard (NAAQS). The PM2.5 level has been lowered to 9 $\mu g/m^3$ annual mean, averaged over 3 years, from the previous level of 12 $\mu g/m^3$. States are required to submit area designation recommendations to EPA by February 7, 2025. EPA then has until February 7, 2026 to publish final designations for the revised Primary Annual PM2.5 NAAQS.

The Air Pollution Control Division (APCD) currently operates nineteen (19) PM2.5 monitors in Colorado. All PM2.5 monitoring for the most recent 3-year period shows annual values below the level of the NAAQS.

The EPA requires states base their designation recommendations on valid monitoring data results over a three-year period for calendar years 2021 - 2023. Fourteen (14) of Colorado's PM2.5 monitors have valid three-year averages reported to the EPA Air Quality System (AQS) database. Based on the valid 2021 - 2023 results, Colorado is in attainment for the revised standard. The following analysis discusses air quality data necessary to demonstrate that Colorado should be designated as attainment or attainment/unclassifiable for the revised Primary Annual PM2.5 NAAQS. It must also be noted that this attainment demonstration applies only to non-tribal lands over which the State of Colorado has direct air quality jurisdiction.

Air Quality Data

The air quality analysis looked at monitoring sites with valid 3-year annual averages for PM2.5 standard in Colorado for 2021 through 2023. The fourteen APCD PM2.5 monitoring sites reported in AQS are shown in Blue in Figure 1. Sites utilized by EPA for PM2.5 speciation are also shown in green.

Figure 1. Map of Colorado PM2.5 Ambient Air Monitoring Sites 2023

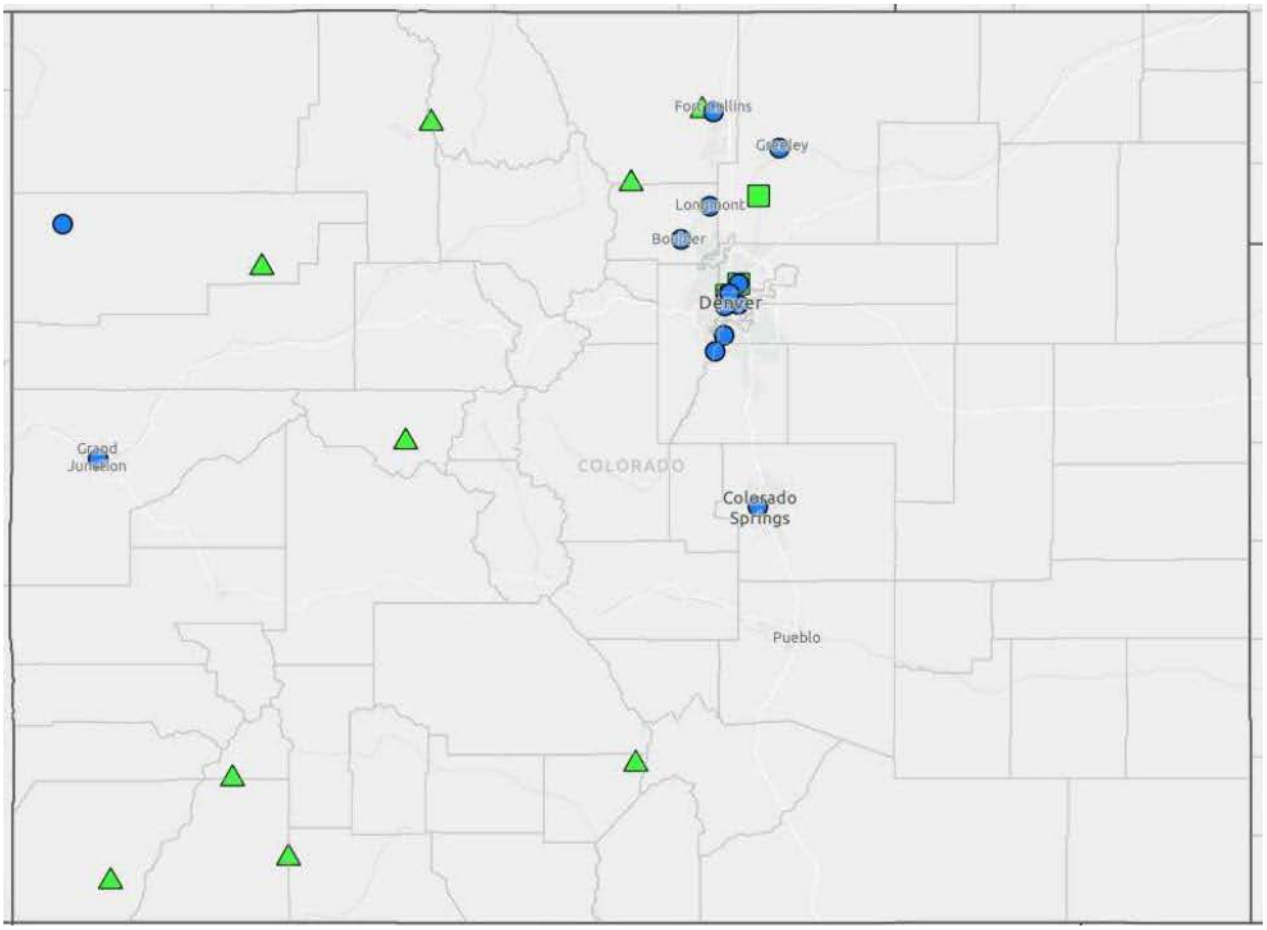
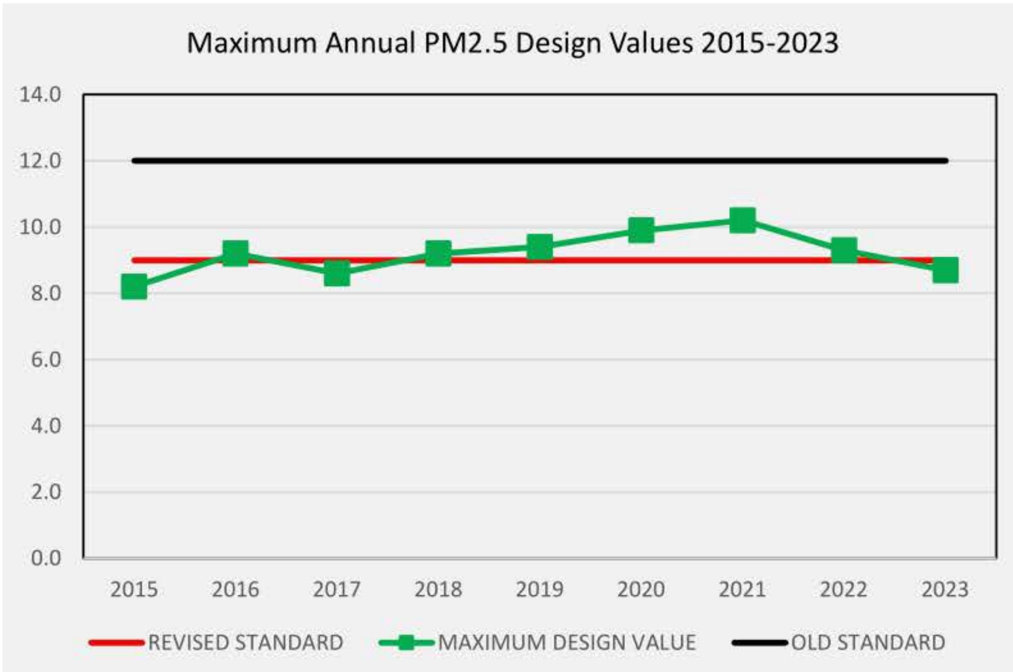


Figure 2 presents long term trends for the APCD PM2.5 sites reported to the AQS in 2023. Annual PM2.5 design values have decreased at all sites since 2021 and are all currently below the 2024 Annual PM2.5 NAAQS.

This decrease is likely due to emissions reductions from vehicles as well as major stationary sources and area sources that have occurred in recent years. These emissions reductions are expected to be maintained as a result of regulatory and statutory requirements for Ozone, Regional Haze, and Greenhouse Gases applicable in Colorado.

Figure 2. Colorado Annual PM2.5 Ambient Air Concentration Trends



The statewide maximum Annual PM2.5 design values for 2015 to 2023 are presented in Table 1.

Table 1. Colorado 3 year Maximum Annual PM2.5 Monitoring Data Summary

Year	Statewide Maximum (μg/m³)	Location
2013-2015	8.2	Rangely Golf Course
2014-2016	9.2	I-25
2015-2017	8.6	I-25
2016-2018	9.2	Globeville
2017-2019	9.4	Globeville
2018-2020	9.9	Globeville
2019-2021	10.2	Globeville
2020-2022	9.3	Globeville
2021-2023	8.7	Globeville

Table 2. AQS Monitoring Site Design Value Summary 2015-2023

County Name	Local Site Name	2013-2015 (μg/m³)	2014-2016 (μg/m³)	2015-2017 (μg/m³)	2016-2018 (μg/m³)	2017-2019 (μg/m³)	2018-2020 (μg/m³)	2019-2021 (μg/m³)	2020-2022 (μg/m³)	2021-2023 (μg/m³)
Adams	Birch Street									8.5
Arapahoe	Arapahoe Community College	6.3	5.9	5.9	6.0	6.1	6.1	6.4	6.1	5.9
Boulder	Longmont - Municipal Building	7.0	6.9	6.7	6.9	6.9	7.6	8.4	8.1	7.3
Boulder	Boulder Chamber Of Commerce	5.9	5.6	5.5	5.8	6.0	6.2	6.5	6.1	5.5
Denver	Denver - National Jewish Health							7.7	7.5	6.9
Denver	La Casa	7.5	7.2	7.0	7.1	7.2	7.3	7.5	7.2	6.6
Denver	I-25		9.2	8.6	8.0	8.1	8.3	8.5	7.6	7.4
Denver	Globeville				9.2	9.4	9.9	10.2	9.3	8.7
Douglas	Chatfield State Park	5.5	5.2	5.3	5.7	5.8	5.9	6.1	5.8	5.5
El Paso	Colorado Springs - College	5.7	5.6	5.7	6.0	5.7	5.7	5.6	5.5	5.3
Larimer	Fort Collins - CSU - Edison	6.8	6.8	7.1	7.3	7.0	7.2	7.5	7.7	7.1
Mesa	Grand Junction - Powell Building	7.4	6.6	6.1	5.9	5.5	5.7	5.8	5.8	5.3
Rio Blanco	Rangely Golf Course	8.2	7.8	7.8	7.9	8.0	8.3	8.6	8.5	7.2
Weld	Greeley - Hospital	7.3			9.1	9.1	9.5	9.5	8.8	8.1

Summary Conclusions

The data and analysis presented provide documentation and compelling evidence supporting a finding that Colorado should be designated as attainment or attainment/unclassifiable for the 2024 revised Primary Annual PM2.5 NAAQS. It is important to note that only areas over which Colorado has direct air quality jurisdiction are included in this attainment attainment/unclassifiable finding and recommendation. The Southern Ute Indian Tribe, and the Southern Ute Indian Tribe/State of Colorado Environmental Commission, as well as the Ute Mountain Ute Indian Tribe, are distinct nations or entities and consequently such Tribal lands are not included in this designation recommendation.

Table 3 provides a complete listing of the recommended designations, by area. Figure 3 provides a map of the Air Quality Control Regions for the Annual PM2.5 Designation Recommendations in Colorado. These recommendations are based on monitoring information that indicates compliance with the revised standard.

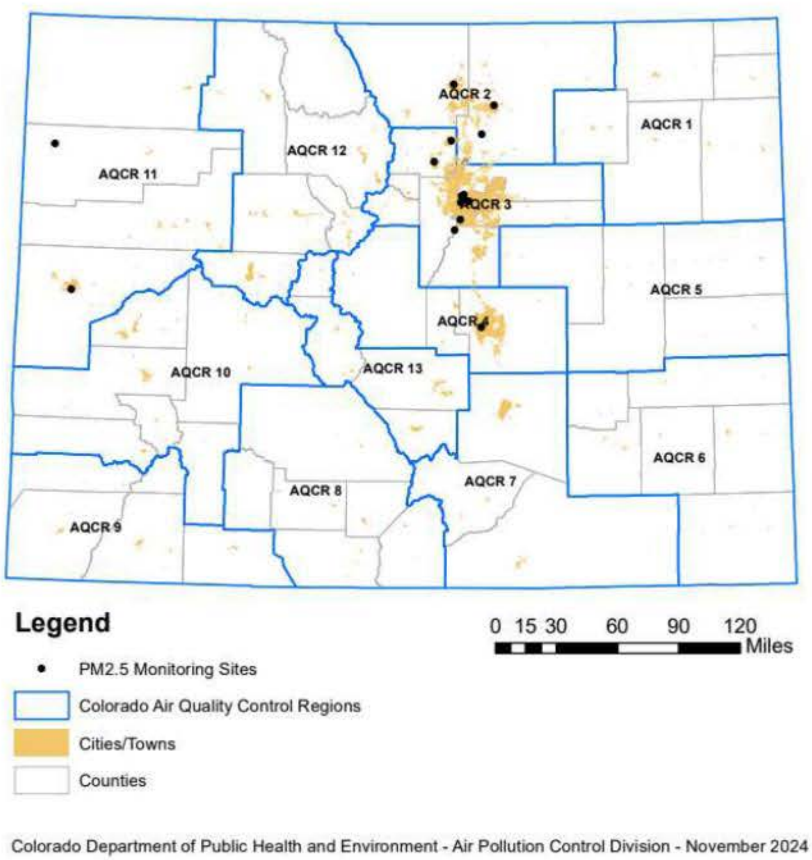
Table 3. Recommended 2024 Primary Annual PM2.5 Designations by Region for Colorado

2024 Colorado Designation Recommendations Primary Annual PM2.5 NAAQS (2021-2023 Design Values)	
Air Quality Control Region (AQCR)	PM2.5 NAAQS Designation
State AQCR 01 Logan County Morgan County Phillips County Sedgwick County Washington County Yuma County	Attainment/Unclassifiable
State AQCR 02 Larimer County Weld County	Attainment
State AQCR 03 Adams County Arapahoe County Boulder County Broomfield County Clear Creek County Denver County Douglas County Jefferson County Gilpin County	Attainment
State AQCR 04 El Paso County Park County Teller County	Attainment

2024 Colorado Designation Recommendations Primary Annual PM2.5 NAAQS (2021-2023 Design Values)	
Air Quality Control Region (AQCR)	PM2.5 NAAQS Designation
State AQCR 05 Cheyenne County Elbert County Kit Carson County Lincoln County	Attainment/Unclassifiable
State AQCR 06 Baca County Bent County Crowley County Kiowa County Otero County Prowers County	Attainment/Unclassifiable
State AQCR 07 Huerfano County Las Animas County Pueblo County	Attainment/Unclassifiable
State AQCR 08 Alamosa County Conejos County Costilla County Mineral County Rio Grande County Saguache County	Attainment/Unclassifiable
State AQCR 09 Archuleta County (part) excluding Southern Ute Indian Tribe (SUIT) lands Dolores County La Plata County (part) excluding SUIT and Ute Mountain Ute Tribe lands Montezuma County (part) excluding SUIT and Ute Mountain Ute Tribe lands San Juan County	Attainment/Unclassifiable
State AQCR 10 Delta County Gunnison County Hinsdale County Montrose County Ouray County San Miguel County	Attainment/Unclassifiable
State AQCR 11 Garfield County Mesa County Moffat County Rio Blanco County	Attainment

2024 Colorado Designation Recommendations Primary Annual PM2.5 NAAQS (2021-2023 Design Values)	
Air Quality Control Region (AQCR)	PM2.5 NAAQS Designation
State AQCR 12 Eagle County Grand County Jackson County Pitkin County Routt County Summit County	Attainment/Unclassifiable
State AQCR 13 Chaffee County Custer County Fremont County Lake County	Attainment/Unclassifiable

Figure 3. Map of Air Quality Control Regions for Annual PM2.5 Designations in Colorado



February 7, 2025

Karen McGuire, Acting Deputy Regional Administrator
United States Environmental Protection – Region 1
5 Post Office Square – Suite 100
Boston, MA 02109-3912

Re: Connecticut's Designation Request for the 2024 Revised National Ambient Air Quality Standards for Fine Particulate, $PM_{2.5}$

Dear Ms. McGuire,

On February 7, 2024, the Environmental Protection Agency (EPA) strengthened the primary annual fine particulate matter ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS) from 12.0 micrograms per cubic meter to 9.0. This stronger standard will save lives, and help make the people of Connecticut, and across the United States, healthier by preventing premature deaths, as well as reducing susceptibility to respiratory illnesses related to $PM_{2.5}$ air pollution.

As the federal Clean Air Act (CAA) is implemented through long standing principles of cooperative federalism, implementation of the new standard will fall primarily to the states. As we embark on this new planning process together, and pursuant to CAA section 107(d), the State of Connecticut hereby submits its designation request, which recommends that the entire state be designated as "attainment." As required under the federal Clean Air Act, the attached designation request identifies areas that comply with the standard, or that violate or contribute to nearby violations of the standard.

I am pleased to say the entire state measures in compliance with the revised federal annual standard, which is based on the enclosed review of data from Connecticut's ambient air quality monitoring network. With respect to nearby areas, the Elizabeth Lab Monitor in Union County, New Jersey is the nearest noncompliant monitor in the region. The enclosed review also indicates that emissions from Connecticut sources do not materially contribute to air quality at the noncomplying monitor. Therefore, I recommend that the entire State of Connecticut be designated as "attainment" for the revised annual $PM_{2.5}$ NAAQS.

If we can be of further assistance as you review this recommendation, please contact Tracy Babbidge, Air Bureau Chief at the Department of Energy and Environmental Protection at (860) 539-7341. Thank you for your consideration in this important matter.

Sincerely,

Ned Lamont

Governor Ned Lamont

cc: Katie Dykes, Commissioner, CT DEEP
Emma Cimino, CT DEEP
Tracy Babbidge, CT DEEP

Designation Request

2024 Revised
National Ambient Air Quality Standards
for
Fine Particulate

Connecticut Department of Energy and Environmental Protection
January 2025

Contents

List of Tables

List of Figures

Acronyms and Abbreviations

CAA	Clean Air Act
CBSA	Core Based Statistical Area
CFR	Code of Federal Regulations
CSA	Combined Statistical Area
CTDOT	Connecticut Department of Transportation
DEEP	Department of Energy and Environmental Protection
EPA	U.S. Environmental Protection Agency
FR	Federal Register
$\mu g/m^3$	Micrograms per cubic meter
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NH_3	Ammonia
NO_x	Nitrogen Oxides
PM_{10}	Particulate Matter < 10 microns
$PM_{2.5}$	Particulate Matter < 2.5 microns
SO_2	Sulfur Dioxide
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1 Introduction and Background

1.1 Purpose

On February 7, 2024, the US Environmental Protection Agency (EPA) promulgated a revision to the primary annual National Ambient Air Quality Standard (NAAQS) for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), or fine particulate.[1] Subsequent to promulgation of a new or revised NAAQS, States are required under Section 107 of the Clean Air Act (CAA) to submit recommendations to EPA regarding the State's attainment and nonattainment boundaries and designations for the standard. This document presents the Connecticut Department of Energy and Environmental Protection's (DEEP's) analysis of data relevant to the $PM_{2.5}$ NAAQS both monitoring air quality levels within, and surrounding the State, and recommends that EPA designate the entire State of Connecticut attainment for the 2024 $PM_{2.5}$ NAAQS.

1.2 Regulatory Background

EPA sets primary and secondary NAAQS designed to be protective of public health and welfare, respectively. Effective May 6, 2024, based on an integrated assessment of new scientific evidence, which strengthened the EPA's body of knowledge regarding $PM_{2.5}$-related health effects, the primary $PM_{2.5}$ NAAQS was strengthened from 12.0 micrograms per cubic meter ($\mu g/m^3$) to 9.0 $\mu g/m^3$.[2] The EPA made no changes to the primary 24-hour standards for $PM_{2.5}$ and PM_{10}. EPA also did not change the secondary annual and 24-hour particulate standards. The full list of current NAAQS can be found on EPA's website.

Under section 107(d) of the Clean Air Act (CAA), states are required to submit designation recommendations to EPA, no later than 1 year after promulgation of a NAAQS. Therefore, states are required to provide designation recommendations to EPA by February 7, 2025, for the revised annual $PM_{2.5}$ NAAQS. If EPA intends to promulgate a designation that deviates from the state recommendation, EPA must notify the state at least 120 days prior to promulgating the modified designation, and EPA must provide the state an opportunity to comment on the potential modification. The Clean Air Act requires completion of the designation process within two years of promulgation (i.e., by February 7, 2026) unless the Administrator finds that additional information is needed to make these decisions. In such a case, EPA may take up to an additional year to make the designations (i.e., by February 7, 2027).

In a memo dated February 7, 2024, EPA describes the five-factor framework it intends to use to determine area boundaries and designations.[3] The first factor considered is air quality levels measured at fourteen monitoring stations located around the state. This is discussed in more detail as part of the discussion of DEEP's analysis of the five factors analyzed in making recommendations. Based on the monitored data, Connecticut is measuring air quality levels that comply with the revised federal standard for PM 2.5. DEEP addresses each of the five factors in this document and concludes that the entire state should be designated attainment for the 2024 $PM_{2.5}$ NAAQS.

[1] https://www.epa.gov/particle-pollution-designations/particle-pollution-designations-memorandum-and-data-2024-revised

[2] Reconsideration of the National Ambient Air Quality Standard for Particulate Matter, 89 FR 16202 16202 (March 6, 2024)

[3] https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf

2 Five Factor Analysis

The CAA requires that a nonattainment area must include not only the area that is violating the standard, but also nearby areas that contribute to the violation. Thus, for each ambient $PM_{2.5}$ monitor or group of monitors that indicate violations of the standard, EPA indicated their intent to determine the appropriate nearby areas to include within the nonattainment area boundary based on that area's emissions contribution to the monitored violations. Areas that meet the standard and do not contribute to nearby nonattainment should be designated as attainment, and areas with insufficient data should be designated unclassifiable.

To determine what constitutes an area, EPA will consider entire metropolitan areas, and adjacent counties, as being nearby and having the potential to contribute to the nonattainment monitor(s). Metropolitan areas are officially delineated as Core Based Statistical Areas (CBSAs) or Combined Statistical Areas (CSAs) as shown regionally in Figure 2-1.[4]

EPA guidance recommends identifying each monitor in an area and identifying nonattainment monitors. Recommendations for an area designation should then be based on consideration of the following five factors:

1) air quality,
2) emissions and emissions-related data,
3) meteorology,
4) geography/topography, and
5) jurisdictional boundaries.

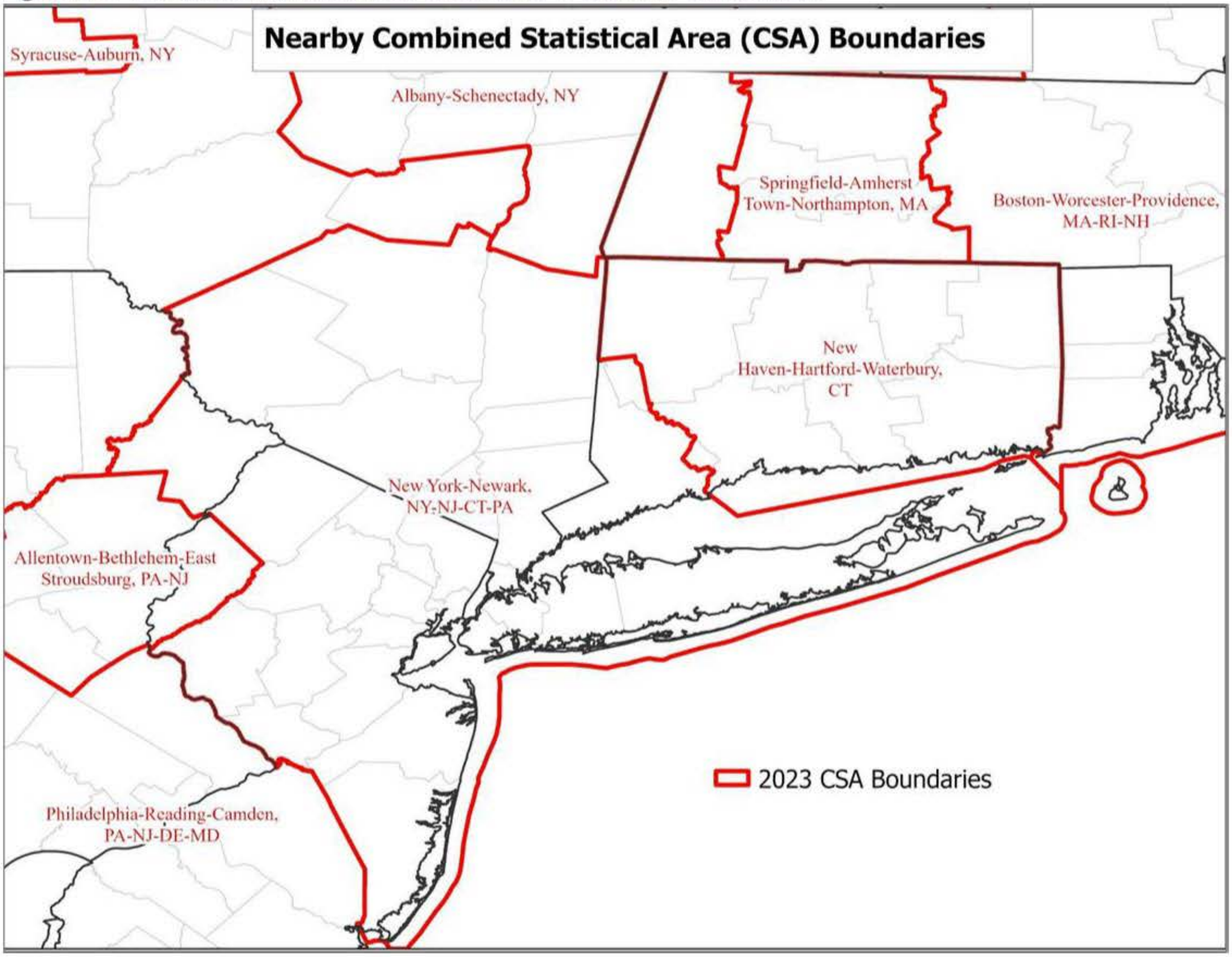
The factors are intended to inform EPA's analysis of the statutory definition of a nonattainment area, which is to include "any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet)" the $PM_{2.5}$ NAAQS.[5]

---

[4] Combined Statistical Area Map (July 2023)

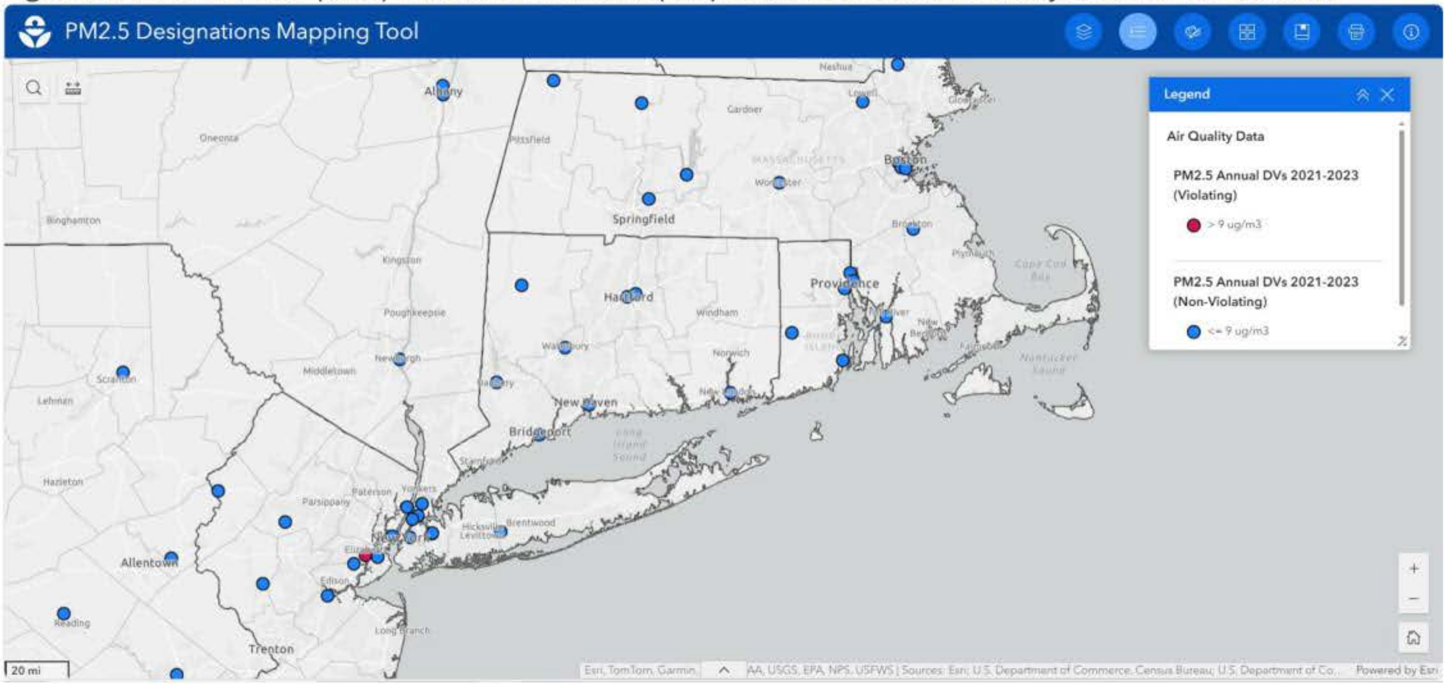
[5] CAA Sections 107(d)(4)(A)(v)

Figure 2-1. Combined Statistical Area boundaries in and near Connecticut.



DEEP used EPA's $PM_{2.5}$ Designations Mapping Tool to determine nonattainment monitors within and nearby areas adjacent to Connecticut. As shown in Figure 2-2, all monitors in areas near and adjacent to Connecticut are in attainment with the new $PM_{2.5}$ annual standard except for one monitor. That one monitor is the Elizabeth Lab monitor in the city of Elizabeth, Union County, New Jersey. There are a significant number of attaining monitors in the area between Connecticut and the Elizabeth Lab monitor indicating it is unlikely that Connecticut contributes to nonattainment at the distant Elizabeth Lab monitor. Nevertheless, portions of Connecticut are within the same CSA as the Elizabeth Lab monitor. Therefore, consistent with EPA guidance, the remainder of this document focuses on the five factors relative to Connecticut and this monitor.

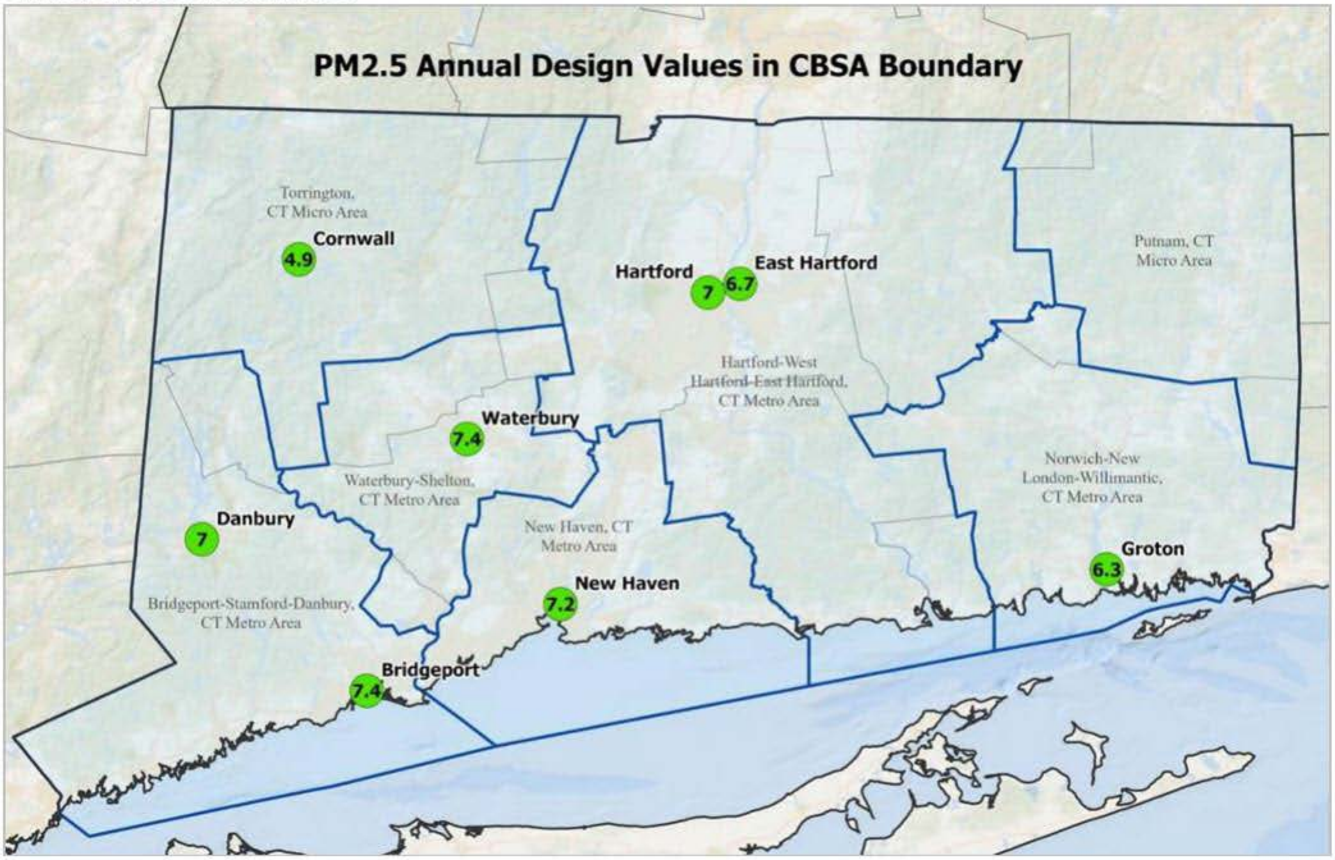
Figure 2-2. Attainment (blue) and nonattainment (red) $PM_{2.5}$ monitors in and adjacent to Connecticut.



2.1 Factor 1: Air Quality

DEEP maintains a comprehensive network of eight $PM_{2.5}$ air quality monitors throughout the state with the primary objective of determining compliance with the $PM_{2.5}$ NAAQS and submits network plans to EPA Region 1 annually to demonstrate that air monitoring operations meet or surpass all applicable federal requirements. Figure 2-3 shows 2023 annual PM2.5 design values at each of the monitors and their respective locations within their CBSAs. Design values represent monitored data in the proper averaging time and form such that it can be compared to the level of the standard. Connecticut's design values are all well below the 9.0 $\mu g/m^3$ $PM_{2.5}$ standard.

Figure 2-3. $PM_{2.5}$ design values for 2023 shown for each Connecticut monitor location along with Core Based Statistical Area boundaries.



Recent trends in design values, shown in Table 2-1 for both the 24-hour and annual standards, show that Connecticut's maximum values have been steady over the past five years with a slight increase in 2023. The increase in 2023 is likely due to extraordinary smoke events from widespread wildfires affecting regional monitors that year.[6]

Table 2-1. Maximum 24-hour and annual $PM_{2.5}$ design values for each year from 2019 - 2023.

Maximum 24-hour and Annual Design Values at Connecticut Monitors					
Year	**2019**	**2020**	**2021**	**2022**	**2023**
24-Hour Design Value NAAQS = 35 (µg/m³)	20	20	20	20	21
Annual Design Value NAAQS = 9 (µg/m³)	7.2	7.2	7.2	7.1	7.4

Longer term design value trends are shown for the 24-hour and annual standard for each of Connecticut's monitors in Figure 2-4 and Figure 2-5, respectively. The impact of the 2023 smoke events is perhaps most evident in the 24-hour trend at the rural Cornwall site, which shows an increase from 12 µg/m³ in 2022 to 16 µg/m³ in 2023. Future design values are expected to remain below the standards, consistent with trends prior to 2023.

[6] https://portal.ct.gov/deep/air/planning/ozone/2023-exceptional-events

Figure 2-4. Long-term trends in $PM_{2.5}$ 24-hour design values at each of Connecticut's monitors shown in relation to the standard.

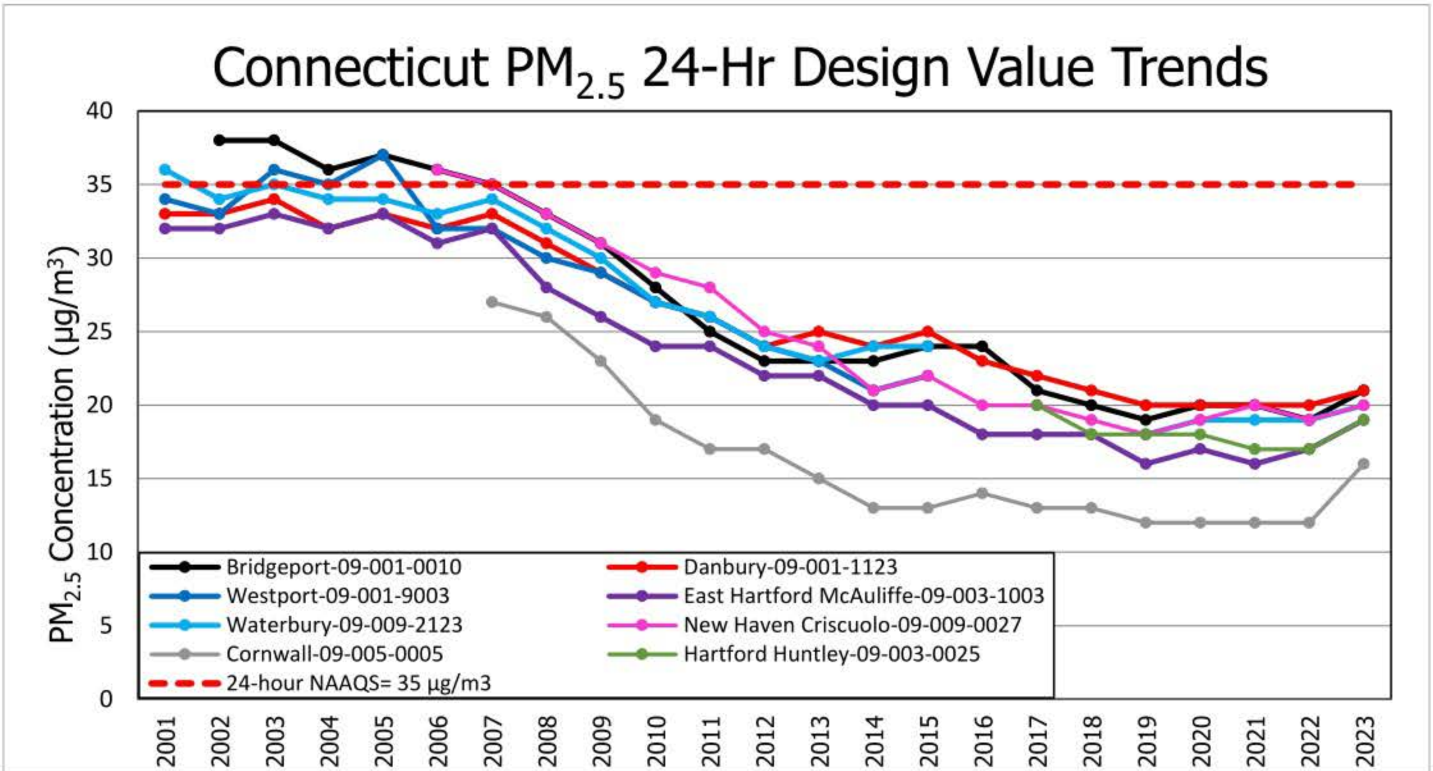


Figure 2-5. Long-term trends in $PM_{2.5}$ annual design values at each of Connecticut's monitors shown in relation to the standard.

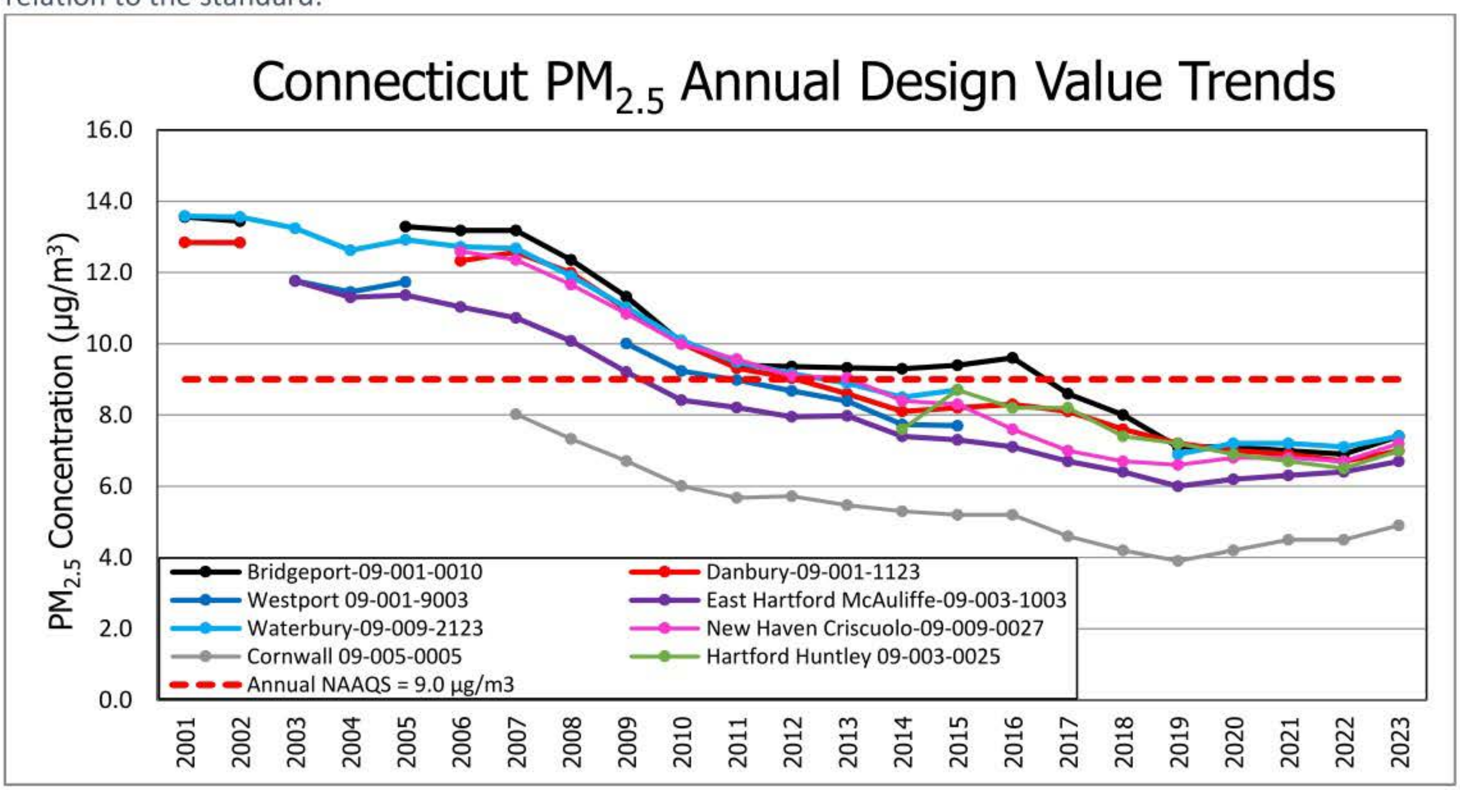
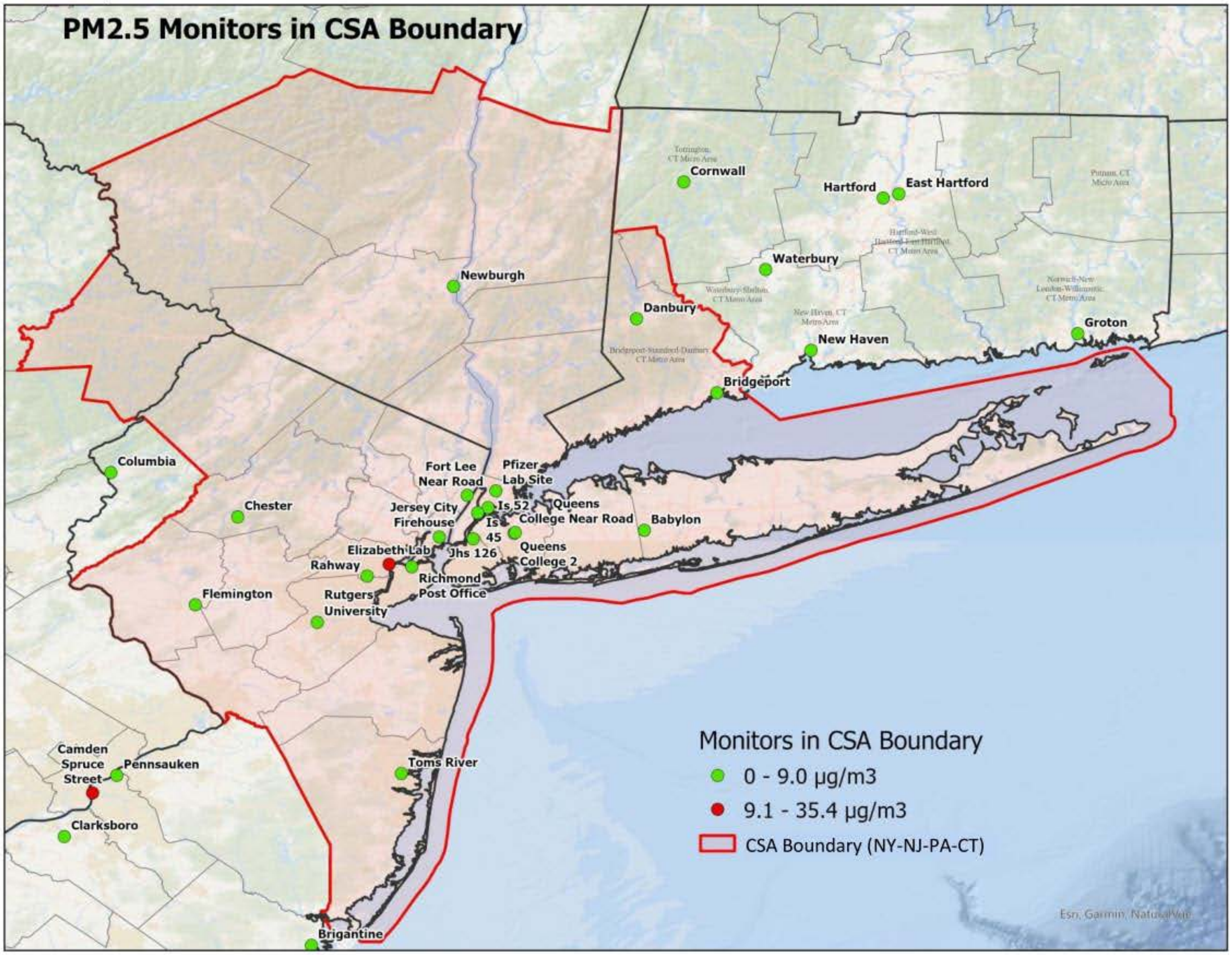


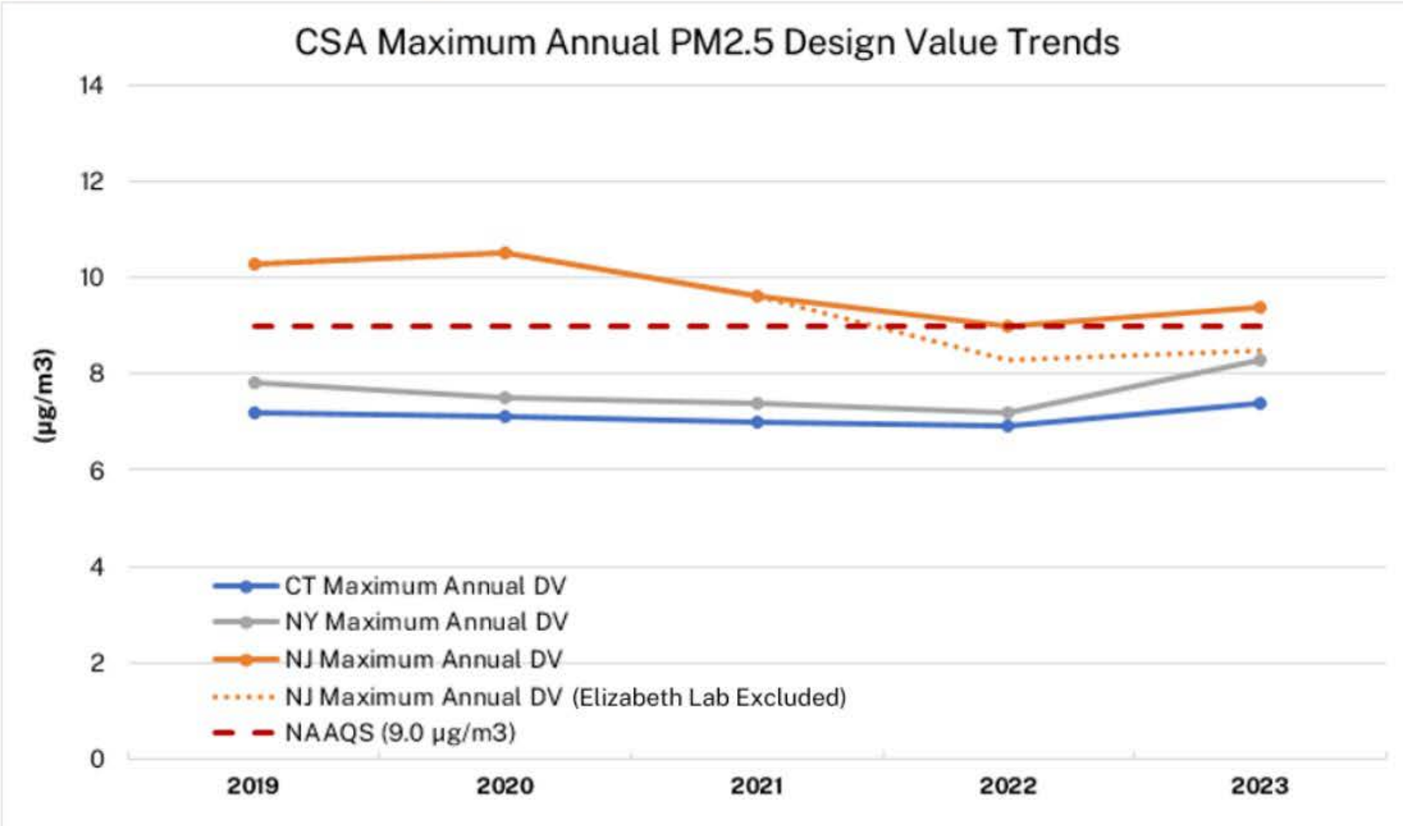
Figure 2-6 shows the locations of $PM_{2.5}$ monitors within the New York-Newark (NY-NJ-PA-CT) CSA with indication of their current attainment status. The Elizabeth Lab site, near the center of the CSA, is the only site that exceeds the standard. The 27 other monitor sites in the CSA attain the standard and many of these are located between the Elizabeth Lab site and Connecticut's borders.

Figure 2-6. Attainment (green) and nonattainment (red) monitors shown within the New York - Newark (NY-NJ-PA-CT) CSA.



Maximum design value trends from monitors in the CSA, by state, are charted in Figure 2-7. Note that Pennsylvania has no $PM_{2.5}$ monitors located in the CSA. Prior to the extraordinary smoke impacts from wildfires in 2023, all trends were downward. The trend for New Jersey, with the exclusion of Elizabeth Lab site, is also shown and would indicate attainment with an approximate ten percent drop in the design value for sites in the New Jersey portion of the CSA.

Figure 2-7. Maximum annual design value (DV) trend of each state's monitors within the CSA.



The Elizabeth Lab Monitor

The Elizabeth Lab (monitor number 34-039-0004) in Union County, New Jersey is located within an industrial area close to the New Jersey Turnpike and Interstate-278 (Figure 2-8).[7] Annual $PM_{2.5}$ design values for the site are plotted in Figure 2-9 and show a downward trend from 2014 through 2020. The trend levels off near the standard between 2020 and 2023, only rising above the standard in 2023.

[7] New Jersey Air Monitoring Site Description (nj.gov)

Figure 2-8. Aerial image showing the location of the Elizabeth Lab monitor.

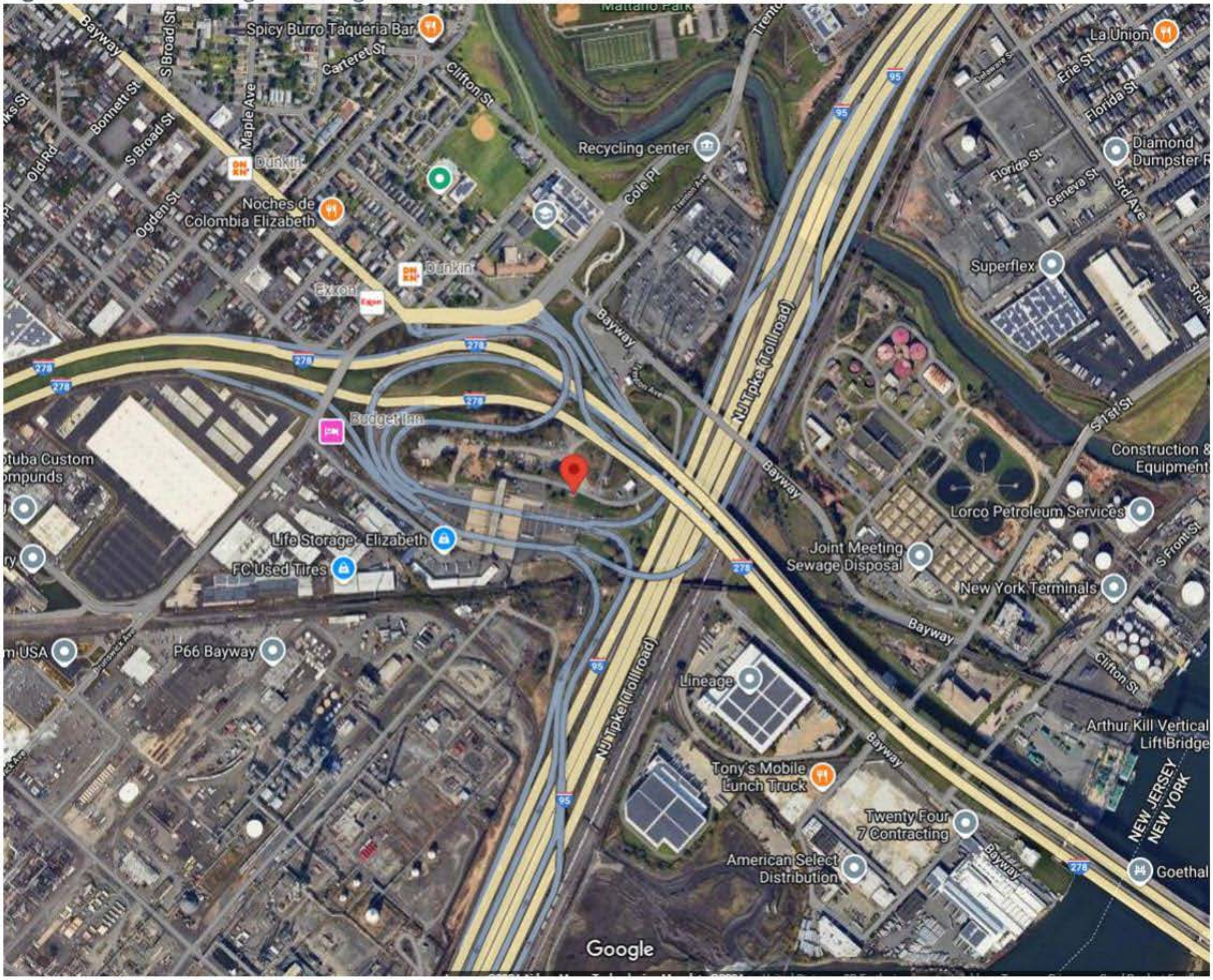
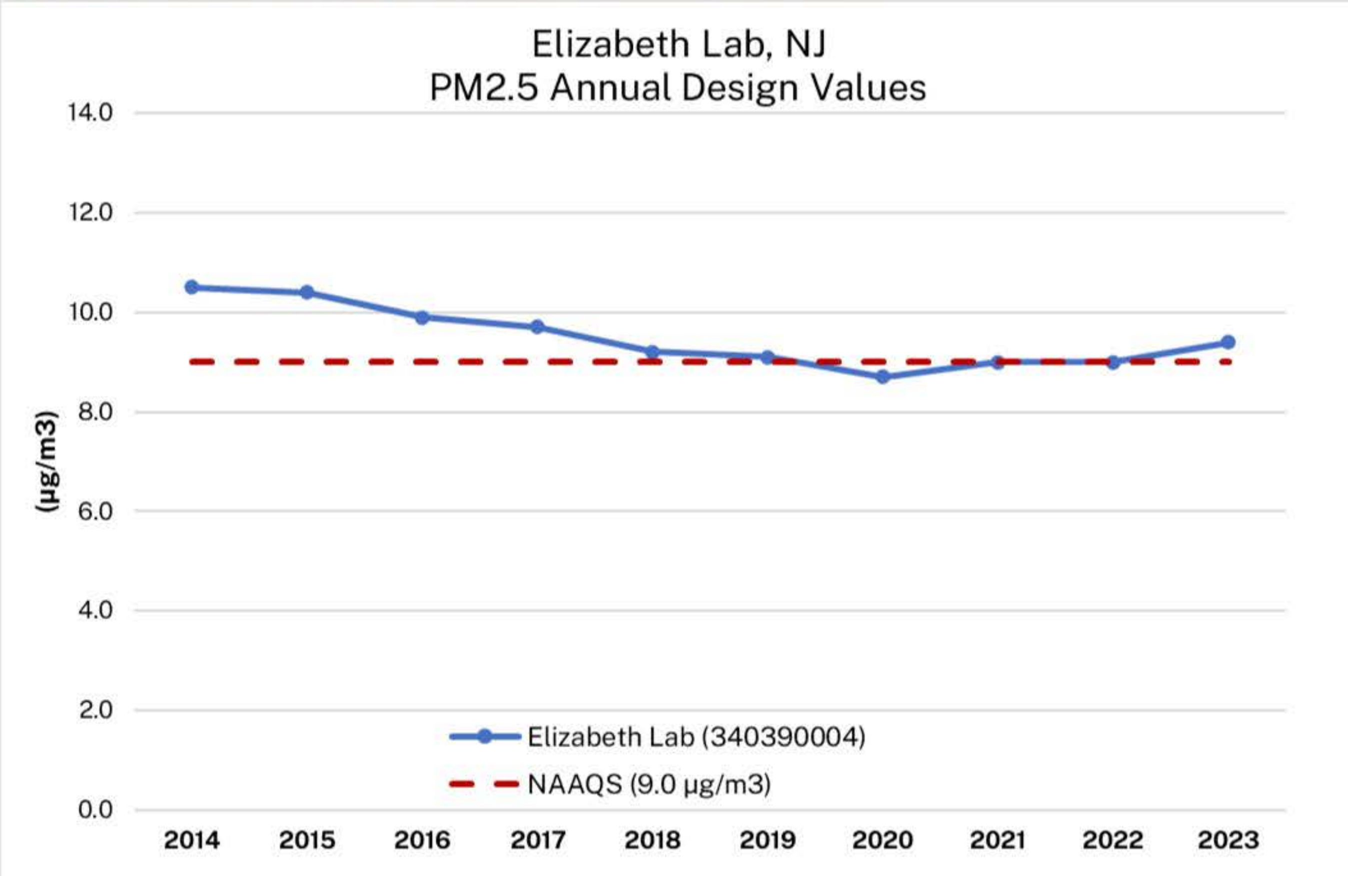


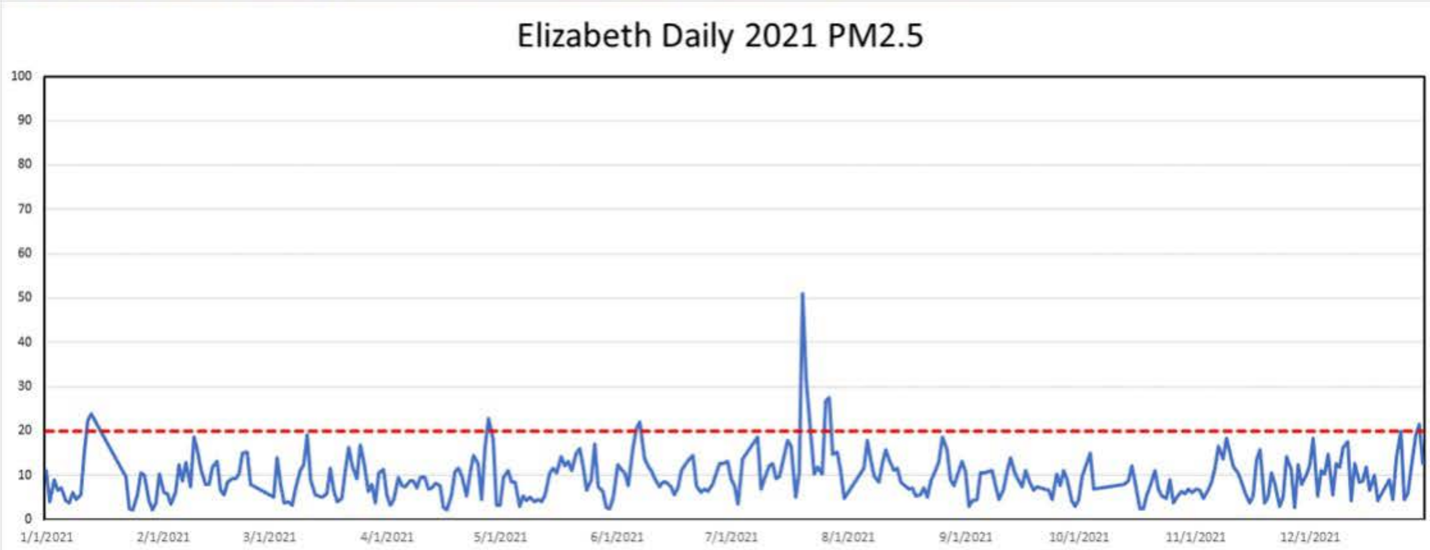
Figure 2-9. Annual $PM_{2.5}$ design values at Elizabeth Lab (2014-2023).



Daily $PM_{2.5}$ values at Elizabeth Lab

Daily $PM_{2.5}$ values were plotted from 2021-2023 for the Elizabeth Lab monitor to further understand the increased annual design value at the site. The arithmetic mean for each day was used in the following graphics showing daily 24-hour values. The data was obtained from EPA's Air Data website. Other than a few spikes, values in 2021 (Figure 2-10) remained mostly under the arithmetic mean. A major smoke event occurred throughout the region on July 20, 2021, and was the likely cause of the peak spike shown for the year.

Figure 2-10. Daily average $PM_{2.5}$ values for 2021 at the Elizabeth, NJ monitor.



$PM_{2.5}$ 24-hour values in 2022 (Figure 2-11) show a slightly decreasing trend. Again, certain peaks can be attributed to smoke and smoke from small fires located near the monitor (Figure 2-12) evident on April 13, 2022. Regardless of the localized fires and sources, the annual design value was 9.0 µg/m^3, making monitored levels for this year compliant with the revised standard.

Figure 2-11. Daily average $PM_{2.5}$ values for 2022 at the Elizabeth, NJ monitor.

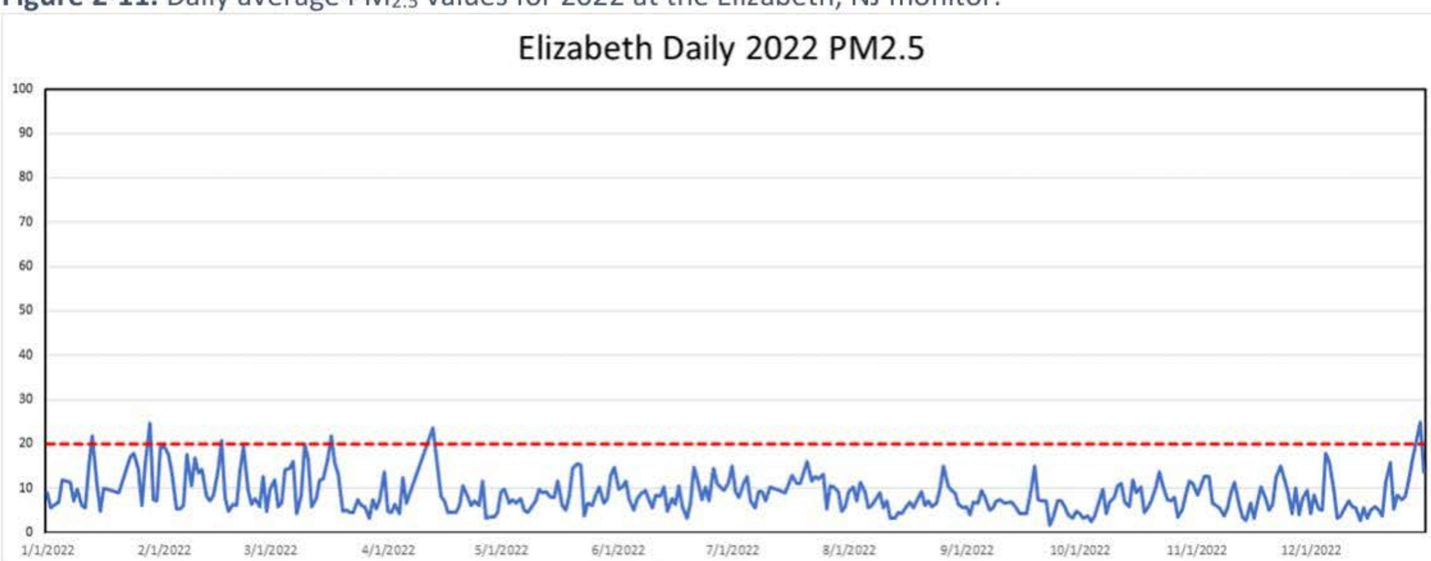
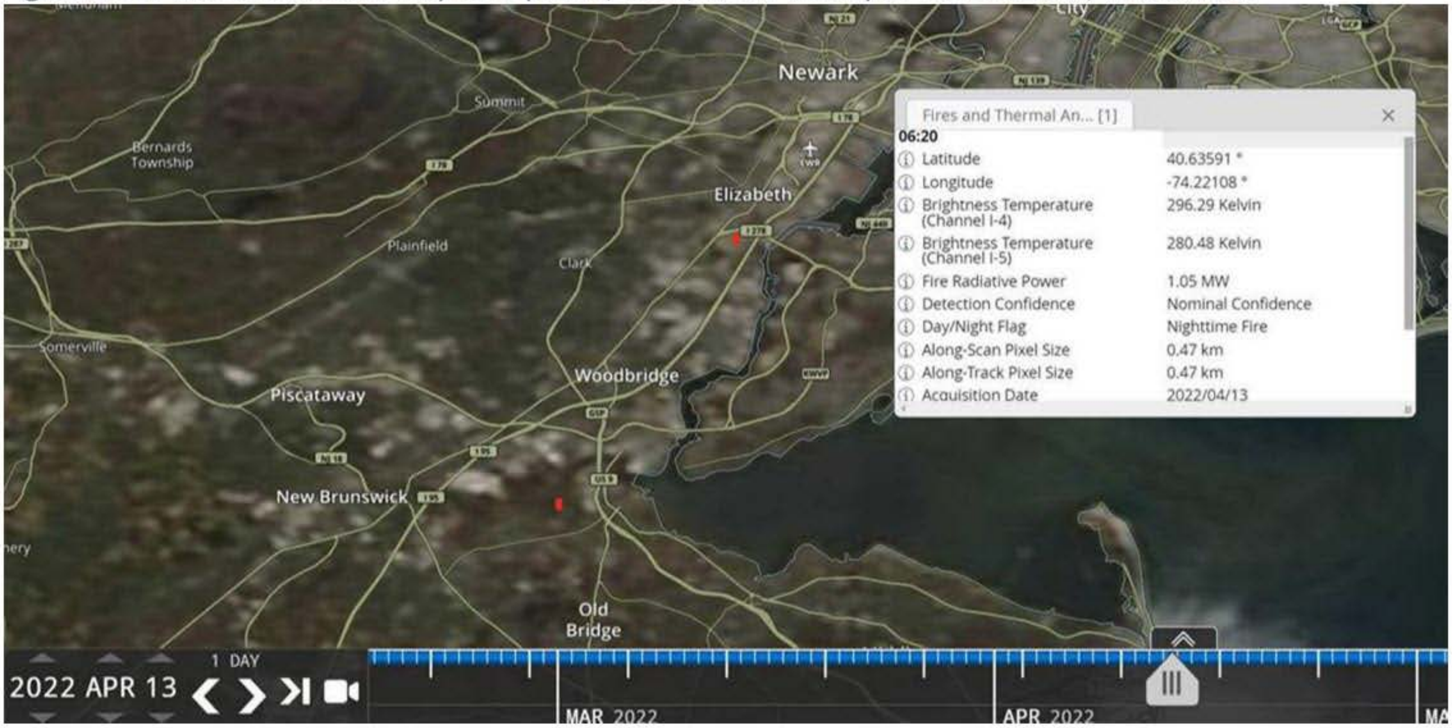
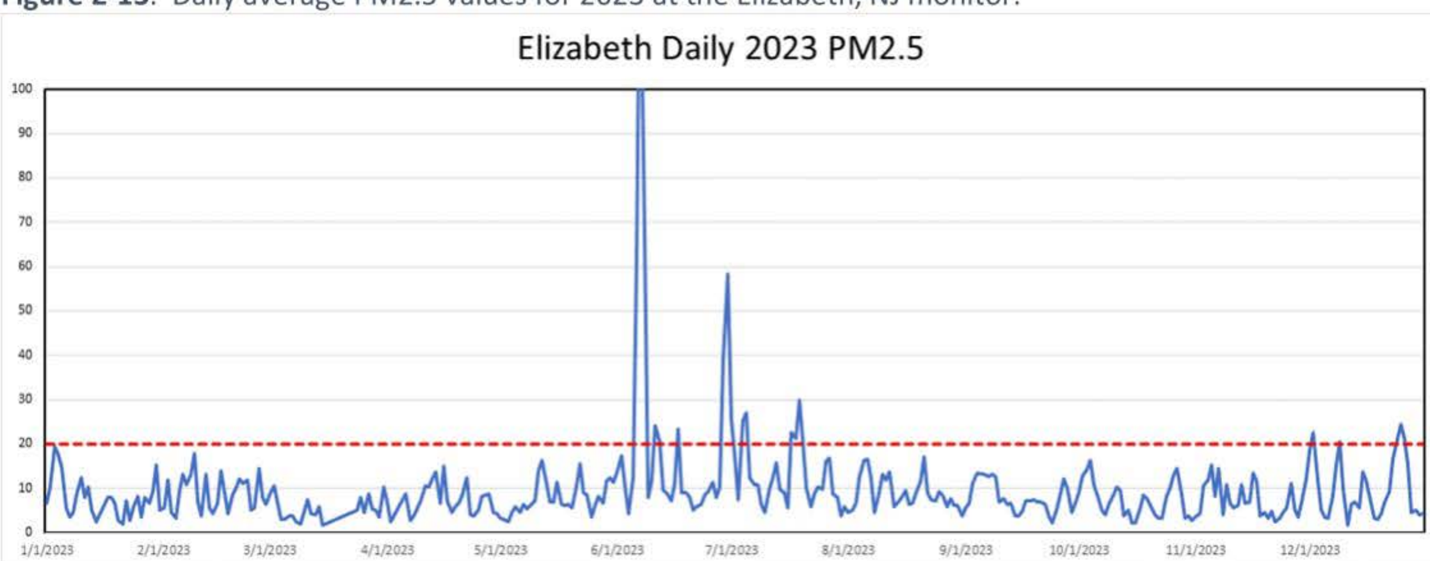


Figure 2-12. Fire and thermal map for April 13, 2022, in the vicinity of the Elizabeth, NJ monitor.



Wildfire smoke was present throughout the summer of 2023 causing a few severely elevated $PM_{2.5}$ 24-hour values (Figure 2-13). These extreme spikes are evidently larger than any seen in the previous two-year graphics, with the highest value being 138.8 µg/m^3 on June 7, 2023. The smoke events of 2023 were extreme, and it is likely that Elizabeth Lab design values will trend lower as the influence of these outliers is diminished.

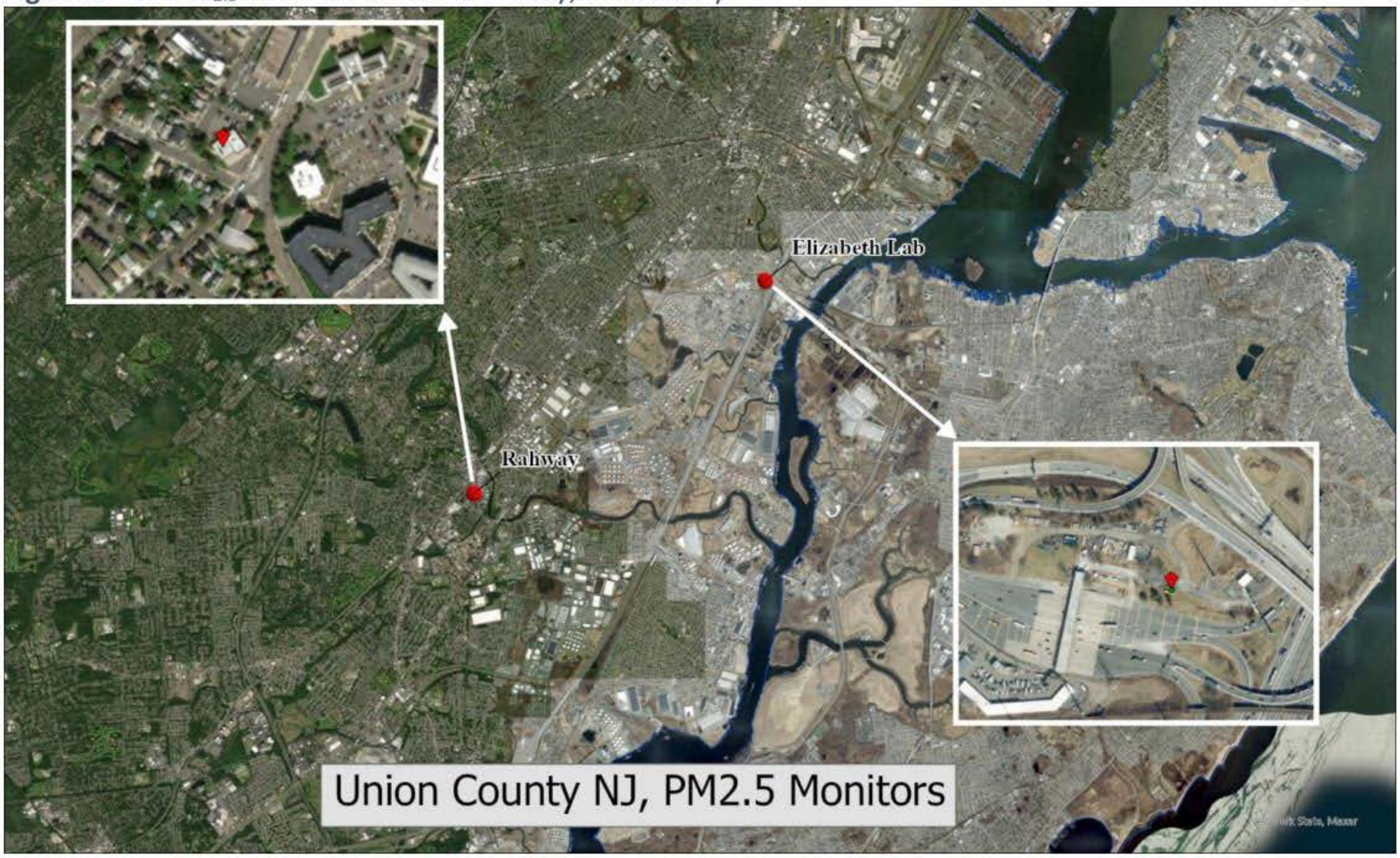
Figure 2-13. Daily average PM2.5 values for 2023 at the Elizabeth, NJ monitor.



The Rahway monitor compared to Elizabeth Lab.

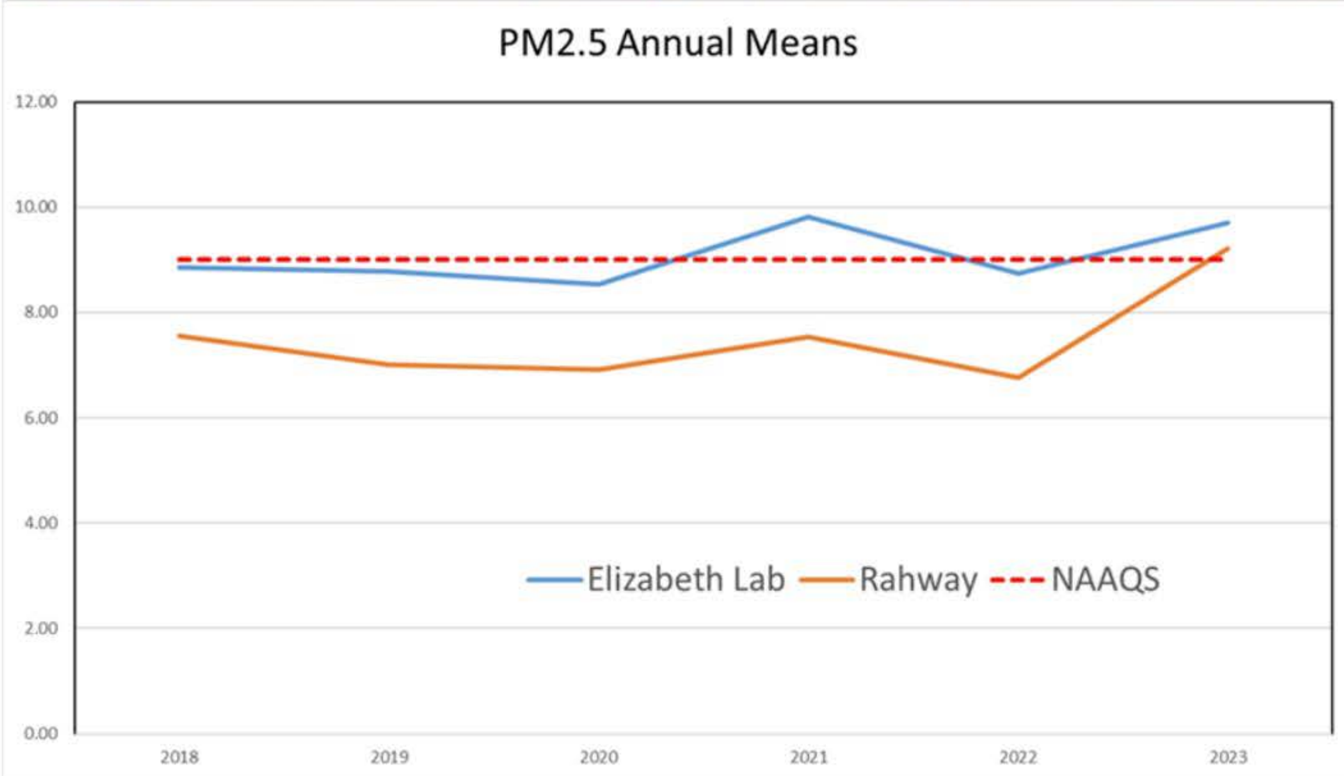
The New Jersey Department of Environmental Protection operates a continuous $PM_{2.5}$ monitor 5.7 miles from the Elizabeth Lab site in the City of Rahway. The relative location of these two monitors can be seen in Figure 2-14.

Figure 2-14. $PM_{2.5}$ monitors in Union County, New Jersey.



Trends in annual $PM_{2.5}$ design values for the two monitors are plotted from 2018 through 2023 in Figure 2-15. The trends are similar with the exception that the Elizabeth Lab monitor trends approximately two µg/m^3 above the Rahway site. The difference is likely due to local $PM_{2.5}$ emissions influencing the Elizabeth Lab site.

Figure 2-15. Trends in annual $PM_{2.5}$ design values (µg/m^3) for the Rahway and Elizabeth Lab sites (2018-2023).



2.2 Factor 2: Emissions and Emissions Related Data

The National Emissions Inventory (NEI) is an EPA compendium of emissions reported every three years.[8] Emissions data from the NEI was assessed for the 2011, 2014, 2017, and 2020 inventory years.[9]

Table 2-2 shows the anthropogenic $PM_{2.5}$ and related precursor pollutant emissions totals for Connecticut. Emissions are shown for primary $PM_{2.5}$ and precursor species: ammonia (NH_3), nitrogen oxides (NO_x), sulfur dioxide (SO_2) and volatile organic compounds (VOC). The largest reductions were due to low sulfur fuel standards reducing SO_2 emissions followed by ozone reduction strategies to reduce NO_x and VOC emissions. NH_3 and $PM_{2.5}$ emissions fluctuate due, in part, to improvements in emission calculations and methods, but $PM_{2.5}$ reductions are also attributable to cleaner fuels and improved emissions standards. Emission trends are generally consistent with the downward trend in monitored data for pollutants in the state.

[8] https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
[9] National Emissions Inventory (NEI) | US EPA

Table 2-2. Emission trends for Connecticut taken from the National Emissions Inventory.

Connecticut $PM_{2.5}$ NEI Emission Trends (tons/year)				
Pollutant	**2011 emissions**	**2014 emissions**	**2017 emissions**	**2020 emissions**
$PM_{2.5}$	16,595	13,155	11,868	13,739
NH_3	5,204	4,206	5,324	5,385
NO_X	73,371	63,596	46,903	33,115
SO_2	15,339	12,452	2,666	438
VOC	141,043	143,168	125,317	116,776

Similar trends in emissions for the New York, New Jersey, and Pennsylvania counties included in the CSA are shown in Table 2-3, Table 2-4 , and Table 2-5, respectively. Emissions from the CSA counties for New York and New Jersey significantly exceed Connecticut's statewide emissions of these pollutants.

Table 2-3. Emission trends for the New York counties in the CSA as taken from the National Emissions Inventory.

New York $PM_{2.5}$ CSA Counties NEI Emission Trends (tons/year)				
Pollutant	**2011 emissions**	**2014 emissions**	**2017 emissions**	**2020 emissions**
$PM_{2.5}$	30,439	28,247	25,147	36,443
NH_3	6,024	7,492	5,331	9,565
NO_X	198,151	165,497	124,620	82,921
SO_2	33,491	11,265	6,203	1,881
VOC	271,532	282,961	206,275	190,842

Table 2-4. Emission trends for the New Jersey counties in the CSA as taken from the National Emissions Inventory.

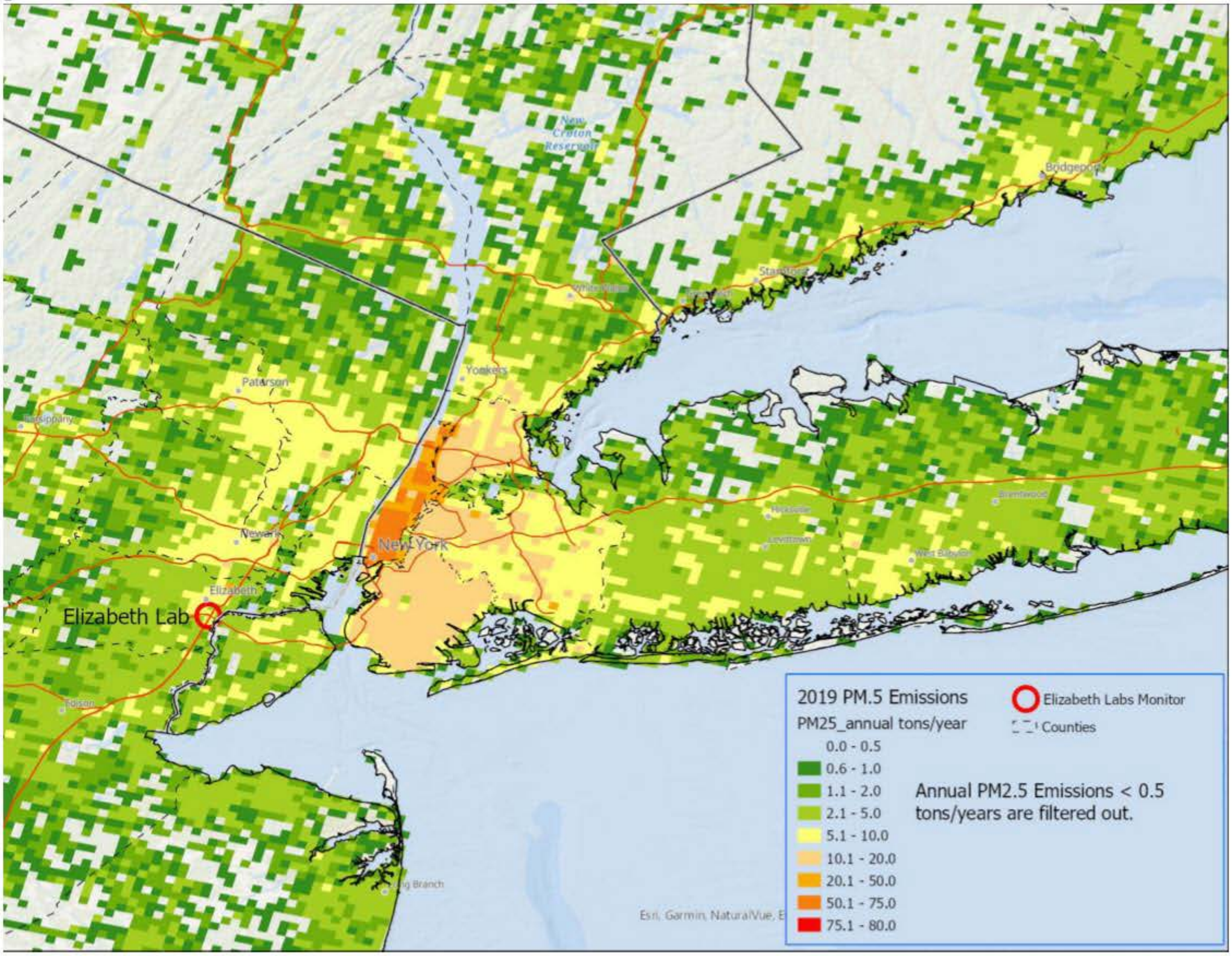
New Jersey $PM_{2.5}$ CSA Counties NEI Emission Trends (tons/year)				
Pollutant	**2011 emissions**	**2014 emissions**	**2017 emissions**	**2020 emissions**
$PM_{2.5}$	18,012	19,033	16,800	18,787
NH_3	4,937	11,328	4,542	4,471
NO_X	123,492	118,054	101,423	59,575
SO_2	10,272	6,988	1,989	588
VOC	185,174	172,661	149,477	142,233

Table 2-5. Emission trends for the Pennsylvania counties in the CSA as taken from the National Emissions Inventory.

Pennsylvania $PM_{2.5}$ CSA Counties NEI Emission Trends (tons/year)				
Pollutant	**2011 emissions**	**2014 emissions**	**2017 emissions**	**2020 emissions**
$PM_{2.5}$	530	921	497	812
NH_3	42	115	153	333
NO_X	2,226	2,282	1,411	931
SO_2	77	120	35	31
VOC	11,826	13,014	9,504	9,229

The geographical distribution of $PM_{2.5}$ emissions for 2019 is shown in Figure 2-16. Emissions are at their highest on Manhattan and western Long Island. As shown earlier in Figure 2-6, multiple monitors within the densest area of emissions attain the standard. Comparatively, the Elizabeth Lab monitor lies in an area of moderate emissions indicating that its nonattainment status is likely due to local influence.

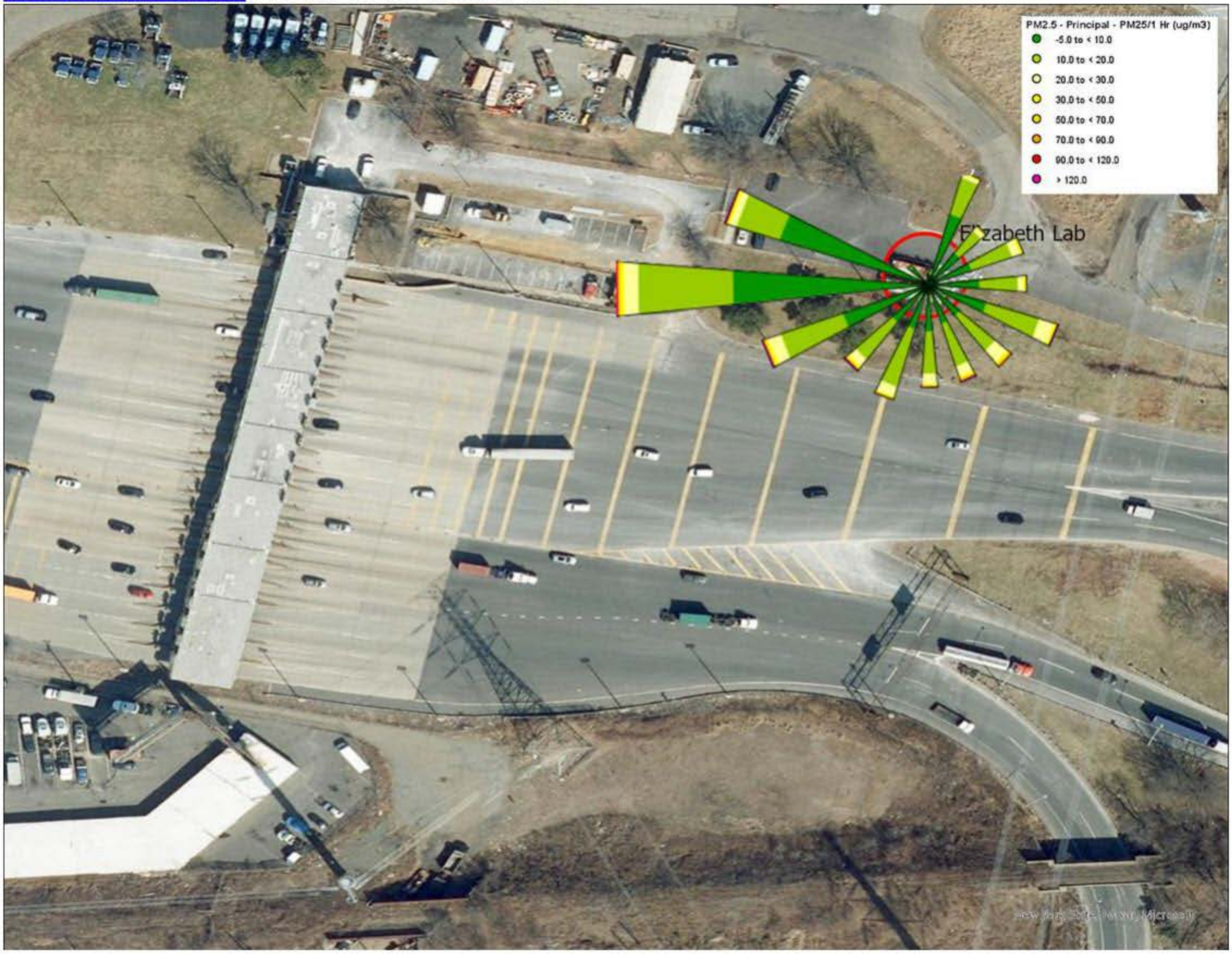
Figure 2-16. High resolution emissions density map for PM2.5 in the New York Metropolitan area showing the location of the Elizabeth Lab monitor. Data is presented for 2019 and apportioned to 1-kilometer square grids.



Source: Ma, Siqi & Tong, Daniel. (2022). Neighborhood Emission Mapping Operation (NEMO): A 1-km anthropogenic emission dataset in the United States. Scientific Data. 9. 10.1038/s41597-022-01790-9.

A closer look at the Elizabeth Lab site confirms the likelihood that it is influenced by local sources. In the image shown in Figure 2-17, the area around the site shows road salt and exposed dirt on the road and lots near the monitor. $PM_{2.5}$ wind rose data for 2023 obtained from AirNow-Tech (airnowtech.org) shows the predominant winds with the highest $PM_{2.5}$ levels coming from the vicinity of the toll booths which may also result in higher $PM_{2.5}$ levels from vehicle exhaust.

Figure 2-17. Close up aerial view of the Elizabeth Lab monitor with 2023 $PM_{2.5}$ wind rose data from [AirNow-Tech (airnowtech.org)]() overlaid on the monitor site.



Population Growth Rates and Patterns

EPA recommends that population density analyses examine the location and, when available, trends in population growth as potential indicators of the probable location and magnitude of emissions sources that may contribute to $PM_{2.5}$ concentrations in a given nonattainment area.

Table 2-6 summarizes population growth estimates for 2020-2040 as projected by the Connecticut Data Center.[10] Overall population growth in Connecticut during this period is estimated at 1.37 percent. Fairfield, Litchfield, Middlesex, New London, and Tolland Counties' population rates are estimated to decline, with the lowest being Litchfield County with an estimated -8.74 percent growth rate (8.74% population decline). The projected fastest growing county (on a percentage basis) is Windham County, located in rural northeast Connecticut.

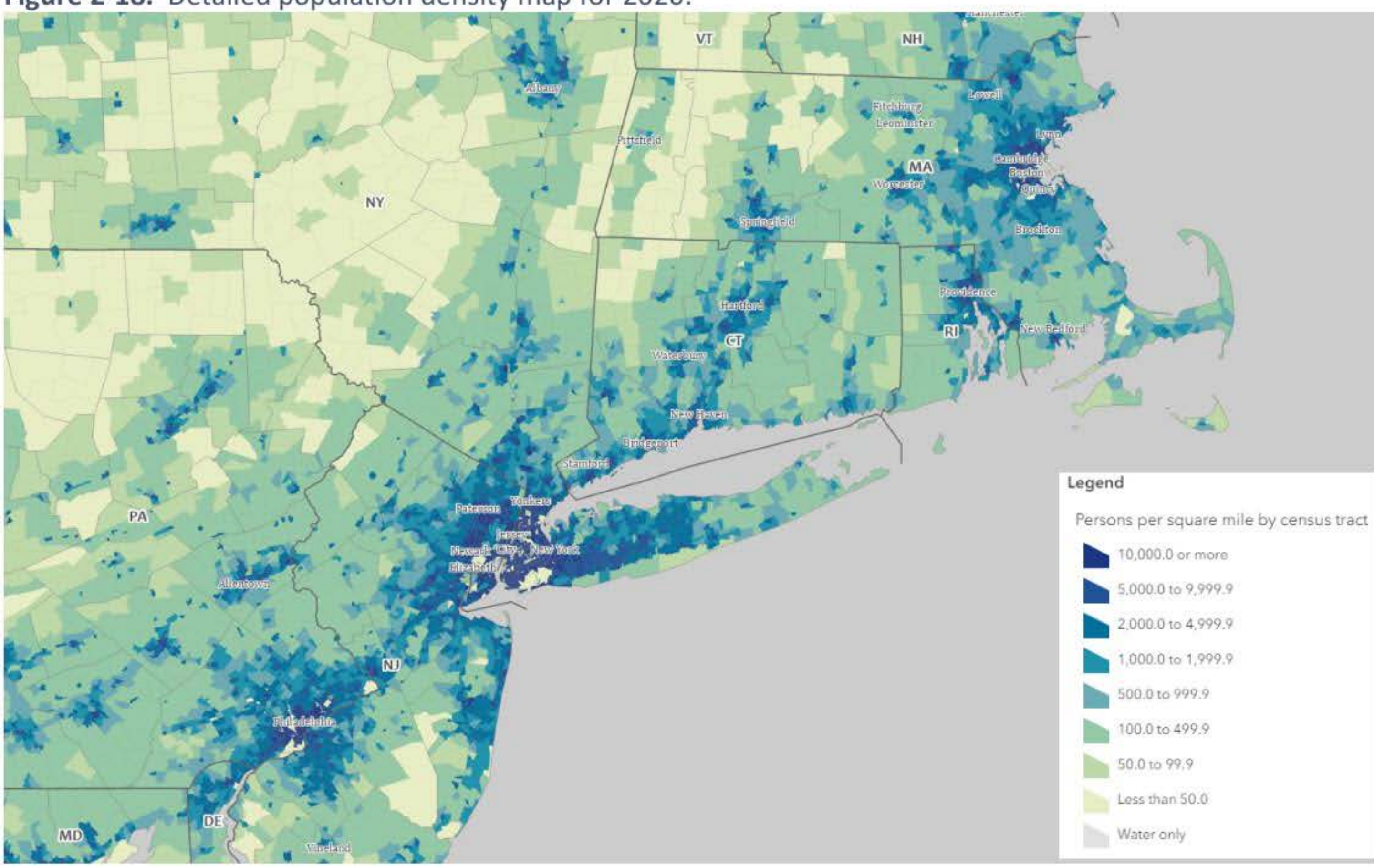
[10] https://www.ctdata.org/

Table 2-6. Population growth estimates by county for Connecticut.

County	2020 Total	2025 Total	2030 Total	2035 Total	2040 Total	Area (Square Miles)	Population Density 2020	2040-2020 %Change
Fairfield	907,603	900,662	897,553	899,423	905,219	624.9	1,452.4	-0.26%
Hartford	909,671	920,241	930,629	9397,54	948,876	735.1	1,237.5	4.31%
Litchfield	186,611	184,190	180,866	176,170	170,303	920.6	202.7	-8.74%
Middlesex	167,213	166,827	166,533	165,033	163,365	369.3	452.8	-2.30%
New Haven	873,659	882,552	891,371	897,492	900,635	604.5	1,445.3	3.09%
New London	278,756	280,497	280,847	279,403	276,187	664.9	419.2	-0.92%
Tolland	156,588	156,249	155,697	155,266	154,560	410.2	381.7	-1.30%
Windham	124,498	127,547	130,497	132,818	134,876	512.9	242.7	8.34%
State Total	**3,604,599**	**3,618,765**	**3,633,993**	**3,645,359**	**3,654,021**	**4,842.4**	**744.4**	**1.37%**

Population density was assessed for the CSA using data from the 2020 Census Demographic Data Map Viewer.[11] Connecticut's population density is highest along Interstate-91 through New Haven and Hartford counties and along the coastal Interstate-95 corridor between New York and Rhode Island (Figure 2-18).

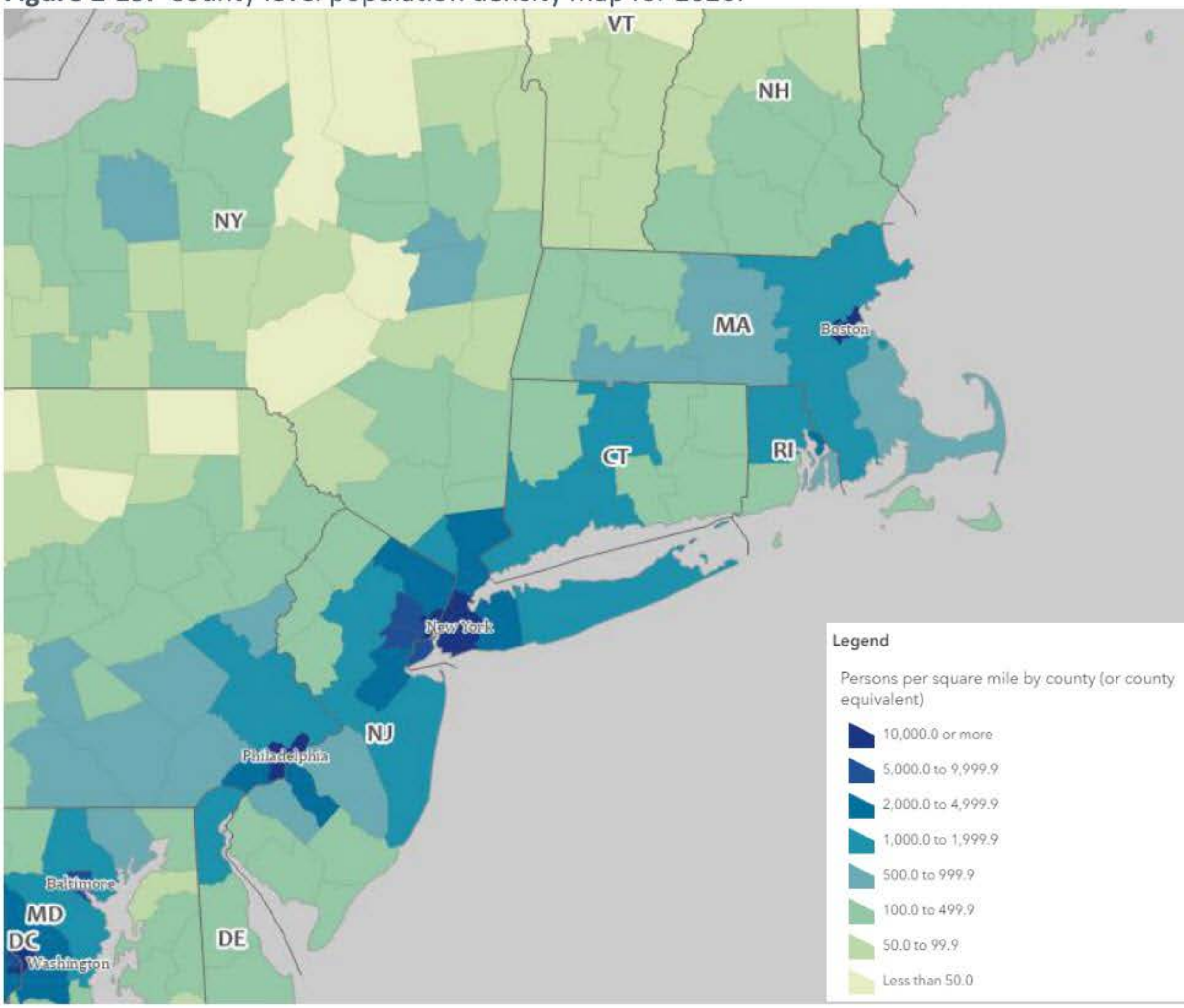
Figure 2-18. Detailed population density map for 2020.



[11] 2020 Census Demographic Data Map Viewer

Population density by county is presented in Figure 2-19. Fairfield county has 1,000-1,999 persons per square mile, while New York's highest county within the CSA has a population density of 10,000 or more persons per square mile. New Jersey's most populous county within the CSA has a population density of 5,000-9,999 persons per square mile. The highest population densities are in the counties surrounding the nonattainment monitor and it is unlikely that population in Connecticut is relevant to nonattainment at the Elizabeth Lab monitor.

Figure 2-19. County level population density map for 2020.



Traffic and Commuting

Though secondary to emissions, EPA recommends particular assessment of the potential impact of traffic and commuting on monitored levels. Five year commuting flows were obtained from census data to compare commutes into New Jersey from states with counties in the the CSA.[12] The 2016-2020 five year average number of commuters from Connecticut to New Jersey are insignificant when compared to the commuters

[12] 2016-2020 5-Year ACS Commuting Flows (census.gov)

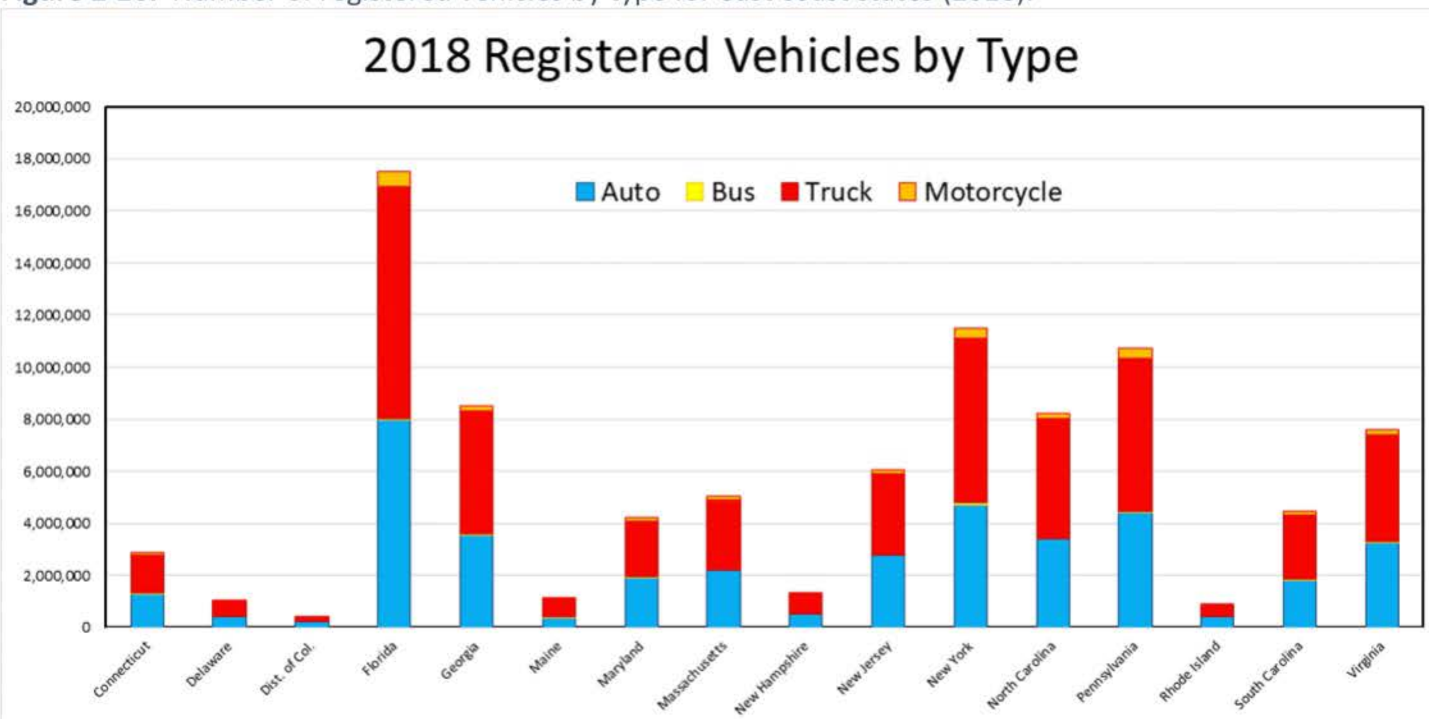
from Pennsylvania or New York (Table 2-7). It is therefore unlilkey that commuting traffic from Connecticut affects the nonattainment status of the Elizabeth Lab monitor.

Table 2-7. 2016-2020 Five-year average annual commuting flow into New Jersey from adjacent states in the CSA.

2016-2020 Origin and Number of Workers Commuting into New Jersey	
Connecticut	**3,358**
New York	**112,925**
Pennsylvania	**121,093**

As the Elizabeth Lab monitor is located near two Interstate highway systems, it is likely that long distance traffic would influence its $PM_{2.5}$ levels. The US Departmet of Transportation provides data for vehicles registered by type for each state.[13] The data for east coast states is charted in Figure 2-20 and indicates little liklihood that vehicles from Connecticut would have a significant impact on the Elizabeth Lab monitor.

Figure 2-20. Number of registered vehicles by type for east coast states (2018).

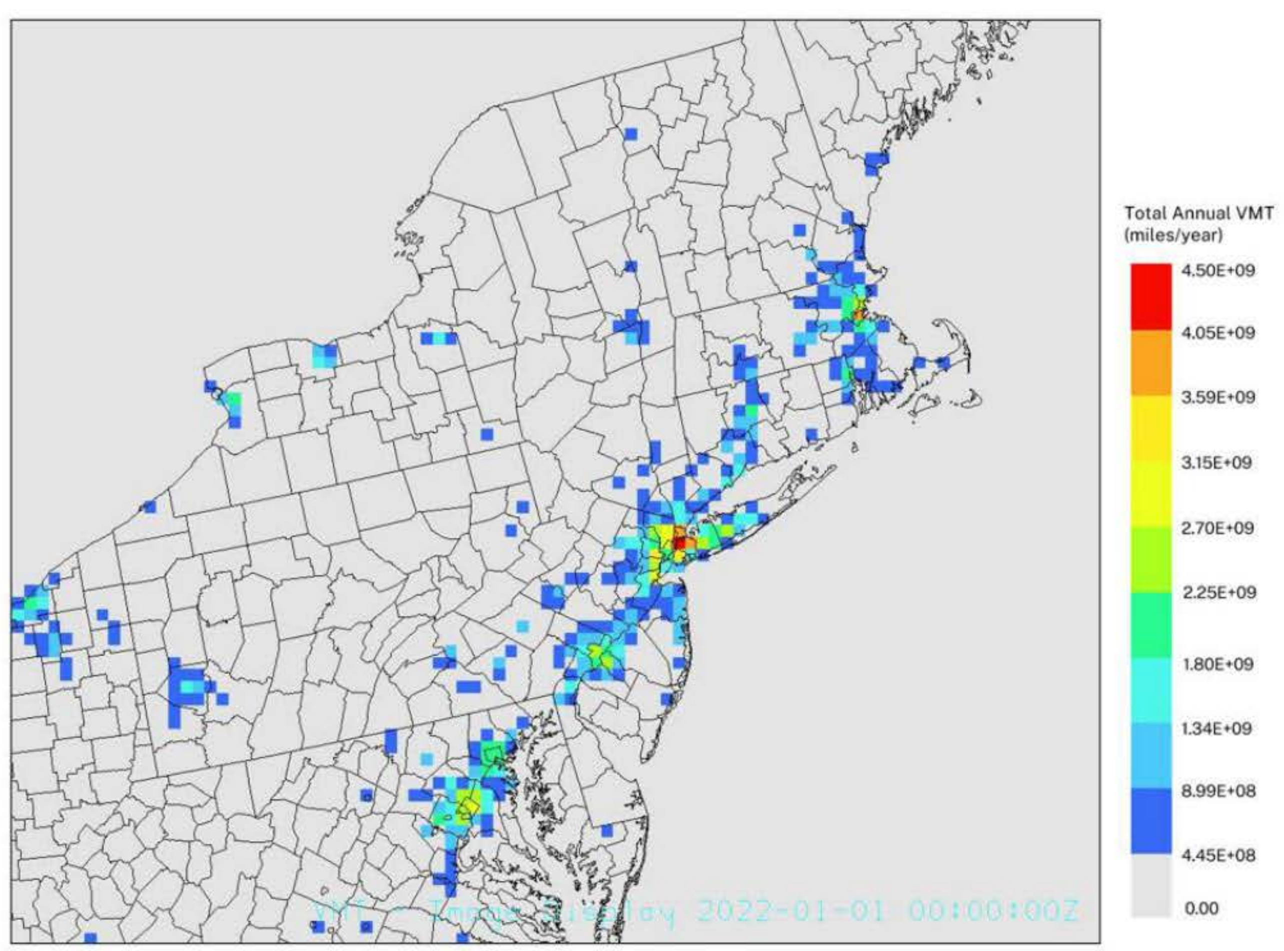


Assessment of vehicle miles traveled (VMT) is way to characterize potential vehicle emissions that may bear on area boundaries. Gridded VMT data was provided by EPA for the 2022 emission modeling platform and downloaded from EPA's modeling inventory website.[14] Figure 2-21 below is a gridded plot of EPA's 2022 annual VMT data for the northeastern region of the United States. In Connecticut, the highest VMT are seen following Interstate-91 from Hartford to New Haven, then along Interstate-95 into New York City. However,

[13] Motor Vehicle Registrations, by vehicle type and state | USDOT Open Data (transportation.gov)
[14] File name: "2022hc_emissions_VMT_23jul2024.zip"

the greatest VMT in the region is found in and around New York City, along western Long Island, and in Northern New Jersey.

Figure 2-21. Gridded 2022 Vehicle Miles Traveled Data (miles/year) from the 2022v1 Emissions Modeling Platform.



Connecticut Department of Transportation (CTDOT) projects a 1.3% annual growth rate in VMT under a business-as-usual scenario. However, under Executive Order 21-3, the Governor has directed CTDOT to set and plan for a VMT reduction target to be achieved by 2030. As a result, CTDOT proposed to reduce per person VMT by 5 percent from the 2019 baseline. This amounts to a reduction of 433.17 per person VMT each year by 2030 as compared to the baseline.[15]

Given the distribution of VMT and expected negative VMT growth in Connecticut, vehicle emissions in Connecticut are unlikely to interfere with attainment in New Jersey.

2.3 Factor 3: Meteorology

[15] https://portal.ct.gov/-/media/dot/documents/dpolicy/vmt-reduction-target.pdf

The evaluation of meteorological data helps to determine the effect on the fate and transport of emissions contributing to $PM_{2.5}$ concentrations and to identify areas potentially contributing to the monitored violations. One basic meteorological analysis involves assessing potential source-receptor relationships in the area using summaries of emissions, wind speed, and wind direction data.

A simple approach is to use wind data from the Connecticut monitoring sites to create wind roses. Instead of producing these with the traditional 'blowing from' direction, these wind roses are shown as 'blowing to,' to better visualize the direction that emissions from these areas may be heading (Figure 2-22). The monitor closest to New Jersey (Greenwich), shows its predominant wind sector blowing toward Elizabeth Lab, but the large majority of winds blow away from that site and into Connecticut or New York. Predominant winds from the remaining sites shown indicate little likelihood that emissions from sources in Connecticut would reach the Elizabeth Lab site.

Figure 2-22. Wind roses depicting the direction wind blows from various monitor location in Connecticut. An arrow indicates the predominate direction for each location, and the location of Elizabeth Lab is shown. Data is from DEEP air monitoring sites for 2023.

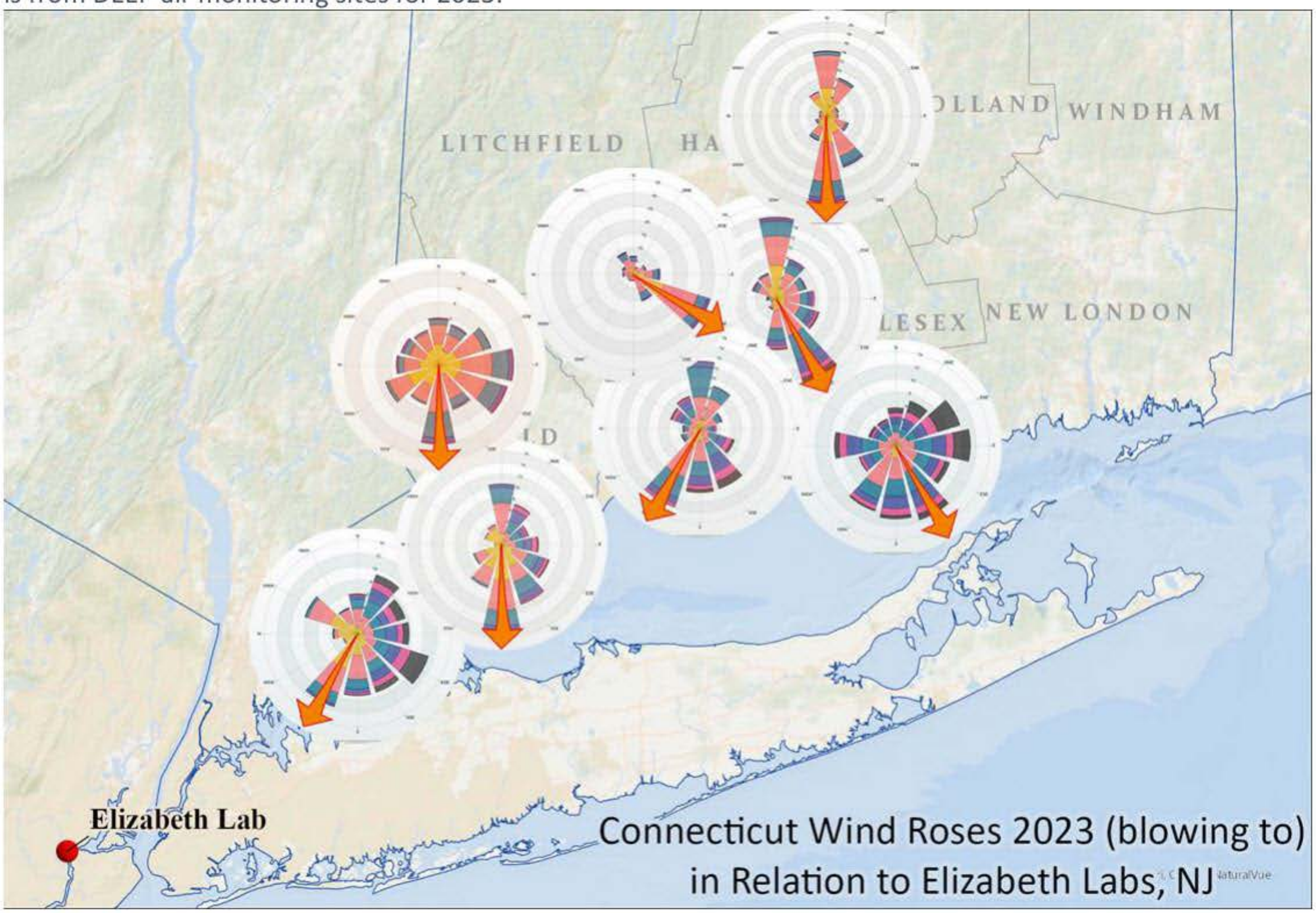
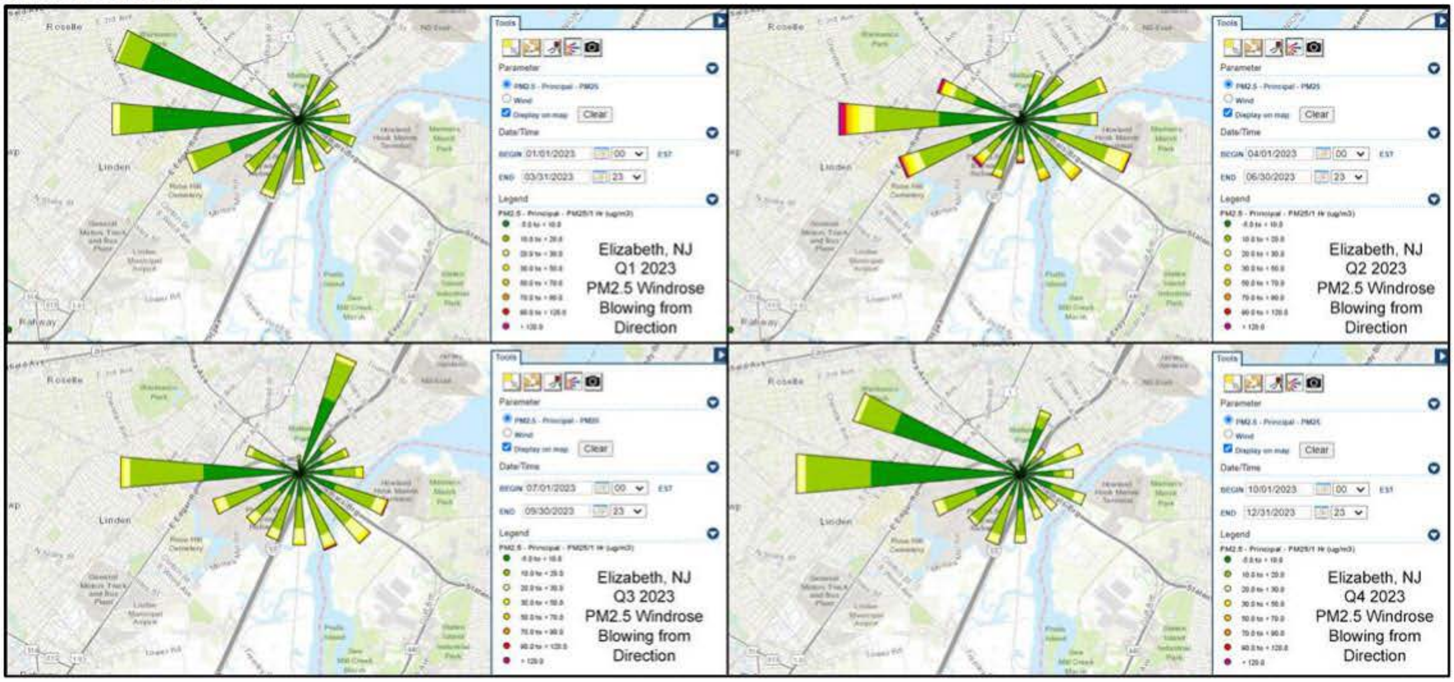


Figure 2-23 shows the 2023 quarterly $PM_{2.5}$ wind roses for the Elizabeth Lab site. Wildfire episodes, particularly in June, were responsible for excessive $PM_{2.5}$ levels at this and many other sites across the region.

The effect of smoke is evident in the wind rose for the second quarter. Higher $PM_{2.5}$ levels come from the south and west of the monitor indicating some influence from the toll booths and associated traffic conditions.

Figure 2-23. Elizabeth Lab 2023 quarterly $PM_{2.5}$ wind roses showing $PM_{2.5}$ concentrations from each wind direction sector.



These wind roses clearly illustrate that in 2023, emissions from Connecticut did not influence $PM_{2.5}$ levels at this monitor.

2.4 Factor 4: Geography/Topography

Connecticut is a small state geographically, with topographical features that do not have a significant effect on air shed boundaries. Long Island Sound plays a role in ozone production but is insignificant regarding $PM_{2.5}$ attainment area boundaries.

2.5 Factor 5: Jurisdictional Boundaries

Two counties in Connecticut, New Haven and Fairfield, are currently in a $PM_{2.5}$ maintenance area that includes counties in New York and New Jersey.[16] The maintenance area includes Union County, New Jersey where the

[16] See Figure 1-1 of https://portal.ct.gov/-/media/deep/air/particulate_matter/pm25planning/certification-of-public-review-process/pm25-lmp----final.pdf

Elizabeth Lab monitor is located, but does not match the current New York-Newark (NY-NJ-PA-CT) CSA. As no other monitor in the CSA is nonattainment, a significantly smaller nonattainment area should be considered.

Additionally, the Rahway monitor, in the same county as the Elizabeth Lab monitor, shows attainment. Therefore, DEEP considers it appropriate to limit the nonattainment area to boundaries within the jurisdiction of the City of Elizabeth.

3 Summary and Conclusions

The analyses presented above demonstrate that all monitors in Connecticut attain the 2024 annual $PM_{2.5}$ NAAQS. Furthermore, in all areas adjacent to Connecticut there is only one monitor, Elizabeth Lab in New Jersey, that violates the standard.

The Elizabeth Lab monitor is located approximately 40 miles southwest of Connecticut's nearest border. Data presented in sections 2.2 and 2.3 of this report show that Connecticut sources do not influence the monitor. Furthermore, in the intervening 40 miles, there are several monitors which attain the standard. Other compelling data, including a nearby attaining monitor in Union County (Rahway), and the location of the Elizabeth Lab monitor near a major interstate exchange indicate that it is impacted from local sources. Design values at the site from 2020 to 2022 were at or just below the standard, and there are indications that wildfire smoke was a factor in the exceedance for 2023. It is therefore likely that the Elizabeth Lab monitor will again attain the standard in the near future, making a nonattainment designation unnecessary. Therefore, in accordance with CAA Section 107(d)(1), DEEP recommends that EPA designate the entire state of Connecticut as attainment for the 2024 annual $PM_{2.5}$ NAAQS.

Figure 3-1. Google maps image, dated 2024, showing the area west of, and including, the Elizabeth Lab monitor.

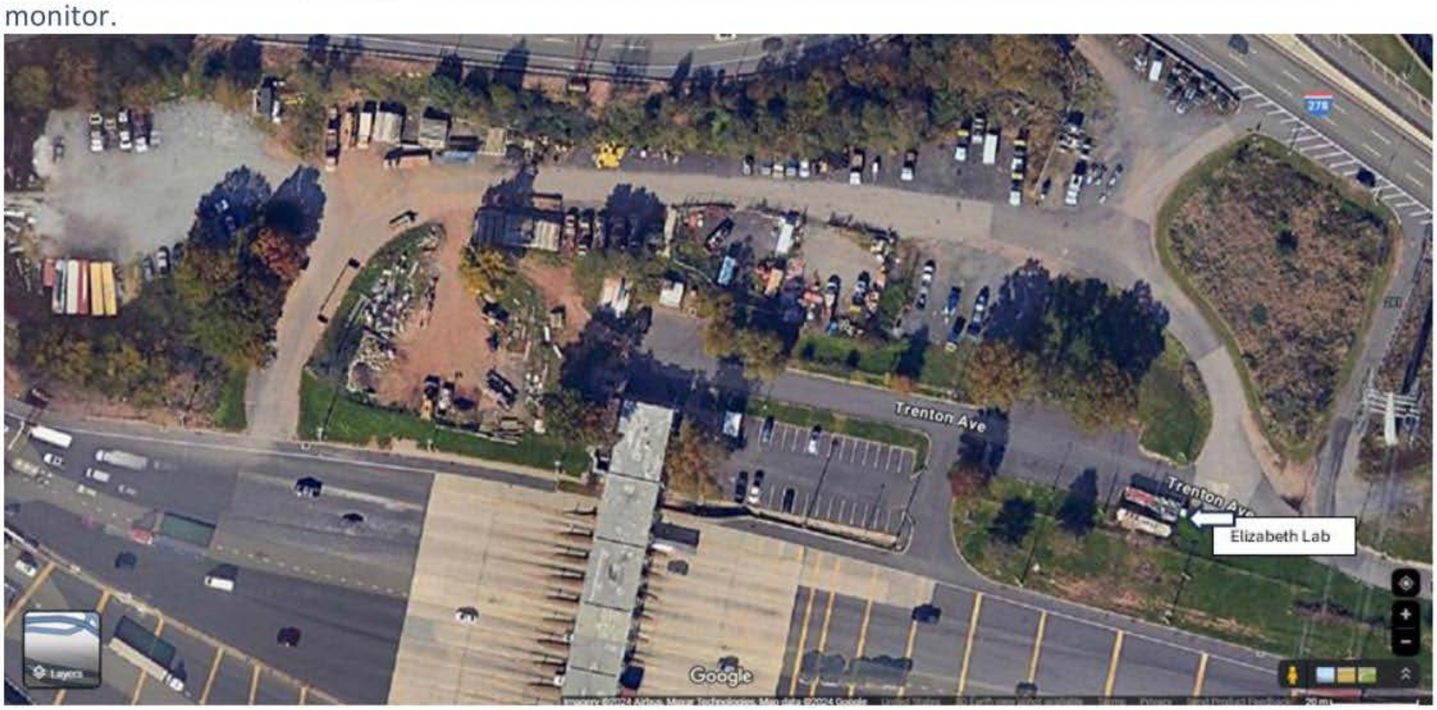


Table A-1. 2021-2023 Annual $PM_{2.5}$ Design Values ($\mu g/m^3$) at Connecticut Monitors

Site Name	2019-2021 Annual Design Value	2020-2022 Annual Design Value	2021-2023 Annual Design Value
Bridgeport (09-001-0010)	7.0	6.9	7.4
Danbury (09-001-1123)	6.9	6.7	7.0
Hartford (09-003-0025)	6.7	6.5	7.0
East Hartford (09-003-1003)	6.3	6.4	6.7
Cornwall (09-005-0005)	4.5	4.5	4.9
New Haven (09-009-0027)	6.8	6.7	7.2
Waterbury (09-009-2123)	7.2	7.1	7.4
Groton (09-011-0124)	5.9	5.9	6.3
State Maximum	**7.2**	**7.1**	**7.4**

MURIEL BOWSER
MAYOR

January 29, 2025

Catherine A. Libertz
Acting Regional Administrator
U.S. Environmental Protection Agency
Region III (Mail Code 3RA00)
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: Designation Recommendation for the District of Columbia under the New 2024 Primary Annual Fine Particulate Standard

Dear Ms. Libertz:

In accordance with Section 107(d) of the Clean Air Act (CAA), I am hereby providing to the Environmental Protection Agency (EPA) the District of Columbia's (District's) recommended designation of the air quality status in the District for the revised fine particulate ($PM_{2.5}$) annual national ambient air quality standard (NAAQS),[1] which was issued by the EPA on February 7, 2024.

The District currently operates a network of five community-scale monitoring stations that are compliant with 40 CFR part 58, and four of the stations measure $PM_{2.5}$. Since the last $PM_{2.5}$ designation recommendation was presented in 2013, the District has moved the Hains Point monitor to the King Greenleaf site, and the District added the Anacostia Freeway Near-Road monitoring station. In 2024, the District added the Bald Eagle Recreation Center station, but it has not collected sufficient data as directed under the designation memorandum[2] to add information to the demonstration of attainment.

The District is using the first four monitoring stations listed in the table below as the measurement network to meet the monitoring requirements of the revised 2024 annual $PM_{2.5}$ NAAQS. These stations have been online long enough to collect sufficient data, and they have each recorded compliance with the revised annual $PM_{2.5}$ NAAQS of 9 $\mu g/m^3$. Design concentration values of $PM_{2.5}$ in units of $\mu g/m^3$ for the three most recent years of quality-assured and certified monitoring data available to date (2021 to 2023) are as follows:

[1] 42 U.S.C. § 7407(d)(1)
[2] Memorandum: *Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard*, U.S. Environmental Protection Agency, issued February 7, 2024.

Monitor ID	Monitor Name	2021	2022	2023
11-001-0041	River Terrace School	7.8	7.5	8.4
11-001-0043	McMillan Reservoir	7.2	6.6	7.7
11-001-0051	Anacostia Freeway	8.8	8.6	8.9
11-001-0053	King Greenleaf	7.9	7.9	8.8
11-001-0055	Bald Eagle	-	-	-

Based on the monitoring data collected, the District is in compliance with the revised annual NAAQS of 9 $\mu g/m^3$.[3] In accordance with Section 107(d)(1) of the Clean Air Act, I recommend that the District be designated as an "attainment/unclassifiable" area.[4]

If you need further information on this matter, please contact Mr. Richard Jackson, Director of the District Department of Energy and Environment (DOEE), at (202) 654-6017.

Sincerely,

Muriel Bowser
Mayor

Cc: Christina Fernandez, Air Protection Division, EPA Region III
Richard Jackson, Director, DOEE
Collin Burrell, Deputy Director, Environmental Services Administration, DOEE
Joseph Jakuta, Interim Associate Director, Air Quality Division, DOEE

[3] 89 Fed. Reg. 16202
[4] 42 U.S.C. § 7407(d)(1)

STATE OF DELAWARE
OFFICE OF THE GOVERNOR

TATNALL BUILDING, SECOND FLOOR
MARTIN LUTHER KING, JR. BOULEVARD SOUTH
DOVER, DELAWARE 19901

BETHANY HALL-LONG
GOVERNOR

PHONE: 302-744-4101
FAX: 302-739-2775

January 15, 2025

Mr. Adam Ortiz
Regional Administrator, U.S. Environmental Protection Agency, Region III
1600 John F Kennedy Blvd
Philadelphia, PA 19103

Dear Mr. Ortiz:

This letter fulfills Delaware's obligations under Section 107 of the Clean Air Act (CAA) for states to recommend attainment status designations for counties under the annual primary national ambient air quality standards (NAAQS) for fine particulate matter ($PM_{2.5}$). The U.S. Environmental Protection Agency (EPA) promulgated a revised $PM_{2.5}$ Annual NAAQS on February 7, 2024 (2024 $PM_{2.5}$ NAAQS) (89 Federal Register 16202). The EPA revised the level of the primary (health-based) annual $PM_{2.5}$ standard from 12.0 micrograms per cubic meter ($\mu g/m^3$) to 9.0 $\mu g/m^3$.

Delaware recommends that the entire State of Delaware (New Castle, Kent and Sussex counties) be designated "attainment" with the new 2024 $PM_{2.5}$ NAAQS. Delaware makes this recommendation because all of the monitors in Delaware are measuring $PM_{2.5}$ below the revised 2024 $PM_{2.5}$ NAAQS of 9.0 $\mu g/m^3$ and because Delaware is not the cause of exceedances within other counties in nearby states. Delaware makes this recommendation in accordance with EPA's February 7, 2024 Memorandum entitled "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard." The attached Technical Support Document details the analyses that Delaware undertook in support of its recommendation.

Thank you for your consideration of this recommendation. If you have any questions concerning this submittal or would like to discuss it further, please contact Lisa Borin Ogden, Acting Secretary, Department of Natural Resources and Environmental Control (DNREC) or Angela D. Marconi, P.E., DNREC Division of Air Quality at (302) 739-9402.

Sincerely,

Bethany A. Hall-Long

Bethany Hall-Long
Governor

Enclosure

c: Lisa Borin Odgen, Acting Secretary, DNREC
Angela D. Marconi, P.E., Director, DNREC Division of Air Quality
Cristina Fernandez, Air & Radiation Division Director, U.S. EPA Region III

FINAL
2024 Fine Particulate Matter National Ambient Air Quality Standard Designation Technical Support Document

The Department of Natural Resources
and Environmental Control
Division of Air Quality

<u>Main Office</u>
100 West Water Street
Suite 6A
Dover, DE 19904
(302) 739-9402

<u>New Castle County Office</u>
715 Grantham Lane
New Castle, DE 19720
(302) 323-4542

January 2025

THIS PAGE INTENTIONALLY LEFT BLANK

Executive Summary

On February 7, 2024, the U.S. Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standard (NAAQS) for fine particulate matter, by lowering the annual primary standard from 12.0 to 9.0 micrograms per cubic meter (2024 $PM_{2.5}$ NAAQS). Following promulgation of a revised NAAQS, EPA is required to designate areas throughout the United States as attaining or not attaining the NAAQS.

As part of the designation process, states and tribes are required to submit designations recommendations to the EPA. States and tribes identify areas or counties as attainment (meets the standard), nonattainment (does not meet the standard), or unclassifiable (cannot be classified based upon available information).

A review of air quality monitoring data from 2021-2023 shows that all of Delaware's particulate matter monitors are well below the new NAAQS. In addition, analysis shows that Delaware is not causing other areas to fail to meet the NAAQS. Therefore, Delaware is recommending a classification of "attainment" for all three Delaware Counties, New Castle, Kent, and Sussex under the 2024 $PM_{2.5}$ NAAQS.

This Technical Support Document was prepared by the Division of Air Quality in the Department of Natural Resources and Environmental Control for the State of Delaware, to illustrate the technical basis for Delaware's recommendation, and to aid EPA in their designation process.

Table of Contents

List of Figures

List of Tables

List of Acronyms

CAA	Clean Air Act
CBSA	Core Based Statistical Area
CBSA+	Core Based Statistical Area Plus
EMP	Emissions Modeling Platform
EPA	Environmental Protection Agency
FR	Federal Register
HYSPLIT	Hybrid Single-Particle Lagrangian Integrated Trajectory
$\mu g/m^3$	Micrograms Per Cubic Meter
NAAQS	National Ambient Air Quality Standards
NH_3	Ammonia
NOx	Nitric Oxide
$PM_{2.5}$	Fine Particulate Matter
SIP	State Implementation Plan
SLT	State, Local, and Tribal Authorities
SO_2	Sulfur Dioxide
VOC	Volatile Organic Compound
VMT	Vehicular Miles Traveled

1.0 Introduction

On February 7, 2024, the U.S. Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standard (NAAQS) for fine particulate matter ($PM_{2.5}$) (2024 $PM_{2.5}$ NAAQS), by lowering the annual primary standard from 12.0 to 9.0 micrograms per cubic meter ($\mu g/m^3$) [89 Federal Register (FR) 16202].[1] Following promulgation of a revised NAAQS, EPA is required by the Clean Air Act (CAA) to designate areas throughout the United States as attaining or not attaining the NAAQS [CAA Section 107(d)(1)].

As part of the designation process, states and tribes are required to submit designations recommendations to the EPA. States identify areas or counties as attainment (meets the standard), nonattainment (does not meet the standard), or unclassifiable (cannot be classified based upon available information).

In 2012, EPA reviewed and revised the $PM_{2.5}$ NAAQS (2012 $PM_{2.5}$ NAAQS), by strengthening the annual primary standard from 15.0 to 12.0 $\mu g/m^3$.[2] For the 2012 $PM_{2.5}$ NAAQS revision, EPA designated all three counties in Delaware as attainment: New Castle, Kent and Sussex (80 FR 2206).[3]

Designation recommendations for the 2024 $PM_{2.5}$ primary annual standard are due to EPA no later than February 7, 2025. This document supports Delaware's continued recommendation for the designation of New Castle, Kent, and Sussex counties as "attainment" under the 2024 $PM_{2.5}$ NAAQS. Taking into consideration a state's designation recommendation, EPA is required to complete the initial area designations process within 2 years of promulgation of a new or revised NAAQS, in this case February 7, 2026.

---

[1] Reconsideration of the National Ambient Air Quality Standards for Particulate Matter. EPA Final Rule. 89 FR 16202. March 6, 2024. https://www.govinfo.gov/content/pkg/FR-2024-03-06/pdf/2024-02637.pdf)

[2] National Ambient Air Quality Standards for Particulate Matter. EPA Final Rule. 78 FR 3086. January 15, 2013. https://www.govinfo.gov/content/pkg/FR-2013-01-15/pdf/2012-30946.pdf

[3] Air Quality Designations for the 2012 Primary Annual Fine Particle ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS). EPA Final Rule. 80 FR 2206. January 15, 2015. https://www.govinfo.gov/content/pkg/FR-2015-01-15/pdf/2015-00021.pdf

On February 7, 2024, EPA issued a memorandum for states and tribes: *Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard* (2024 EPA Designation Memorandum).[4] In this memorandum EPA suggested that states consider the following five factors in making their recommendations for area designations and nonattainment area boundaries:

- Air Quality Data
- Emissions and emissions-related data
- Meteorology
- Geography/Topography
- Jurisdictional Boundaries

Based upon monitoring data, as well as a weight-of-evidence approach described in Attachment 3 of EPA's memorandum, states or tribes should identify areas as attainment, nonattainment, or unclassifiable. Table 1-1 outlines how Delaware has addressed the above listed five EPA elements from the 2024 EPA Designation Memorandum in this document.

[4] Initial Area Designation for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard. EPA Memorandum. February 7, 2024. https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf

Table 1-1: Delaware's 2024 $PM_{2.5}$ Designation Recommendation Outline

EPA Memo, Attachment 3 - EPA Designation Factors:[5]	Factor Description:	Location in Recommendation:
Air Quality Data (pg.4)	*Identify all monitored violations of the revised primary annual $PM_{2.5}$ NAAQS using the most recently available air quality data.*	Section 2.0 – Air Quality Monitoring Data
Air Quality Data - Design Values (pgs.4-6)	*Current $PM_{2.5}$ design values for each air quality monitoring site.*	Section 2.1 – Delaware's $PM_{2.5}$ Design Values Section 2.2 – CBSA Design Values
Emissions and Emissions Related Data (pgs. 8-9)	*Examine emissions of direct $PM_{2.5}$ and $PM_{2.5}$ precursors.*	Section 3.0 – Emissions Inventory of Sources and Emissions Related Data Section 3.1 –2022 EPA Emissions Modeling Platform
Emissions and Emissions Related Data - Population (pgs. 9-10)	*Population density and degree of urbanization.*	Section 3.2 – Population Density and Degree of Urbanization
Emissions and Emissions Related Data - Traffic (pg.10)	*Total Vehicle Miles Traveled.*	Section 3.3 – Vehicle Miles Traveled
Meteorology (pg. 11)	*Determine the effect on the fate and transport of emissions contributing to $PM_{2.5}$ concentrations and to identify areas potentially contributing to the monitored violations.*	Section 4.0 – Meteorology Section 4.1 – HYSPLIT Trajectories Section 4.2 – Wind Roses
Geography/ Topography (pg. 11)	*Examination of physical features of the land that might define the airshed and affect the formation and distribution of $PM_{2.5}$ over the area.*	Section 5.0 – Geography/Topography
Jurisdictional Boundaries (pgs. 11-12)	*Jurisdictional boundaries used to identify the planning and organizational structure of an area.*	Section 6.0 – Jurisdictional Boundaries

[5] Initial Area Designation for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard. EPA Memorandum. February 7, 2024. https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf

1.1 Delaware $PM_{2.5}$ Monitoring Network Data

The initial area recommendation process begins with an evaluation of available ambient air quality measurements from regulatory monitors to determine the location and magnitude of violations of the standard (if any). The primary goal of the $PM_{2.5}$ monitoring network in Delaware is to determine the status of the ambient air with respect to the 24-hour and annual average $PM_{2.5}$ NAAQS.

Figure 1-1 shows the locations of Delaware's $PM_{2.5}$ monitors. All data from these monitors are measured using EPA approved federal reference methods , or federal equivalent methods . These methods are EPA certified to determine $PM_{2.5}$ in ambient air for comparison with the NAAQS.

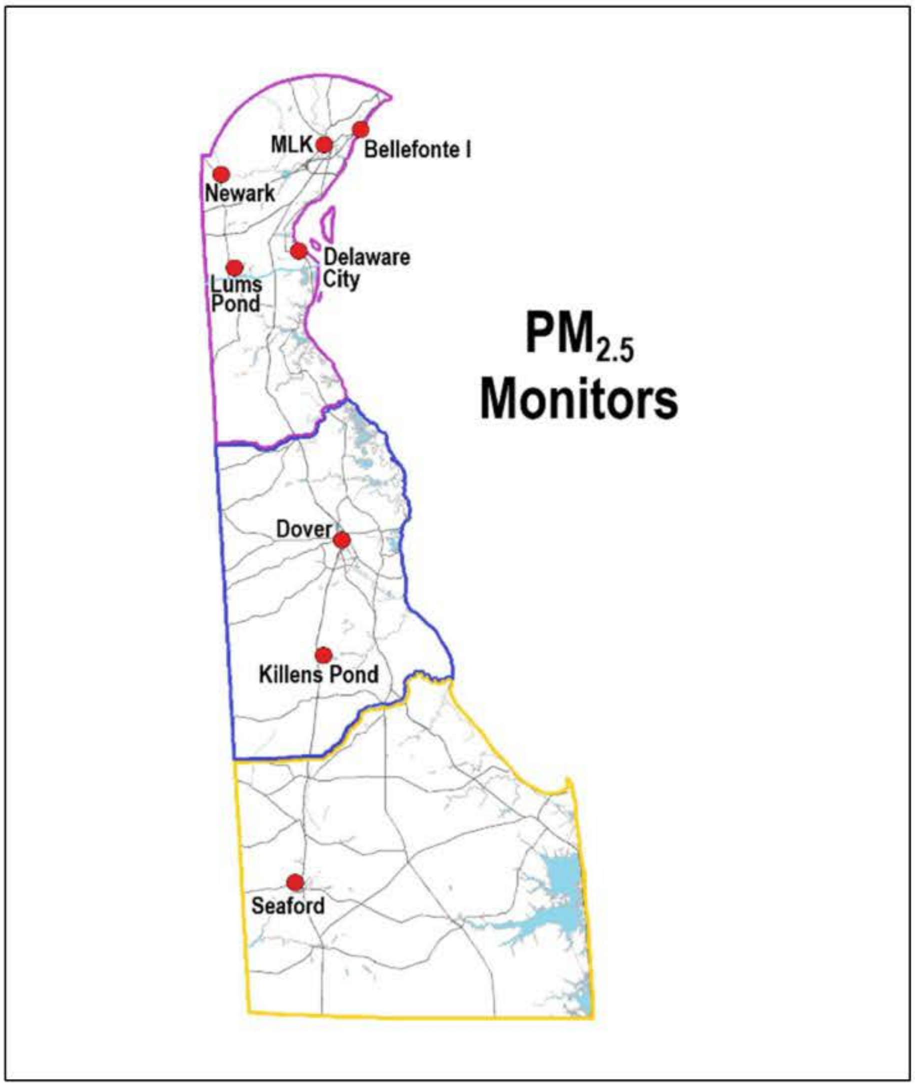


Figure 1-1: Delaware's $PM_{2.5}$ Air Monitors

1.2 Nonattainment Area Analyses and Boundary Determinations

CAA section 107(d) explicitly requires that the EPA designate as nonattainment not only the areas that are violating the standard at issue, but also those nearby areas that contribute to the violation(s). The EPA evaluates the boundaries for each nonattainment area on a case-by-case basis considering the specific facts and circumstances unique to the area.

Individual counties within a state can be associated with nearby metropolitan areas. These areas are called Core Based Statistical Areas (CBSA).[6] Through the designation process, EPA will identify each regulatory air quality $PM_{2.5}$ monitor or group of monitors that indicate a violation of the standard in a CBSA.

Table 1-2 and Figure 1-2 show the three CBSAs that include Delaware counties. Kent County is part of the Dover, DE CBSA, New Castle County is part of the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD CBSA (Philadelphia CBSA); and Sussex County is part of the Salisbury, MD-DE CBSA.

Table 1-2: Core Based Statistical Areas for Delaware

Core Based Statistical Area (CBSA)	Counties
Dover, DE	Kent, DE
Philadelphia-Camden-Wilmington PA-NJ-DE-MD	New Castle, DE Cecil, MD Burlington, NJ Camden, NJ Gloucester, NJ Salem, NJ Bucks, PA Chester, PA Delaware, PA Montgomery, PA Philadelphia, PA
Salisbury, MD-DE	Sussex, DE Somerset, MD Wicomico, MD Worcester, MD

[6] The Office of Management and Budget (OMB) adopted standards for delineating metropolitan and micropolitan statistical areas on December 27, 2000 (65 FR 82229). These delineation standards established the term CBSA. On July 16, 2021, OMB published their 2020 standards for delineating metropolitan and micropolitan statistical areas (86 FR 37770).

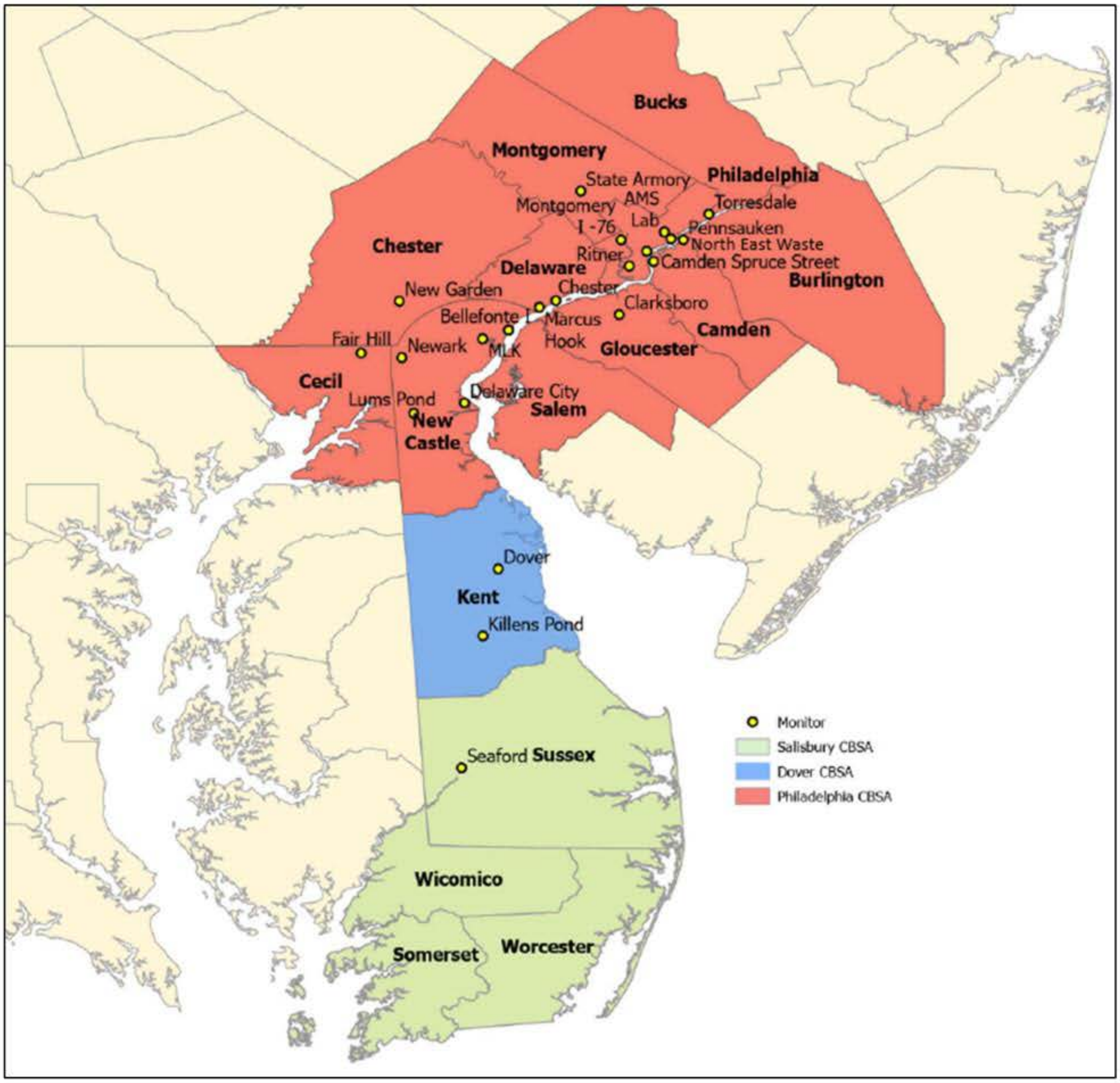


Figure 1-2: Core Based Statistical Areas and $PM_{2.5}$ Monitors

Figure 1-3 shows a detailed map of Philadelphia County within the Philadelphia CBSA, as there are a large number of $PM_{2.5}$ monitors within this area of the CBSA.

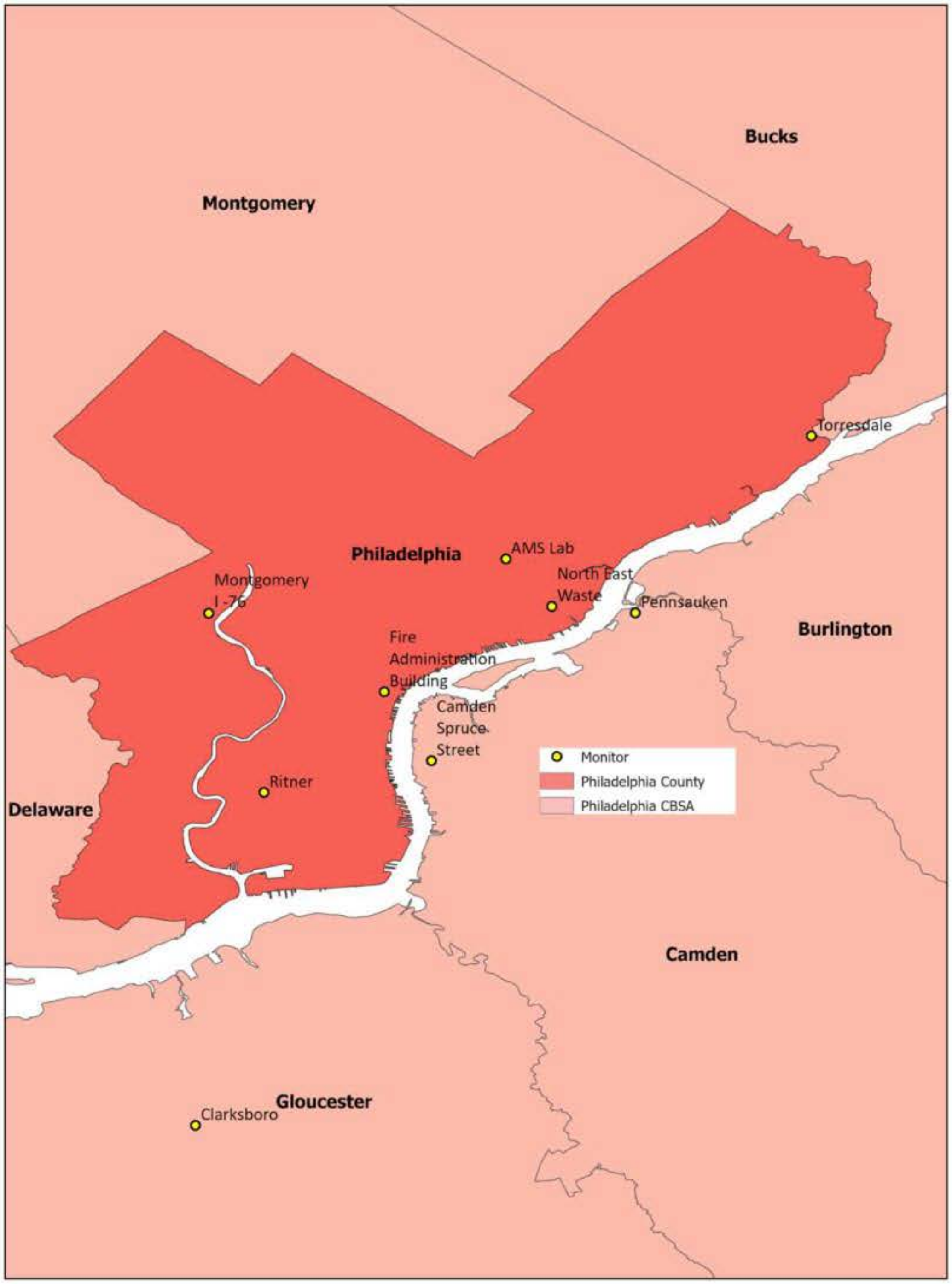


Figure 1-3: Philadelphia County $PM_{2.5}$ Monitors

2.0 Air Quality Monitoring Data

The EPA determines NAAQS designation classifications by considering the "design value" for individual air quality $PM_{2.5}$ monitoring sites. See Figures 1-2 and 1-3 for the location of individual $PM_{2.5}$ monitoring sites within the Dover, Philadelphia, and Salisbury CBSAs. The design values for the $PM_{2.5}$ primary annual NAAQS are calculated using the 3-year average of the annual mean concentrations. For the 2024 $PM_{2.5}$ NAAQS states/tribes are to use the 2021-2023 design value to develop their recommendations, as this is the most recent data available at this time. The EPA will designate as nonattainment all areas with one or more regulatory ambient $PM_{2.5}$ air quality monitors with a design value greater than the annual standard of 9.0 $\mu g/m^3$.

2.1 Delaware $PM_{2.5}$ Design Values

Delaware's annual mean $PM_{2.5}$ concentrations and site information for 2021-2023 are provided in Table 2-1. All Delaware monitoring sites are monitoring $PM_{2.5}$ concentrations that are well below the 9.0 $\mu g/m^3$ 2024 $PM_{2.5}$ NAAQS. Therefore, Delaware is recommending that all three counties in Delaware, New Castle, Kent and Sussex, be designated as "attainment".

It should be noted that the increases in the annual mean concentration in 2023 are linked to exceedances that occurred due to transport of wildfire smoke from outside of the state or outside of the United States. Approximately 270 individual wildfires burned across Saskatchewan, Alberta southern Northwest Territories and northeast British Columbia in west-central Canada, starting in mid-May of 2023.

This smoke affected air quality in many areas of the United States, including Delaware and can be considered "exceptional events" by EPA. Exceptional Events are unusual or naturally occurring events that can affect air quality but are not reasonably controllable using techniques that tribal, state or local air agencies may implement in order to attain and maintain the NAAQS.

Although this smoke significantly affected air quality in Delaware, because the data continues to show attainment, these events are not eligible for consideration as exceptional events, per the EPA's Exceptional Events Rule (81 FR 68216).[7] It is still important to consider that the data are elevated as the result of the transported wildfire smoke, even though they do not violate the NAAQS.

[7] Treatment of Data Influenced by Exceptional Events. EPA Final Rule. 81 FR 68216. October 3, 2016. https://www.epa.gov/sites/default/files/2018-10/documents/exceptional_events_rule_revisions_2060-as02_final.pdf

Table 2-1: Delaware $PM_{2.5}$ Annual Mean Concentrations and 2021-2023 Design Values

County	CBSA	Site Name and ID Number	2021-2023 Design Value	2021	2022	2023
Kent	Dover, DE	Dover 100010003	**6.46**	5.27	6.08	8.04
		Killens Pond 100010002	**6.89**	6.47	5.62	8.57
New Castle	Philadelphia, PA-MD-NJ-DE	Bellefonte 100031003	**7.25**	6.92	5.55	9.29
		MLK 100032004	**7.53**	7.49	6.68	8.42
		Newark 100031012	**8.20**	7.39	6.11	11.10
		Lums Pond 100031007	**7.47**	7.25	6.43	8.73
		Delaware City 100030008	**7.02**	6.61	5.81	8.56
Sussex	Salisbury, MD-DE	Seaford 100010002	**7.59**	7.82	5.92	9.04

2.2 CBSA Design Values

As two of the three CBSAs with Delaware counties include counties in other states; Delaware is also presenting $PM_{2.5}$ monitoring data for each individual CBSA (see Sections 2.2.1 - 2.2.3 below). The Delaware $PM_{2.5}$ monitors are highlighted in yellow.

2.2.1 Dover CBSA

There are two $PM_{2.5}$ monitors located in Kent County Delaware that are associated with the Dover CBSA (see Table 2-2). These $PM_{2.5}$ monitors are measuring well below the 9.0 $\mu g/m^3$ 2024 $PM_{2.5}$ NAAQS.

Table 2-2: Dover CBSA - $PM_{2.5}$ Annual Mean Concentrations and 2021-2023 Design Values

State	County	Site Name and ID Number	2021-2023 Design Value	2021	2022	2023
DE	Kent	Dover 100010003	**6.46**	5.27	6.08	8.04
		Killens Pond 100010002	**6.89**	6.47	5.62	8.57

2.2.2 Philadelphia CBSA

There are nineteen $PM_{2.5}$ monitors located in the Philadelphia CBSA (see Table 2-3). Design values for violating $PM_{2.5}$ monitors are shown in red. One monitor in New Jersey (Camden Spruce Street) and four monitors in Pennsylvania (AMS Lab, North East Waste, Ritner, and Torresdale) were in violation of the 9.0 $\mu g/m^3$ 2024 $PM_{2.5}$ NAAQS. All five of the violating $PM_{2.5}$ monitors are near the City of Philadelphia. Delaware does not know if the State, Local, and Tribal Authorities (SLTs) for these violating $PM_{2.5}$ monitors will be submitting exceptional events demonstrations to EPA. Neither is Delaware able to discern if it is appropriate for the SLT's to submit demonstrations.

The remaining $PM_{2.5}$ monitors in the Philadelphia CBSA have design values below the 9.0 $\mu g/m^3$ 2024 $PM_{2.5}$ NAAQS. For a more detailed analysis regarding the violating monitors in the Philadelphia CBSA, please see Section 2.3. It should be noted that while Burlington NJ, Salem NJ, and Bucks PA counties are part of the CBSA, they do not have any $PM_{2.5}$ air quality monitors.

Table 2-3: Philadelphia CBSA - $PM_{2.5}$ Annual Mean Concentrations and 2021-2023 Design Values

State	County	Site Name and ID Number	2021-2023 Design Value	2021	2022	2023
DE	New Castle	Bellefonte I 100031003	**7.25**	6.92	5.55	9.29
		Delaware City 100030008	**7.02**	6.61	5.81	8.56
		Lums Pond 100031007	**7.47**	7.25	6.43	8.73
		MLK 100032004	**7.53**	7.49	6.08	8.42
		Newark 100031007	**8.20**	7.39	6.11	11.10
MD	Cecil	Fair Hill 240150003	**7.38**	8.08	6.84	7.21
NJ	Camden	Camden Spruce Street 340070002	**9.78**	9.93	8.89	10.50
		Pennsauken 340071007	**7.73**	8.55	6.45	8.20
	Gloucester	Clarksboro 340150002	**7.44**	7.78	6.22	8.32
PA	Chester	New Garden 420290100	**8.13**	8.09	6.88	9.41
	Delaware	Chester 420450002	**8.51**	8.42	7.57	9.55
		Marcus Hook 420450109	**8.46**	8.04	7.20	10.13
	Montgomery	State Armory 100031012	**8.14**	8.29	6.70	9.43
	Philadelphia	AMS Lab 421010004	**9.60**	8.60	7.85	12.35
		Fire Administration Building 421010057	**8.78**	8.70	6.91	10.72
		Montgomery I -76 421010076	**8.54**	8.06	7.31	10.42
		North East Waste 421010048	**9.67**	8.50	8.64	11.87
		Ritner 421010055	**9.32**	9.13	6.92	11.90
		Torresdale Station421010075	**10.05**	8.73	8.15	13.27

2.2.3 Salisbury CBSA

There is only one $PM_{2.5}$ monitor located in the Salisbury CBSA, the Seaford monitor in Delaware. The 2021-2023 Design Value for Seaford was 7.59 µg/m^3, which is below the 9.0 µg/m^3 2024 $PM_{2.5}$ NAAQS. It should be noted that although Somerset, Wicomico, and Worcester counties in Maryland are part of the CBSA, they do not have any $PM_{2.5}$ air quality monitors.

Table 2-4: Salisbury CBSA - $PM_{2.5}$ Annual Mean Concentrations and 2021-2023 Design Values

State	County	Site Name and ID and Number	2021-2023 Design Value	2021	2022	2023
DE	Sussex	Seaford 100010002	**7.59**	7.82	5.92	9.04

2.3 Philadelphia CBSA/CBSA+

CAA section 107(d)(1) requires that the EPA designate as nonattainment not only the area that is violating the standard at issue, but also the nearby areas that contribute to violation(s). The EPA evaluates the boundaries for each nonattainment area on a case-by-case basis considering the specific facts and circumstances unique to the area. The EPA also intends to evaluate any counties adjacent to the CBSA, that have the potential to contribute to violating $PM_{2.5}$ monitors.

In addition to the 11 counties within the Philadelphia CBSA, Delaware identified an additional 15 counties that are adjacent to the Philadelphia CBSA. The Delaware counties are highlighted in yellow in Table 2-5. Throughout this document, these adjacent counties are referred to as the Philadelphia Core Based Statistical Area Plus (Philadelphia CBSA+). Table 2-5 lists the counties that are part of (CBSA) and adjacent to (CBSA+) the Philadelphia CBSA.

Table 2-5: Philadelphia CBSA/CBSA+ Counties*

State	County	Area		State	County	Area
DE	New Castle	CBSA		DE	Kent	CBSA+
MD	Cecil	CBSA		MD	Kent	CBSA+
NJ	Burlington	CBSA		MD	Harford	CBSA+
NJ	Camden	CBSA		NJ	Atlantic	CBSA+
NJ	Gloucester	CBSA		NJ	Cumberland	CBSA+
NJ	Salem	CBSA		NJ	Hunterdon	CBSA+
PA	Bucks	CBSA		NJ	Mercer	CBSA+
PA	Chester	CBSA		NJ	Monmouth	CBSA+
PA	Delaware	CBSA		NJ	Ocean	CBSA+
PA	Montgomery	CBSA		NJ	Warren	CBSA+
PA	Philadelphia	CBSA		PA	Berks	CBSA+
				PA	Lancaster	CBSA+
				PA	Lehigh	CBSA+
				PA	Northampton	CBSA+
				PA	York	CBSA+

2.3.1 Philadelphia CBSA/CBSA+ $PM_{2.5}$ Design Values

Table 2-6 shows the 2021-2023 annual $PM_{2.5}$ design values rankings for monitors in counties within the Philadelphia CBSA/CBSA+. The values are ranked by highest to lowest design value. Design values for violating $PM_{2.5}$ monitors are shown in red (rankings of 1-7 out of 37 total CBSA/CBSA+ monitors). All seven of Delaware's $PM_{2.5}$ air quality monitors, shown in yellow, were well below the NAAQS limit of 9.0 $\mu g/m^3$.

In addition, Delaware's $PM_{2.5}$ air quality monitors ranked well below those of the seven violating monitors: Newark - 19th, MLK - 24th, Lums Pond - 25th, Bellefonte I - 30th, Delaware City -33rd, Killens Pond - 34th, and Dover - 36th. These lower design values indicate that Delaware is not contributing to violating $PM_{2.5}$ monitors. This supports Delaware's recommendation to maintain the previous EPA decision for the 2012 $PM_{2.5}$ NAAQS to designate all three Delaware counties as "attainment".

It should be noted that five of the seven violating $PM_{2.5}$ monitors are near the City of Philadelphia: Camden Spruce Street in New Jersey and AMS Lab, North East Waste, Ritner, and Torresdale in Pennsylvania. The two remaining violating monitors, in Lancaster and York counties, are upwind of Delaware (see Section 4.2); which limits the contribution of Delaware emissions sources to those two violating monitors. This further demonstrates that all three Delaware counties should be designated as "attainment".

Table 2-6: 2021-2023 Design Values for the Philadelphia CBSA/CBSA+

Rank	2021-2023 Annual Design Value (µg/m³)	Local Site Name	County	State	AQS Site ID	CBSA/ CBSA+
1	**10.05**	Torresdale Station	Philadelphia	PA	421010075	CBSA
2	**9.78**	Camden Spruce Street	Camden	NJ	340070002	CBSA
3	**9.67**	North East Waste	Philadelphia	PA	421010048	CBSA
4	**9.60**	AMS Lab	Philadelphia	PA	421010004	CBSA
5	**9.52**	Lancaster Downwind	Lancaster	PA	420710012	CBSA+
6	**9.32**	Ritner	Philadelphia	PA	421010055	CBSA
7	**9.26**	Hill Street	York	PA	421330008	CBSA+
2024 $PM_{2.5}$ NAAQS 9.0 µg/m³						
8	**8.85**	Lancaster	Lancaster	PA	420710007	CBSA+
9	**8.79**	Trenton	Mercer	NJ	340210008	CBSA+
10	**8.78**	Fire Administration Building	Philadelphia	PA	421010057	CBSA
11	**8.76**	Rider University	Mercer	NJ	340210005	CBSA+
12	**8.54**	Montgomery I -76	Philadelphia	PA	421010076	CBSA
13	**8.51**	Chester	Delaware	PA	420450002	CBSA
14	**8.50**	Reading Airport	Berks	PA	420110011	CBSA+
15	**8.46**	Marcus Hook	Delaware	PA	420450109	CBSA
16	**8.42**	Allentown	Lehigh	PA	420770004	CBSA+
17	**8.35**	Columbia	Warren	NJ	340410007	CBSA+
18	**8.33**	Freemansburg	Northampton	PA	420950025	CBSA+
19	**8.20**	Newark	New Castle	DE	100031012	CBSA
20	**8.14**	State Armory	Montgomery	PA	420910013	CBSA
21	**8.13**	New Garden	Chester	PA	420290100	CBSA
22	**8.06**	Flemington	Hunterdon	NJ	340190001	CBSA+
23	**7.73**	Pennsauken	Camden	NJ	340071007	CBSA
24	**7.53**	MLK	New Castle	DE	100032004	CBSA
25	**7.47**	Lums Pond	New Castle	DE	100031007	CBSA
26	**7.44**	Clarksboro	Gloucester	NJ	340150002	CBSA
27	**7.38**	Fair Hill	Cecil	MD	240150003	CBSA
28	**7.37**	Toms River	Ocean	NJ	340292002	CBSA+
29	**7.29**	Edgewood	Harford	MD	240251001	CBSA+
30	**7.25**	Bellefonte I	New Castle	DE	100031003	CBSA
31	**7.21**	Atlantic City	Atlantic	NJ	340011006	CBSA+
32	**7.04**	Millville	Cumberland	NJ	340110007	CBSA+
33	**7.02**	Delaware City	New Castle	DE	100031008	CBSA
34	**6.89**	Killens Pond	Kent	DE	100010002	CBSA+
35	**6.72**	Brigantine	Atlantic	NJ	340010006	CBSA+
36	**6.46**	Dover	Kent	DE	100010003	CBSA+
37	**6.05**	Millington	Kent	MD	240290002	CBSA+

3.0 Emissions Inventory of Sources and Emissions Related Data

Ambient $PM_{2.5}$ is formed through complex atmospheric processes with contributions from direct emissions of particles and from secondarily formed particles that result from multiple $PM_{2.5}$ precursors. For initial area designations associated with the 2024 revised primary annual $PM_{2.5}$ NAAQS, the EPA intends to examine emissions of identified sources of direct $PM_{2.5}$, precursor pollutants. The main precursor gases associated with fine particle formation are, ammonia (NH_3), oxides of nitrogen (NOx), sulfur dioxide (SO_2), and volatile organic compounds (VOC).

In the designations process, for each metropolitan area with a violating $PM_{2.5}$ monitor, the EPA evaluates the emissions data from counties to assess each county's contribution to $PM_{2.5}$ concentrations at the violating monitor or monitors in the area under evaluation.

3.1 2022 EPA Emissions Modeling Platform (2022 EMPv1)

For the state recommendations for the 2024 revised primary annual $PM_{2.5}$ NAAQS, the EPA recommended states use the draft 2022 emissions modeling platform (EMP) inventory version 1 ("2022 EMPv1"). It is the most recent emissions inventory information available at the beginning of this designations process. Air pollution sources are broken down into the following emissions source categories:

- Point sources represent large sources of emissions located at a discrete geographic point. Examples include power plants, factories, industries, and large institutional facilities.
- Nonpoint sources (also called area sources) are those that are too widespread or numerous to be accounted for individually. There are many nonpoint subcategories, but a handful of examples include residential fuel combustion, consumer solvent use, commercial cooking, animal husbandry, and agricultural tilling.
- Nonroad sources are equipment and vehicles that do not primarily travel on roadways. Examples include construction equipment, recreational vehicles, and lawn & garden equipment.
- Onroad sources are vehicles that primarily travel on roadways such as cars, trucks, buses, and motorcycles.

Sections 3.1.1 – 3.1.5 show annual emissions data for $PM_{2.5}$ and the four precursor gases, in tons; for the counties within the three CBSAs and the Philadelphia CBSA+ counties that are adjacent to the Philadelphia CBSA (30 counties). Tables 3-1 through 3-5 show the ranking of Delaware counties in annual emissions for individual pollutants, compared with counties in other states. Section 3.1.6 summaries the overall rankings of the three Delaware counties.

3.1.1 $PM_{2.5}$ Emissions

New Castle County ranks 12th, Sussex 18th, and Kent 20th out the 30 counties for annual tons of $PM_{2.5}$ emissions.

Table 3-1: 2022 EMPv1 $PM_{2.5}$ Annual Emissions (Tons)

Rank	$PM_{2.5}$ (Tons)	State	County	CBSA/CBSA+
1	**7,715**	NJ	Atlantic	Philadelphia CBSA+
2	**4,038**	PA	Lancaster	Philadelphia CBSA+
3	**3,839**	PA	Montgomery	Philadelphia CBSA
4	**3,681**	PA	York	Philadelphia CBSA+
5	**3,316**	PA	Bucks	Philadelphia CBSA
6	**3,234**	NJ	Burlington	Philadelphia CBSA
7	**3,121**	PA	Berks	Philadelphia CBSA+
8	**2,951**	PA	Philadelphia	Philadelphia CBSA
9	**2,906**	PA	Chester	Philadelphia CBSA
10	**2,755**	NJ	Ocean	Philadelphia CBSA+
11	**2,560**	PA	Northampton	Philadelphia CBSA+
12	**2,391**	DE	New Castle	Philadelphia CBSA
13	**2,283**	PA	Delaware	Philadelphia CBSA
14	**1,978**	PA	Lehigh	Philadelphia CBSA+
15	**1,433**	NJ	Monmouth	Philadelphia CBSA+
16	**1,167**	MD	Harford	Philadelphia CBSA+
17	**1,079**	NJ	Camden	Philadelphia CBSA
18	**1,058**	DE	Sussex	Salisbury CBSA
19	**860**	NJ	Gloucester	Philadelphia CBSA
20	**760**	DE	Kent	Dover CBSA
21	**728**	NJ	Cumberland	Philadelphia CBSA+
22	**726**	NJ	Mercer	Philadelphia CBSA+
23	**643**	MD	Cecil	Philadelphia CBSA
24	**516**	MD	Wicomico	Salisbury CBSA
25	**494**	NJ	Hunterdon	Philadelphia CBSA+
26	**422**	MD	Worchester	Salisbury CBSA
27	**403**	NJ	Salem	Philadelphia CBSA
28	**340**	NJ	Warren	Philadelphia CBSA+
29	**262**	MD	Kent	Philadelphia CBSA+
30	**176**	MD	Somerset	Salisbury CBSA

3.1.2 SO_2 Emissions

New Castle County ranks 3rd, Sussex 7th, and Kent 23rd out the 30 counties for SO_2 emissions. Though, it should be noted that there is a large break between the top two counties, Northampton and York, PA and the remaining 28 counties. The difference between the number 2 and 3 counties is 3,550 tons; which makes it difficult to accurately compare counties by rank. Northampton and York counties have several types of industrial facilities that have the potential to emit SO_2, including, but not limited to coal fired Electric Generating Units, Cement Manufacturing, and brick manufacturing.

Table 3-2: 2022 EMPv1 SO_2 Annual Emissions (Tons)

Rank	SO_2 (Tons)	State	County	CBSA/CBSA+
1	**4,702**	PA	Northampton	Philadelphia CBSA+
2	**4,245**	PA	York	Philadelphia CBSA+
3	**695**	DE	New Castle	Philadelphia CBSA
4	**588**	PA	Bucks	Philadelphia CBSA
5	**574**	PA	Delaware	Philadelphia CBSA
6	**532**	PA	Berks	Philadelphia CBSA+
7	**501**	DE	Sussex	Salisbury CBSA
8	**435**	PA	Lehigh	Philadelphia CBSA+
9	**415**	NJ	Atlantic	Philadelphia CBSA+
10	**398**	PA	Montgomery	Philadelphia CBSA
11	**363**	MD	Harford	Philadelphia CBSA+
12	**341**	NJ	Salem	Philadelphia CBSA
13	**331**	PA	Lancaster	Philadelphia CBSA+
14	**323**	PA	Philadelphia	Philadelphia CBSA
15	**255**	PA	Chester	Philadelphia CBSA
16	**243**	NJ	Gloucester	Philadelphia CBSA
17	**226**	NJ	Cumberland	Philadelphia CBSA+
18	**220**	MD	Cecil	Philadelphia CBSA
19	**203**	NJ	Burlington	Philadelphia CBSA
20	**172**	NJ	Ocean	Philadelphia CBSA+
21	**145**	MD	Wicomico	Salisbury CBSA
22	**140**	NJ	Camden	Philadelphia CBSA
23	**103**	DE	Kent	Dover CBSA
24	**77**	NJ	Monmouth	Philadelphia CBSA+
25	**62**	MD	Worchester	Salisbury CBSA
26	**46**	MD	Kent	Philadelphia CBSA+
27	**45**	NJ	Mercer	Philadelphia CBSA+
28	**35**	MD	Somerset	Salisbury CBSA
29	**31**	NJ	Warren	Philadelphia CBSA+
30	**17**	NJ	Hunterdon	Philadelphia CBSA+

3.1.3 NOx Emissions

New Castle County ranks 7th, Sussex 16th, and Kent 21st out the 30 counties for NOx emissions.

Table 3-3: 2022 EMPv1 NOx Annual Emissions (Tons)

Rank	NOx (Tons)	State	County	CBSA/CBSA+
1	**13,481**	PA	York	Philadelphia CBSA+
2	**11,049**	PA	Philadelphia	Philadelphia CBSA
3	**10,499**	MD	Worchester	Salisbury CBSA
4	**10,496**	PA	Montgomery	Philadelphia CBSA
5	**10,259**	MD	Wicomico	Salisbury CBSA
6	**9,467**	PA	Lancaster	Philadelphia CBSA+
7	**9,117**	DE	New Castle	Philadelphia CBSA
8	**8,859**	PA	Delaware	Philadelphia CBSA
9	**8,112**	PA	Berks	Philadelphia CBSA+
10	**8,017**	PA	Bucks	Philadelphia CBSA
11	**6,799**	PA	Chester	Philadelphia CBSA
12	**6,692**	PA	Northampton	Philadelphia CBSA+
13	**6,359**	MD	Somerset	Salisbury CBSA
14	**5,597**	NJ	Monmouth	Philadelphia CBSA+
15	**5,310**	PA	Lehigh	Philadelphia CBSA+
16	**5,180**	DE	Sussex	Salisbury CBSA
17	**4,993**	NJ	Ocean	Philadelphia CBSA+
18	**4,234**	NJ	Camden	Philadelphia CBSA
19	**4,126**	NJ	Burlington	Philadelphia CBSA
20	**4,024**	NJ	Gloucester	Philadelphia CBSA
21	**3,583**	DE	Kent	Dover CBSA
22	**3,157**	NJ	Mercer	Philadelphia CBSA+
23	**2,828**	NJ	Atlantic	Philadelphia CBSA+
24	**2,559**	MD	Harford	Philadelphia CBSA+
25	**2,267**	NJ	Cumberland	Philadelphia CBSA+
26	**2,258**	MD	Cecil	Philadelphia CBSA
27	**1,928**	NJ	Hunterdon	Philadelphia CBSA+
28	**1,513**	NJ	Salem	Philadelphia CBSA
29	**1,476**	NJ	Warren	Philadelphia CBSA+
30	**723**	MD	Kent	Philadelphia CBSA+

3.1.4 VOC Emissions

Sussex County ranks 5th, New Castle 11th, and Kent 14th out the 30 counties for VOC emissions.

Table 3-4: 2022 EMPv1 VOC Annual Emissions (Tons)

Rank	VOC (Tons)	State	County	CBSA/CBSA+
1	**27,856**	PA	Lancaster	Philadelphia CBSA+
2	**24,061**	PA	York	Philadelphia CBSA+
3	**23,673**	NJ	Atlantic	Philadelphia CBSA+
4	**23,367**	PA	Berks	Philadelphia CBSA+
5	**22,762**	DE	Sussex	Salisbury CBSA
6	**21,317**	NJ	Burlington	Philadelphia CBSA
7	**19,937**	PA	Chester	Philadelphia CBSA
8	**19,150**	PA	Montgomery	Philadelphia CBSA
9	**18,267**	NJ	Ocean	Philadelphia CBSA+
10	**17,222**	PA	Bucks	Philadelphia CBSA
11	**16,305**	DE	New Castle	Philadelphia CBSA
12	**15,910**	PA	Philadelphia	Philadelphia CBSA
13	**15,844**	NJ	Monmouth	Philadelphia CBSA+
14	**15,426**	DE	Kent	Dover CBSA
15	**13,872**	MD	Harford	Philadelphia CBSA+
16	**12,541**	PA	Lehigh	Philadelphia CBSA+
17	**11,972**	NJ	Cumberland	Philadelphia CBSA+
18	**11,765**	NJ	Gloucester	Philadelphia CBSA
19	**11,521**	PA	Delaware	Philadelphia CBSA
20	**11,166**	NJ	Camden	Philadelphia CBSA
21	**11,072**	MD	Cecil	Philadelphia CBSA
22	**10,604**	PA	Northampton	Philadelphia CBSA+
23	**10,499**	MD	Worchester	Salisbury CBSA
24	**10,259**	MD	Wicomico	Salisbury CBSA
25	**8,846**	NJ	Mercer	Philadelphia CBSA+
26	**8,504**	NJ	Warren	Philadelphia CBSA+
27	**8,469**	NJ	Salem	Philadelphia CBSA
28	**8,167**	NJ	Hunterdon	Philadelphia CBSA+
29	**6,698**	MD	Kent	Philadelphia CBSA+
30	**6,359**	MD	Somerset	Salisbury CBSA

3.1.5 NH_3 Emissions

Sussex County ranks 2nd, Kent 5th, and New Castle 14th out the 30 counties for NH_3 emissions.

Table 3-5: 2022 EMPv1 NH_3 Annual Emissions (Tons)

Rank	NH_3 (Tons)	State	County	CBSA/CBSA+
1	**13,545**	PA	Lancaster	Philadelphia CBSA+
2	**8,124**	DE	Sussex	Salisbury CBSA
3	**7,767**	PA	Northampton	Philadelphia CBSA+
4	**4,365**	PA	Berks	Philadelphia CBSA+
5	**3,110**	DE	Kent	Dover CBSA
6	**3,067**	PA	York	Philadelphia CBSA+
7	**2,984**	MD	Somerset	Salisbury CBSA
8	**2,386**	MD	Wicomico	Salisbury CBSA
9	**2,231**	MD	Worchester	Salisbury CBSA
10	**1,863**	PA	Chester	Philadelphia CBSA
11	**1,351**	PA	Bucks	Philadelphia CBSA
12	**1,337**	PA	Montgomery	Philadelphia CBSA
13	**1,069**	NJ	Atlantic	Philadelphia CBSA+
14	**1,069**	DE	New Castle	Philadelphia CBSA
15	**997**	PA	Philadelphia	Philadelphia CBSA
16	**992**	NJ	Burlington	Philadelphia CBSA
17	**891**	MD	Cecil	Philadelphia CBSA
18	**786**	PA	Lehigh	Philadelphia CBSA+
19	**781**	MD	Kent	Philadelphia CBSA+
20	**766**	NJ	Ocean	Philadelphia CBSA+
21	**734**	NJ	Monmouth	Philadelphia CBSA+
22	**674**	MD	Harford	Philadelphia CBSA+
23	**661**	PA	Delaware	Philadelphia CBSA
24	**597**	NJ	Gloucester	Philadelphia CBSA
25	**579**	NJ	Cumberland	Philadelphia CBSA+
26	**575**	NJ	Salem	Philadelphia CBSA
27	**530**	NJ	Hunterdon	Philadelphia CBSA+
28	**474**	NJ	Warren	Philadelphia CBSA+
29	**381**	NJ	Mercer	Philadelphia CBSA+
30	**351**	NJ	Camden	Philadelphia CBSA

3.1.6 Emissions Inventory Summary

When taking into consideration the rankings for $PM_{2.5}$ and the four precursor pollutants, on average Kent County ranks 17th, New Castle 9th, and Sussex 10th out of 30 total counties. While New Castle and Sussex Counties rank in the top 10 for SO_2; as detailed in Section 3.1.2, it should be noted that there is a large break (3,550 tons) between the top two counties, Northampton and York PA and the remaining 28 counties. This makes it difficult to accurately compare counties by rank for SO_2. When SO_2 is removed from the calculated ranking average, Kent County ranks 15th, New Castle 11th, and Sussex 10th.

Further, in Delaware's most recent Regional Haze State Implementation Plan (SIP) for the Second Implementation Period[8] Delaware's modeled contribution of sulfates and nitrates to local Class I areas (which include certain national parks and wilderness areas), was extremely low. Out of 36 states in the eastern United States, the highest modeled contribution for Delaware was only 0.6% for Brigantine National Wildlife Refuge (Brigantine) in New Jersey; a ranking of 31 out of 36 states. For comparison, Pennsylvania's modeled contribution to Brigantine was 19.9%, the highest out of the 36 states.

3.2 Population Density and Degree of Urbanization

The EPA recommends that states consider the population density and the degree of urbanization in areas included versus excluded from the nonattainment area as one of the factors in determining appropriate nonattainment area boundaries. Population and densities for the three CBSAs and Philadelphia CBSA+ are presented in Table 3-6. Kent County ranks 21st, New Castle 7th and Sussex 19th out of 30 counties.

[8] Approval and Promulgation of Air Quality Implementation Plan; Delaware; Regional Haze State Implementation Plan for the Second Implementation Period. EPA Final Rule. 89 FR 84288. October 22, 2024. https://www.govinfo.gov/content/pkg/FR-2024-10-22/pdf/2024-24196.pdf

Table 3-6: 2020 County Level Population Statistics

Rank	2020 Population	State	County	CBSA/CBSA+	Sq. Miles	2020 Population Density
1	1,603,797	PA	Philadelphia	Philadelphia CBSA	136	11,824
2	856,553	PA	Montgomery	Philadelphia CBSA	487	1,758
3	646,538	PA	Bucks	Philadelphia CBSA	620	1,042
4	643,615	NJ	Monmouth	Philadelphia CBSA+	475	1,354
5	637,229	NJ	Ocean	Philadelphia CBSA+	634	1,005
6	576,830	PA	Delaware	Philadelphia CBSA	185	3,117
7	570,719	DE	New Castle	Philadelphia CBSA	432	1,322
8	552,984	PA	Lancaster	Philadelphia CBSA+	984	562
9	534,413	PA	Chester	Philadelphia CBSA	759	704
10	523,485	NJ	Camden	Philadelphia CBSA	224	2,333
11	461,860	NJ	Burlington	Philadelphia CBSA	814	567
12	456,438	PA	York	Philadelphia CBSA+	911	501
13	428,849	PA	Berks	Philadelphia CBSA+	866	495
14	387,340	NJ	Mercer	Philadelphia CBSA+	229	1,693
15	374,557	PA	Lehigh	Philadelphia CBSA+	348	1,076
16	312,951	PA	Northampton	Philadelphia CBSA+	377	830
17	302,294	NJ	Gloucester	Philadelphia CBSA	328	923
18	274,534	NJ	Atlantic	Philadelphia CBSA+	563	488
19	237,378	DE	Sussex	Salisbury CBSA	942	252
20	260,924	MD	Harford	Philadelphia CBSA+	441	591
21	181,851	DE	Kent	Dover CBSA	594	306
22	154,152	NJ	Cumberland	Philadelphia CBSA+	499	309
23	128,947	NJ	Hunterdon	Philadelphia CBSA+	437	295
24	109,632	NJ	Warren	Philadelphia CBSA+	363	302
25	103,725	MD	Cecil	Philadelphia CBSA	353	294
26	103,588	MD	Wicomico	Salisbury CBSA	380	273
27	64,837	NJ	Salem	Philadelphia CBSA	340	191
28	24,620	MD	Somerset	Salisbury CBSA	324	76
29	19,198	MD	Kent	Philadelphia CBSA+	283	68
30	5,460	MD	Worcester	Salisbury CBSA	473	12

3.3 Vehicle Miles Traveled

Traffic data can help assess the influence of mobile source emissions in a given area. The EPA recommends that analyses examine information on traffic volume in and around the area containing a violating $PM_{2.5}$ monitor. This includes examining the total Vehicle Miles Traveled (VMT) for each county. Areas with higher VMT can be an indicator of the location of mobile source emissions that may contribute to $PM_{2.5}$ concentrations at the violating monitor. VMTs for the three CBSAs and Philadelphia CBSA+ are presented in Table 3-7. New Castle County ranks 4th, Sussex 18th, and Kent 22nd out the 30 counties for VMTs.

Further, Delaware's recently finalized Regional Haze Progress report for the Second Planning Period, which provides updated based on our approved Regional Haze SIP for the Second Planning Period, provides extensive analysis of the $PM_{2.5}$ in Delaware. The largest component, making up 79% of Delaware's $PM_{2.5}$, is from nonpoint sources. By contrast, onroad sources only contribute 4% of Delaware's $PM_{2.5}$. The small fraction of Delaware's $PM_{2.5}$ that is attributable to onroad sources shows that this does not contribute to nonattainment in Philadelphia County.

Table 3-7: 2022 Vehicle Miles Traveled (VMT)

Rank	2022 VMT (million)	State	County	CBSA/CBSA+
1	6,394	PA	Montgomery	Philadelphia CBSA
2	6,325	NJ	Monmouth	Philadelphia CBSA+
3	6,061	PA	Philadelphia	Philadelphia CBSA
4	5,529	DE	New Castle	Philadelphia CBSA
5	4,910	NJ	Ocean	Philadelphia CBSA+
6	4,851	NJ	Burlington	Philadelphia CBSA
7	4,634	PA	Bucks	Philadelphia CBSA
8	4,520	PA	Lancaster	Philadelphia CBSA+
9	4,237	PA	Chester	Philadelphia CBSA
10	4,021	NJ	Camden	Philadelphia CBSA
11	3,489	PA	Berks	Philadelphia CBSA+
12	3,488	NJ	Mercer	Philadelphia CBSA+
13	3,281	PA	York	Philadelphia CBSA
14	3,271	PA	Lehigh	Philadelphia CBSA+
15	3,200	PA	Delaware	Philadelphia CBSA
16	3,103	NJ	Gloucester	Philadelphia CBSA
17	2,658	NJ	Atlantic	Philadelphia CBSA+
18	2,564	DE	Sussex	Salisbury CBSA
19	2,517	MD	Harford	Philadelphia CBSA+
20	2,311	PA	Northampton	Philadelphia CBSA+
21	1,809	NJ	Hunterdon	Philadelphia CBSA+
22	1,779	DE	Kent	Dover CBSA
23	1,492	NJ	Warren	Philadelphia CBSA+
24	1,300	MD	Cecil	Philadelphia CBSA
25	1,211	NJ	Cumberland	Philadelphia CBSA+
26	977	MD	Wicomico	Salisbury CBSA
27	871	MD	Worcester	Salisbury CBSA
28	834	NJ	Salem	Philadelphia CBSA+
29	272	MD	Somerset	Salisbury CBSA
30	202	MD	Kent	Philadelphia CBSA+

4.0 Meteorology

The evaluation of meteorological data helps to determine the effect on the fate and transport of emissions contributing to $PM_{2.5}$ concentrations and to identify areas potentially contributing to the monitored violations. The following Sections detail the meteorological analyses that EPA recommended states evaluate in their February 7, 2024 memorandum.

4.1 HYSPLIT Trajectories - Violating $PM_{2.5}$ Monitors

Air parcel trajectory models can help understanding of complex transport situations in an area. The Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) modeling system is useful for illustrating the three-dimensional paths traveled by air parcels over time to a violating monitor.

For these designations, EPA plotted HYSPLIT trajectories for each violating monitor, for all days within the design value period, as well as for the subset of all days within the design value period that have a 24-hr $PM_{2.5}$ average exceeding the annual standard. Backward trajectories may illustrate potential source regions for the air that affected the monitor on high concentration days. HYSPLITS can indicate where the pollutants that are being measured/monitored at a site are likely to originate from. However, in its guidance memo EPA stated HYSPLIT trajectories alone do not conclusively indicate the contribution to a measured high concentration of $PM_{2.5}$ and that HYSPLIT should not be used in isolation to determine an area boundary.

Start times for backward trajectories were chosen to best coincide with times of maximum $PM_{2.5}$ concentrations. Backward trajectories were initiated at these times for each day of the 2000-2022 period, with a trajectory length of 24 hours.

Trajectories were computed with a starting elevation of 500 meters above ground level. Which provides a good balance between remaining within the mixed layer at most times while avoiding terrain influences at lower elevations.

Figures 4-1 through 4-12 show EPA's HYSPLIT density maps[9] for the violating $PM_{2.5}$ monitors in the Philadelphia CBSA/CBSA+, 0800 (AM) and 2200 (PM) local standard time. EPA's Integrated Science Assessment[10] showed 0800 and 2200 as the two typical periods of $PM_{2.5}$ maximum concentration. Maps were not available for the AMS Lab monitor in Philadelphia County, PA, as $PM_{2.5}$ monitoring data was not available for the first three quarters of 2021.

[9] Particle Pollution Designations Memorandum and Data for the 2024 Revised Annual $PM_{2.5}$ NAAQS. EPA Website. Accessed December 30, 2024. https://www.epa.gov/particle-pollution-designations/particle-pollution-designations-memorandum-and-data-2024-revised

[10] Integrated Science Assessment for Particulate Matter. EPA Notice of Availability. 85 FR 4655. January 27, 2020. https://www.govinfo.gov/content/pkg/FR-2020-01-27/pdf/2020-01223.pdf

$PM_{2.5}$ densities, for all 12 of the maps for the violating monitors, are concentrated near the violating monitor. Six maps show the prevailing $PM_{2.5}$ density either from northwest (Camden Spruce Street – AM, North East Waste – AM, Ritner – AM, Lancaster Downwind – AM, Hill Street – AM, and Hill Street – PM). Four are from the west (Torresdale – PM, Camden Spruce Street – PM, North East Waste – PM, and Lancaster Downwind – PM). One is from the North (Torresdale – AM), and the final map is from the Southwest (Ritner – PM).

With the exception of the Ritner – PM map, all maps show the $PM_{2.5}$ density mapped away from the State of Delaware. This suggests that the predominant sources of $PM_{2.5}$ emissions for each violating monitor are primarily originating from Pennsylvania, not Delaware.

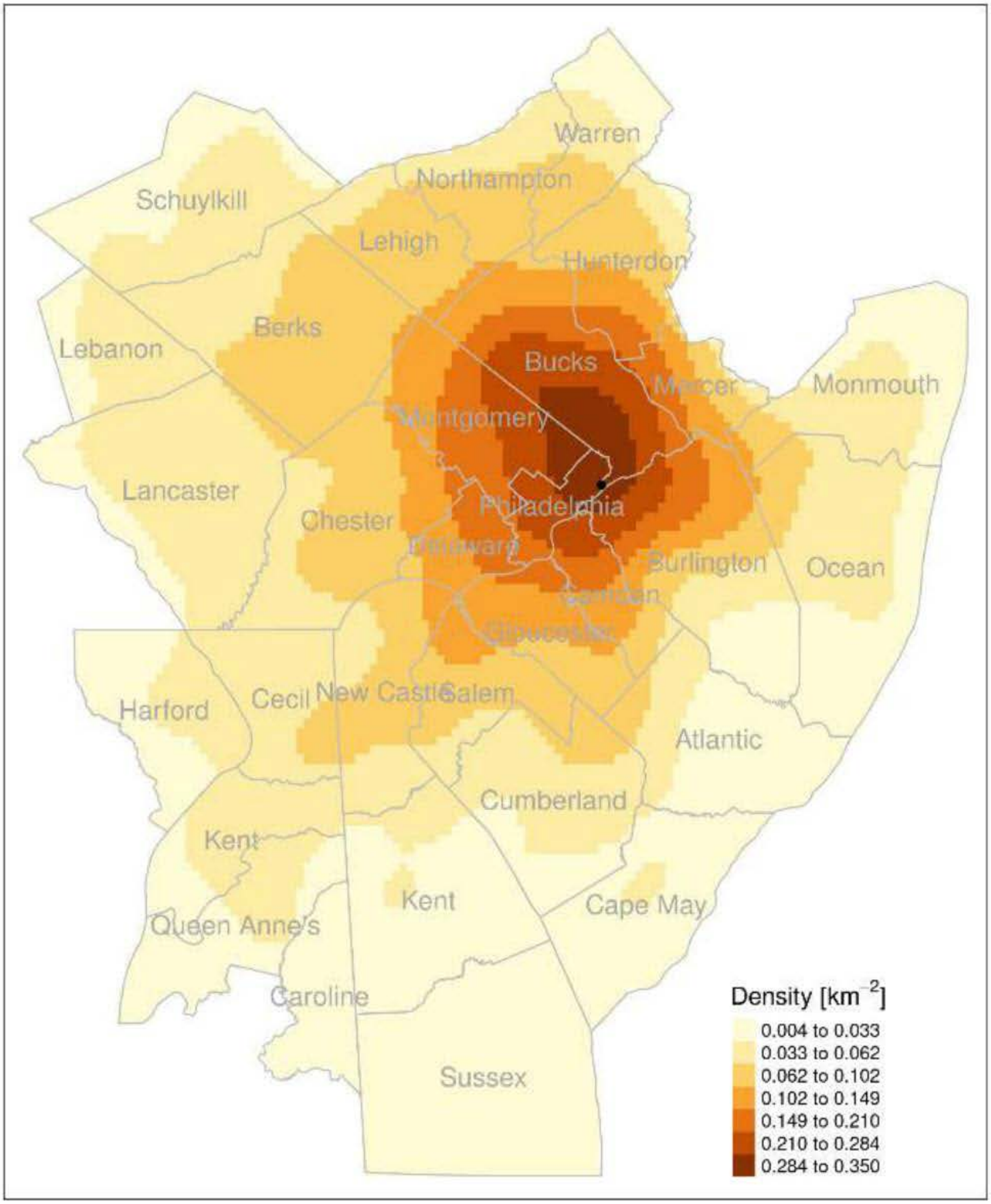


Figure 4-1: Torresdale HYSPLIT AM – 0800 LST

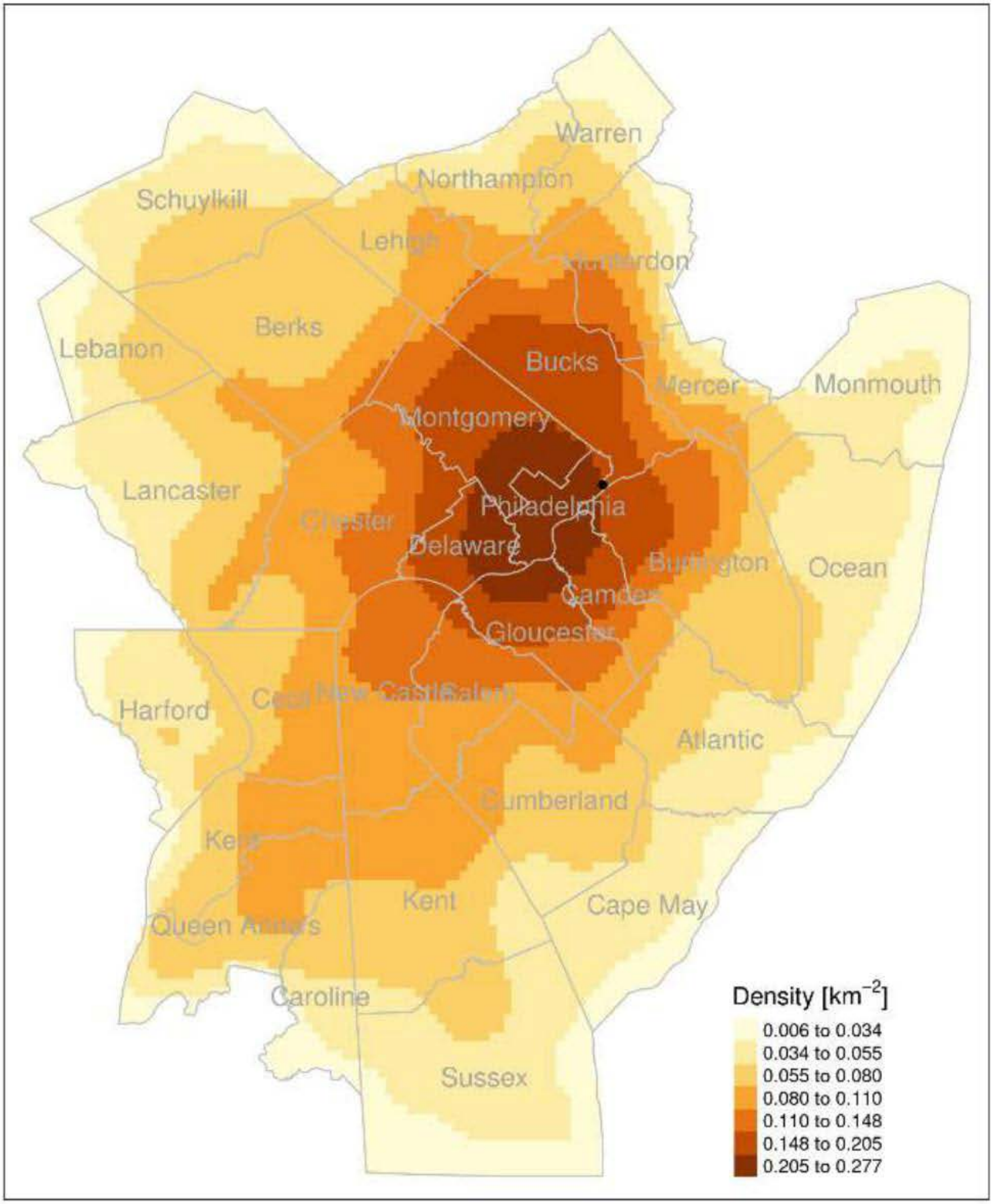


Figure 4-2: Torresdale HYSPLIT PM – 2200 LST

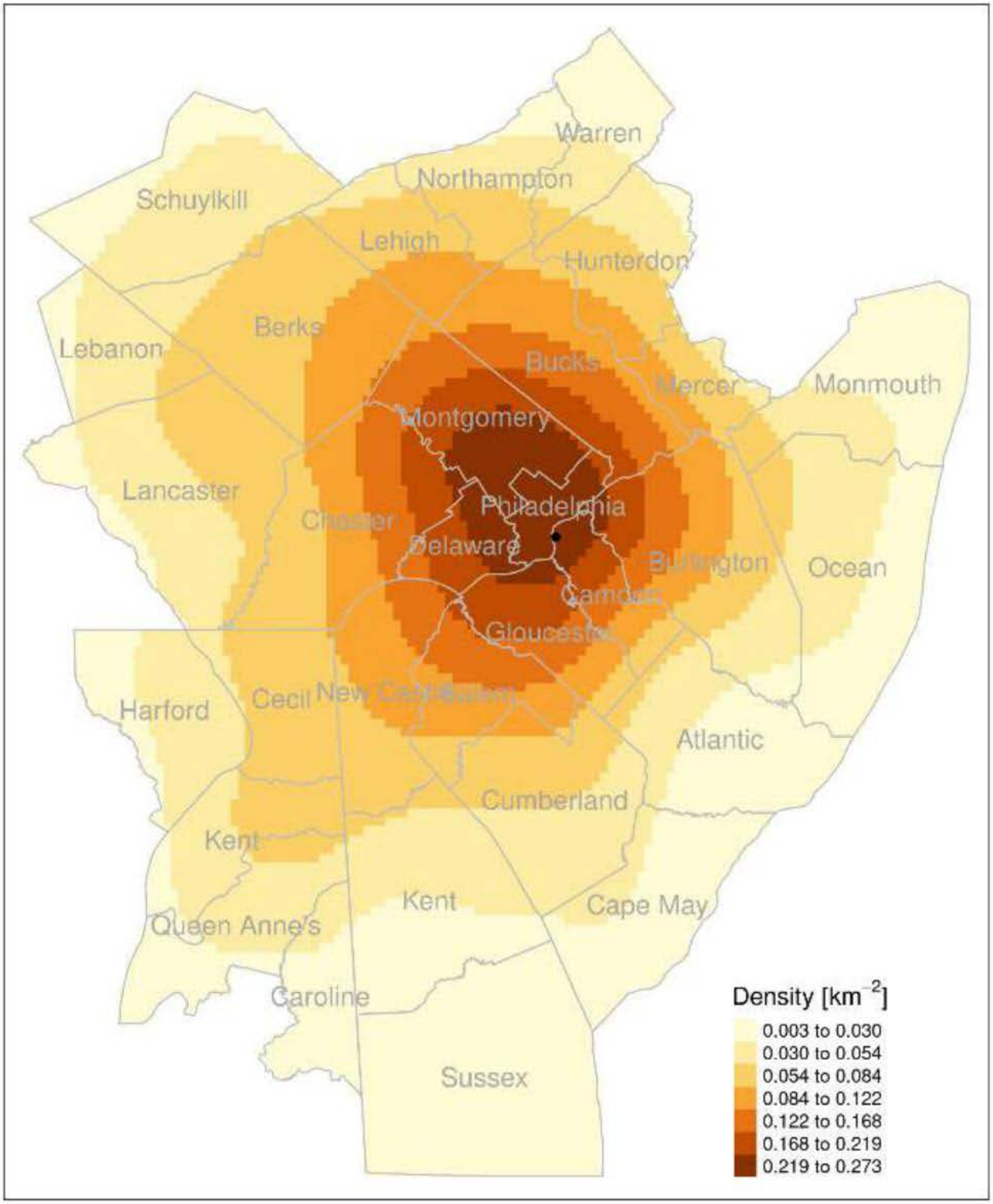


Figure 4-3: Camden Spruce Street HYSPLIT AM – 0800 LST

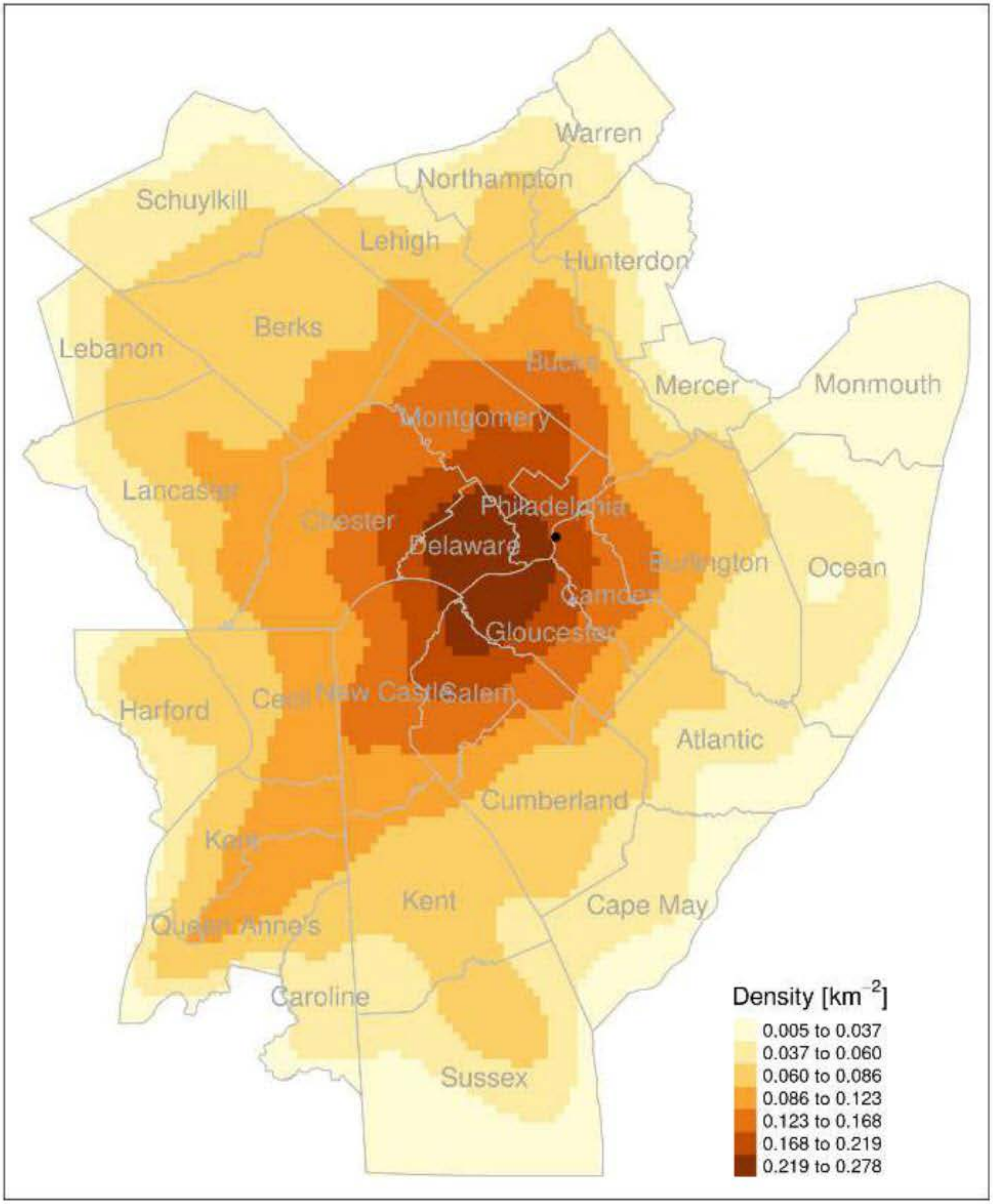


Figure 4-4: Camden Spruce Street HYSPLIT PM – 2200 LST

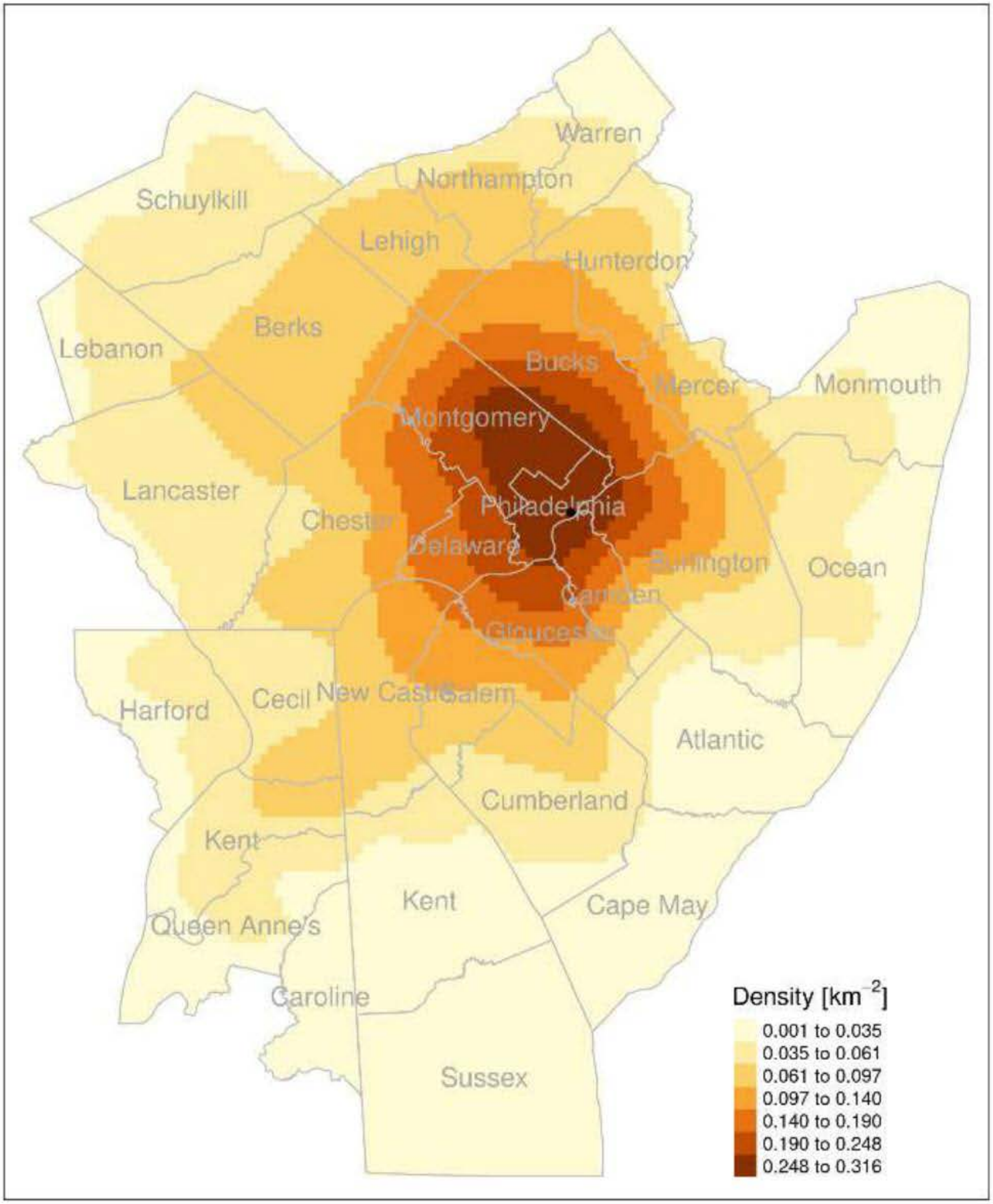


Figure 4-5: North East Waste HYSPLIT AM – 0800 LST

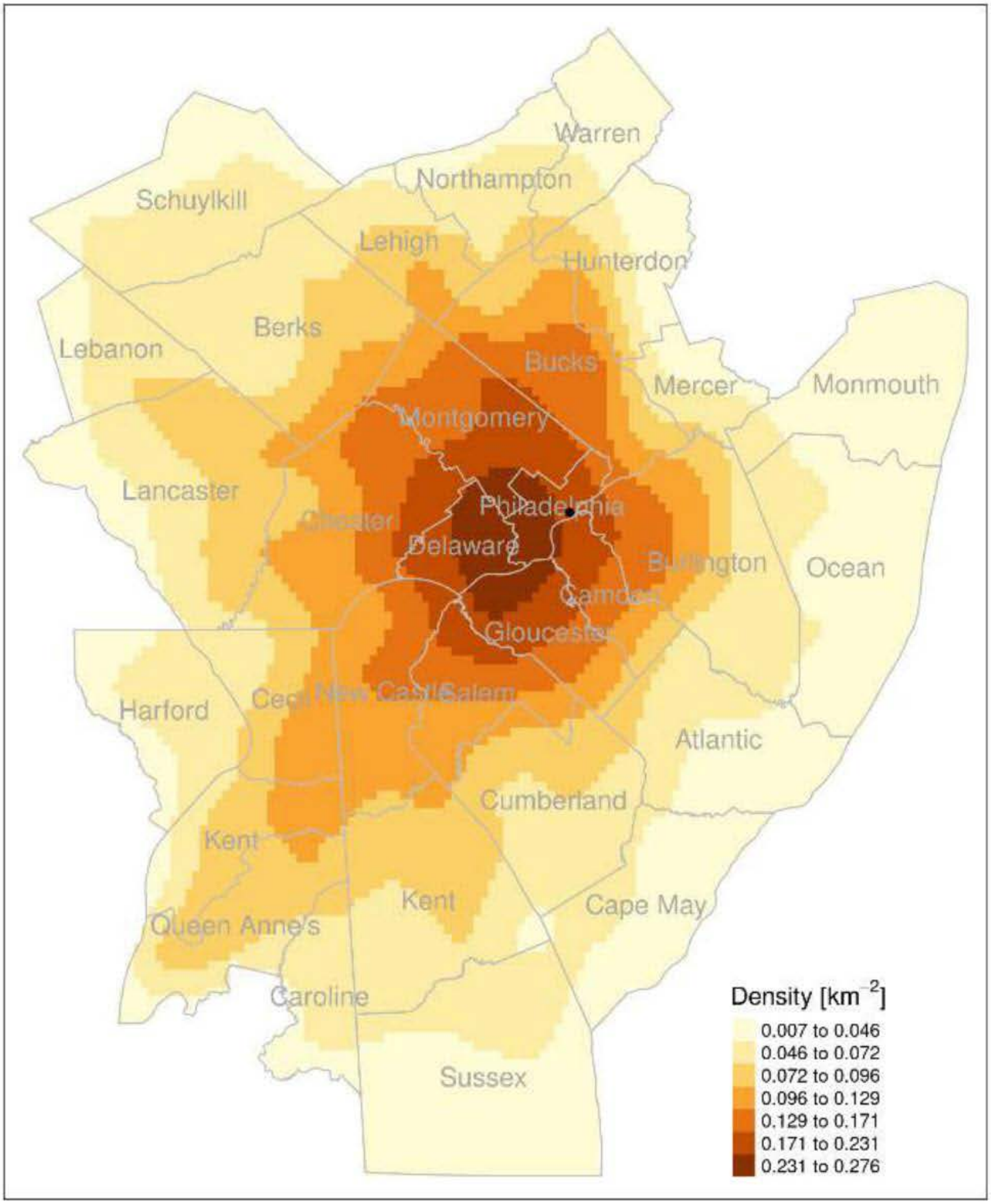


Figure 4-6: North East Waste HYSPLIT PM – 2200 LST

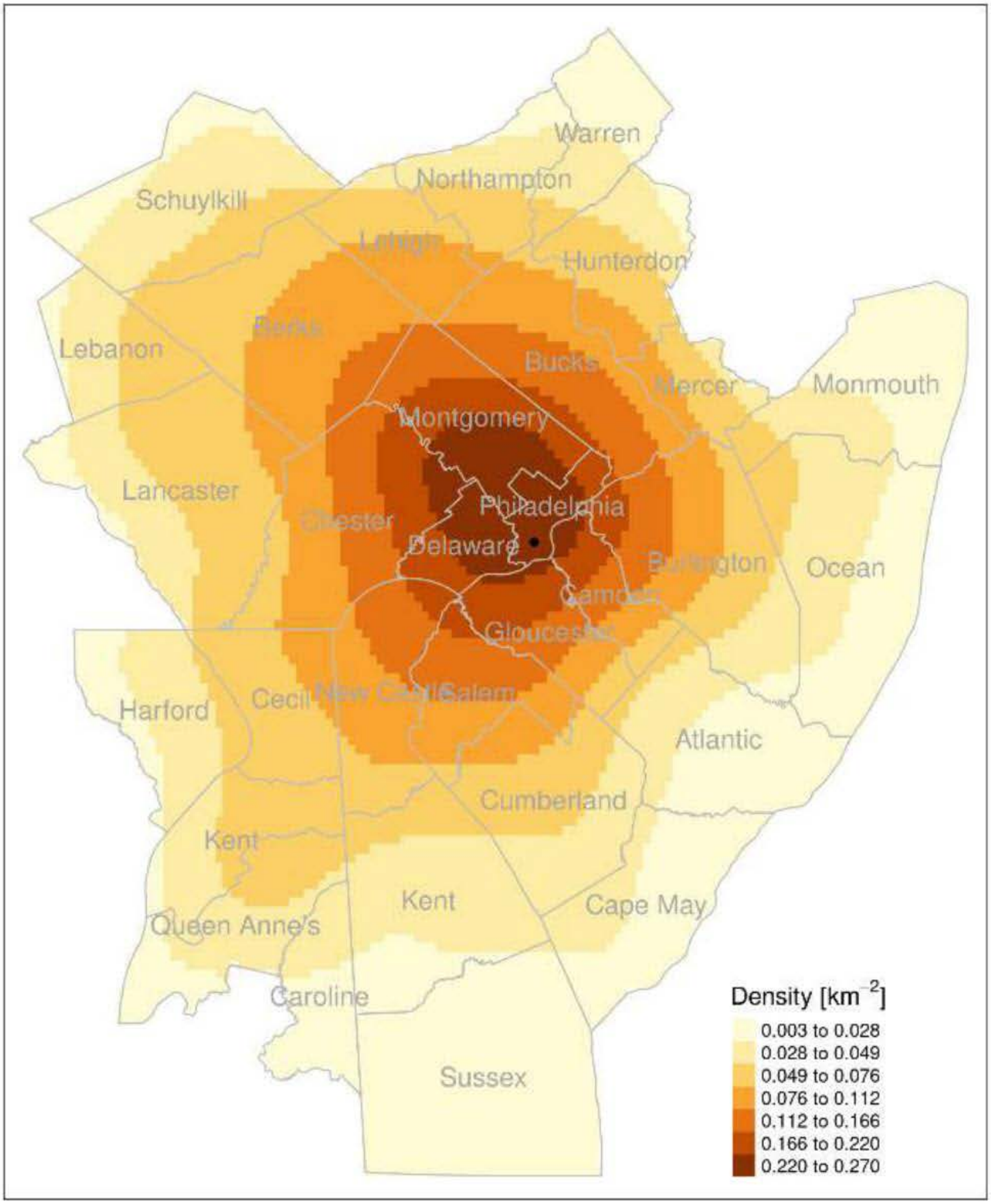


Figure 4-7: Ritner HYSPLIT AM – 0800 LST

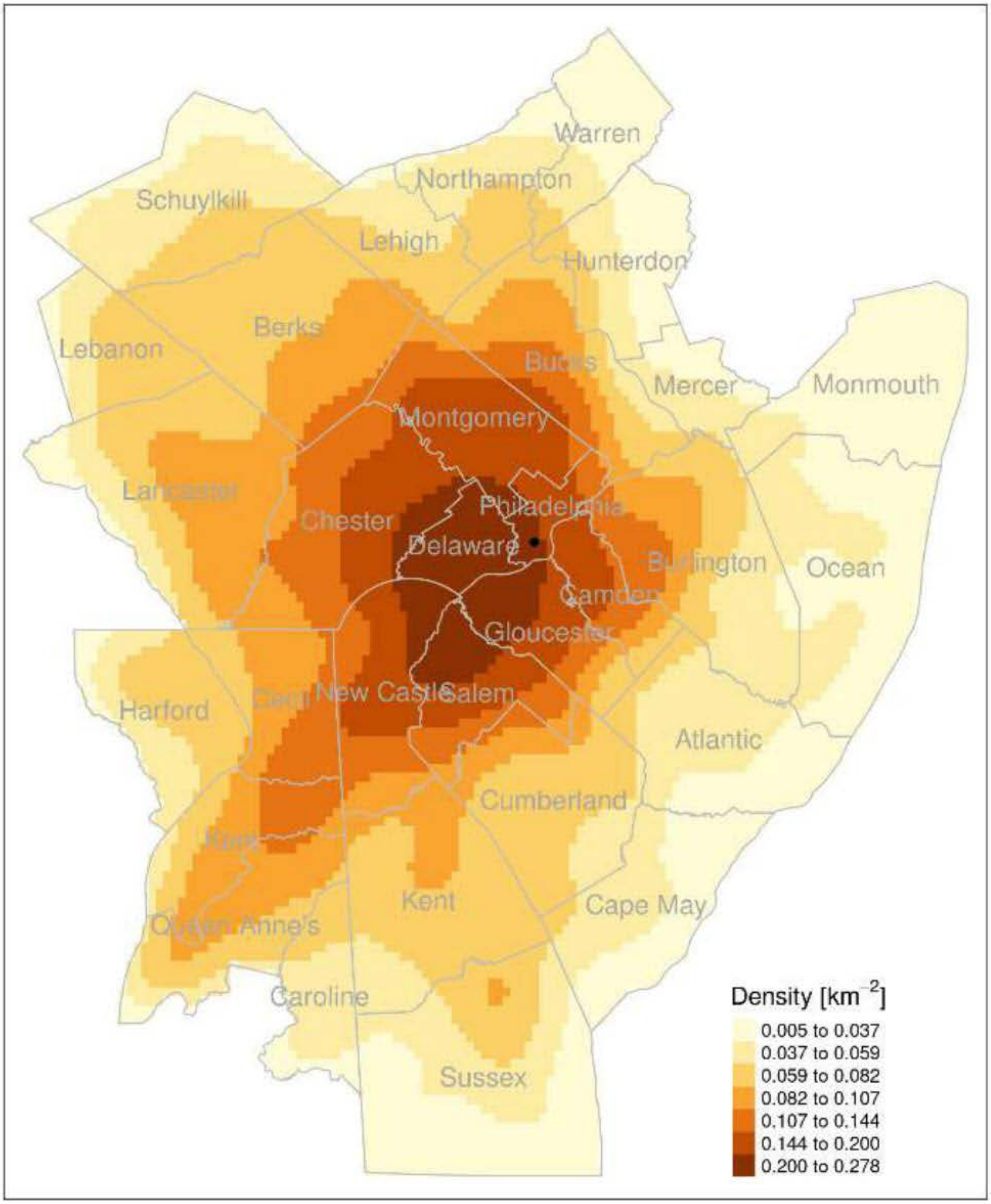


Figure 4-8: Ritner HYSPLIT PM – 2200 LST

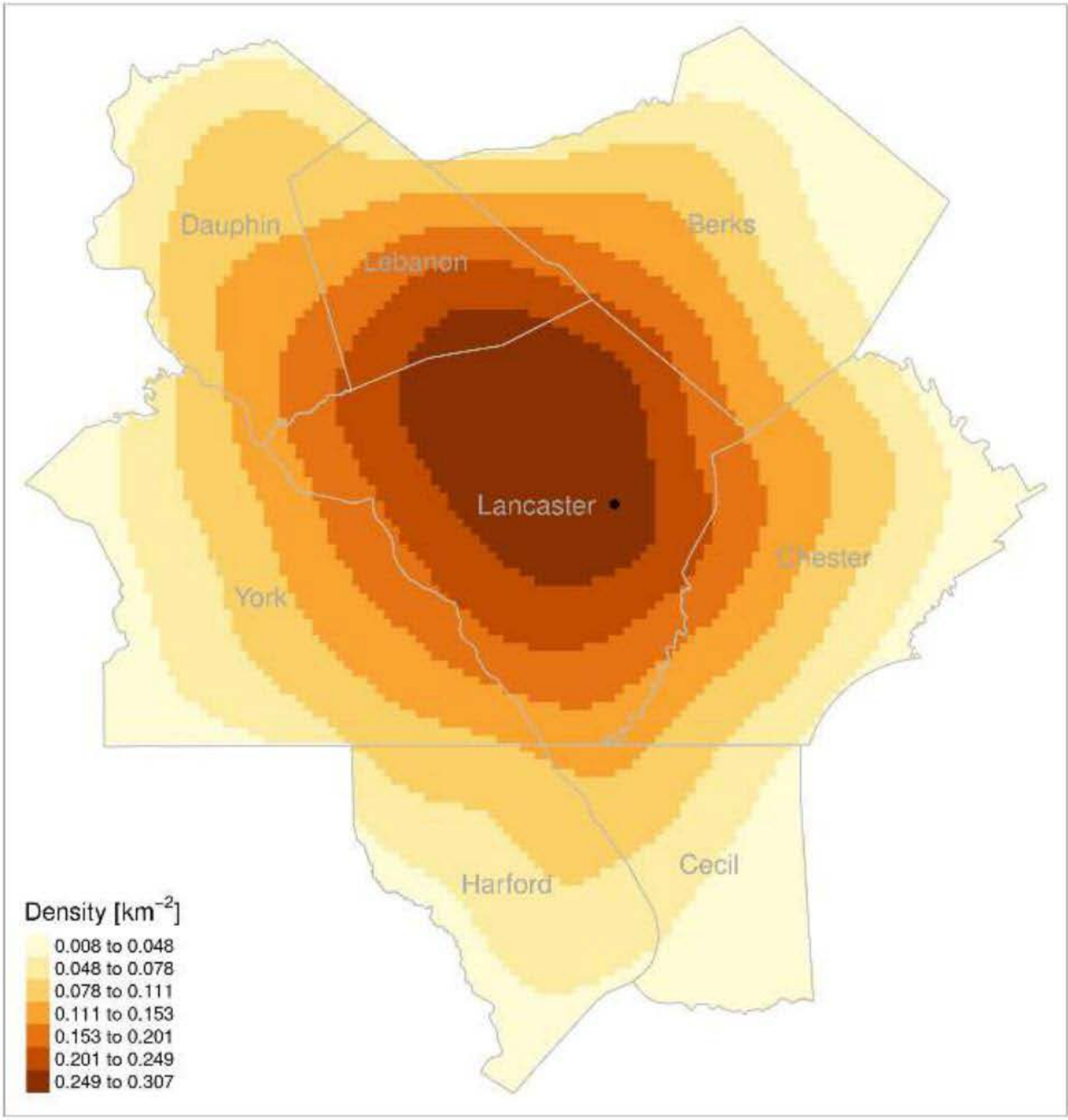


Figure 4-9: Lancaster Downwind HYSPLIT AM – 0800 LST

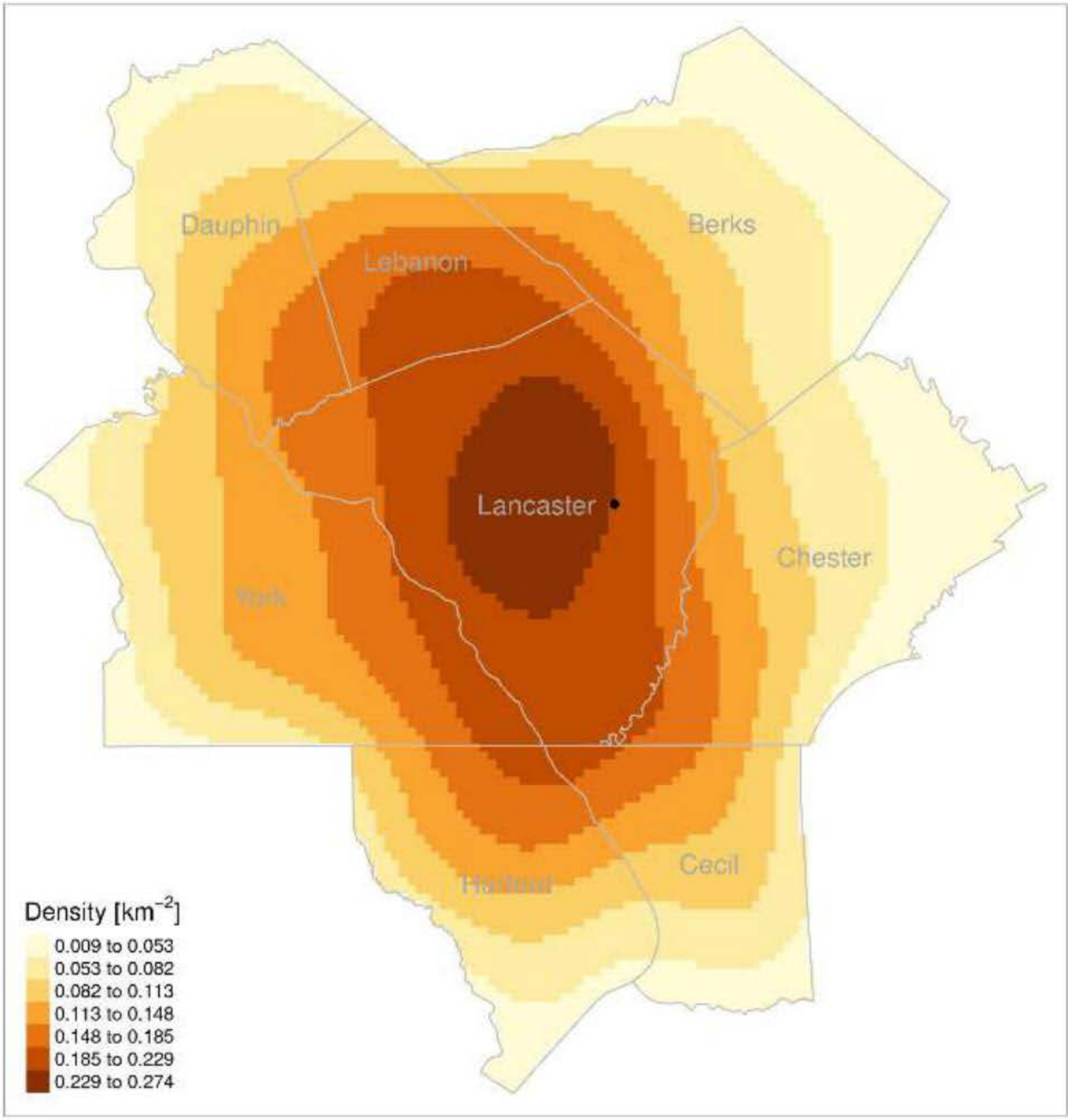


Figure 4-10: Lancaster Downwind HYSPLIT PM – 2200 LST

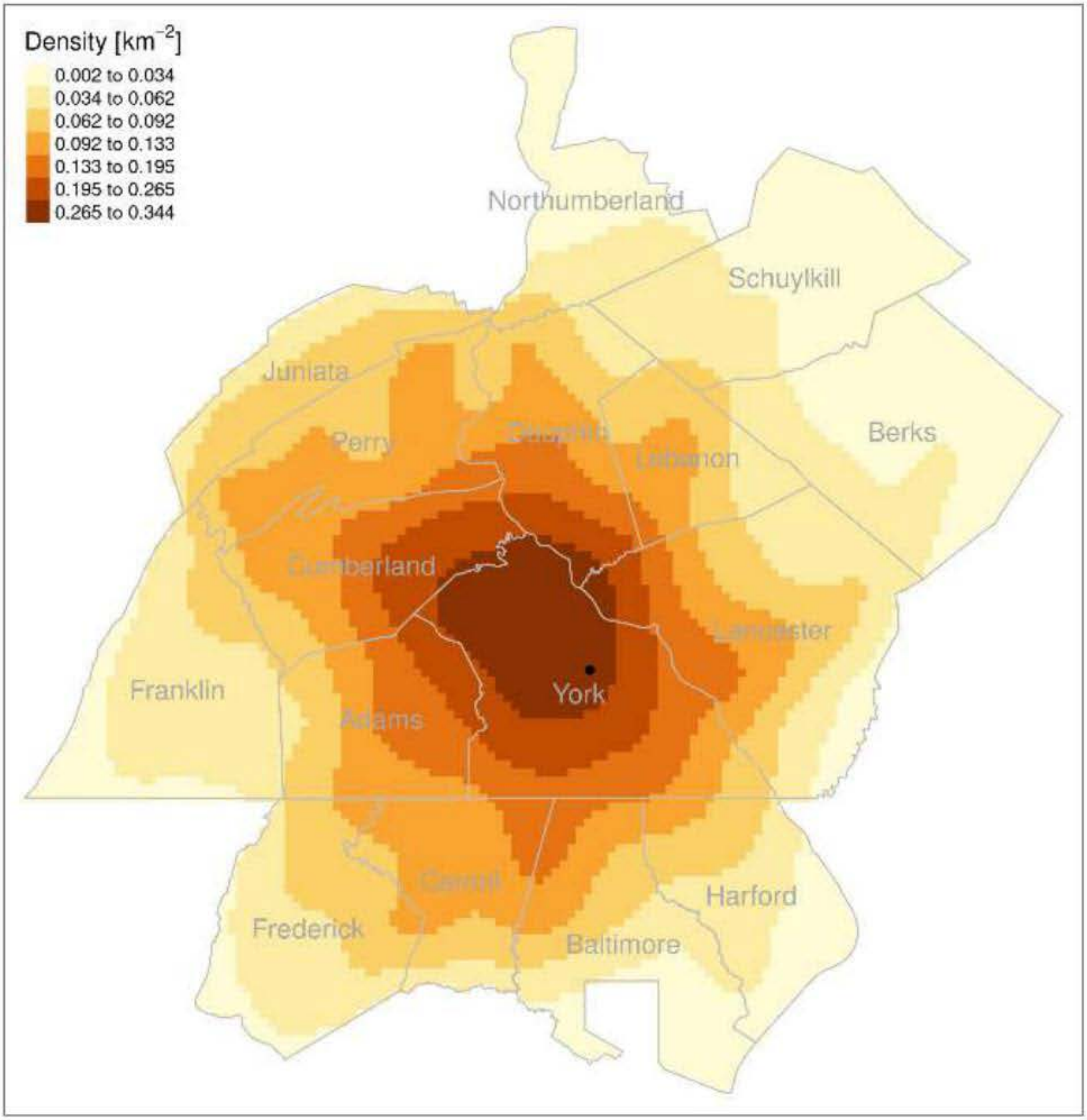


Figure 4-11: Hill Street HYSPLIT AM – 0800 LST

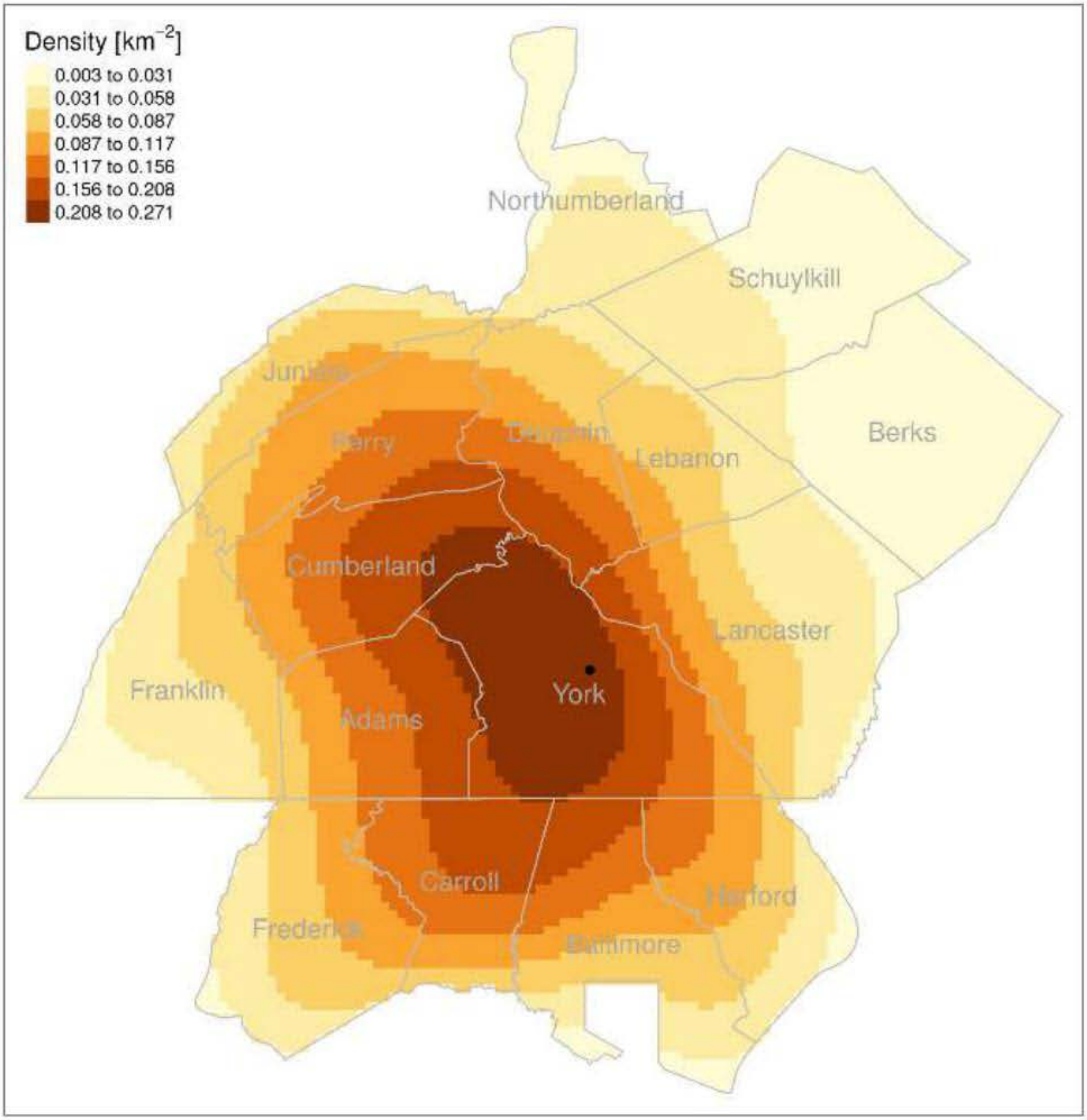


Figure 4-12: Hill Street HYSPLIT PM – 2200 LST

4.2 Wind Roses

One type of meteorological analysis that can be helpful in determining pollution transport involves assessing potential source-receptor relationships in the area using summaries of wind speed and wind direction data. EPA made available wind roses, through its $PM_{2.5}$ Designations Mapping Tool,[11] to assist with the analysis of wind speed and direction.

Wind roses are graphical charts that characterize the speed and direction of winds at a location. Presented in a circular format, the length of each "spoke" around the circle indicates the amount of time that the wind blows from a particular direction. Colors along the spokes indicate categories of wind speed. EPA used hourly wind data from 2021-2023 to create the wind roses.

Figure 4-13 shows the wind roses for the region that encompasses the three CBSAs. With the exception of the wind rose for Philadelphia County, the majority of wind roses in the region show that the predominant directions from which the wind is blowing are from the northwest and west. This indicates that the wind mostly travels over Pennsylvania, potentially pulling in pollutants from emission sources in Pennsylvania. The wind rose for Philadelphia County is significantly different than other wind roses in the region. The Philadelphia County wind rose indicates light wind speeds in all directions and shows a disproportionately higher frequencies of winds from the southwest and northwest. This wind rose also only displays data for one year (2021) rather than three years. It is possible that the Philadelphia County wind monitor is surrounded by significantly taller obstructions which dampen the wind speeds overall. Three years of wind data is available for the Philadelphia Airport wind monitor. This data shows a distribution similar to other wind roses in the CBSA.

Figures 4-14 through 4-16 show the wind roses for the three Delaware Counties. In Kent County the winds are predominantly from the West and South. For New Castle County, the winds are predominantly from the Northwest. Finally for Sussex County, the winds are predominantly from the Southwest.

With the exception of the southerly winds from Kent County and southern wind from Sussex County, the predominant winds for each county in Delaware would move pollutants away from violating $PM_{2.5}$ monitors that are located near the City of Philadelphia. Regarding Kent and Sussex Counties, the HYSLPIT maps in Section 4.1 generally show minimal density of $PM_{2.5}$ originating from Kent and Sussex Counties. Which indicates that the pollutants are less likely to be transported from Kent and Sussex Counties than from Pennsylvania counties, either because of the distance to the violating $PM_{2.5}$ monitors or a smaller magnitude of emission sources in Kent and Sussex Counties.

---

[11] EPA's $PM_{2.5}$ Designations Mapping Tool
https://experience.arcgis.com/experience/a2ca272ce9fc4019a88ce35b863e2cab

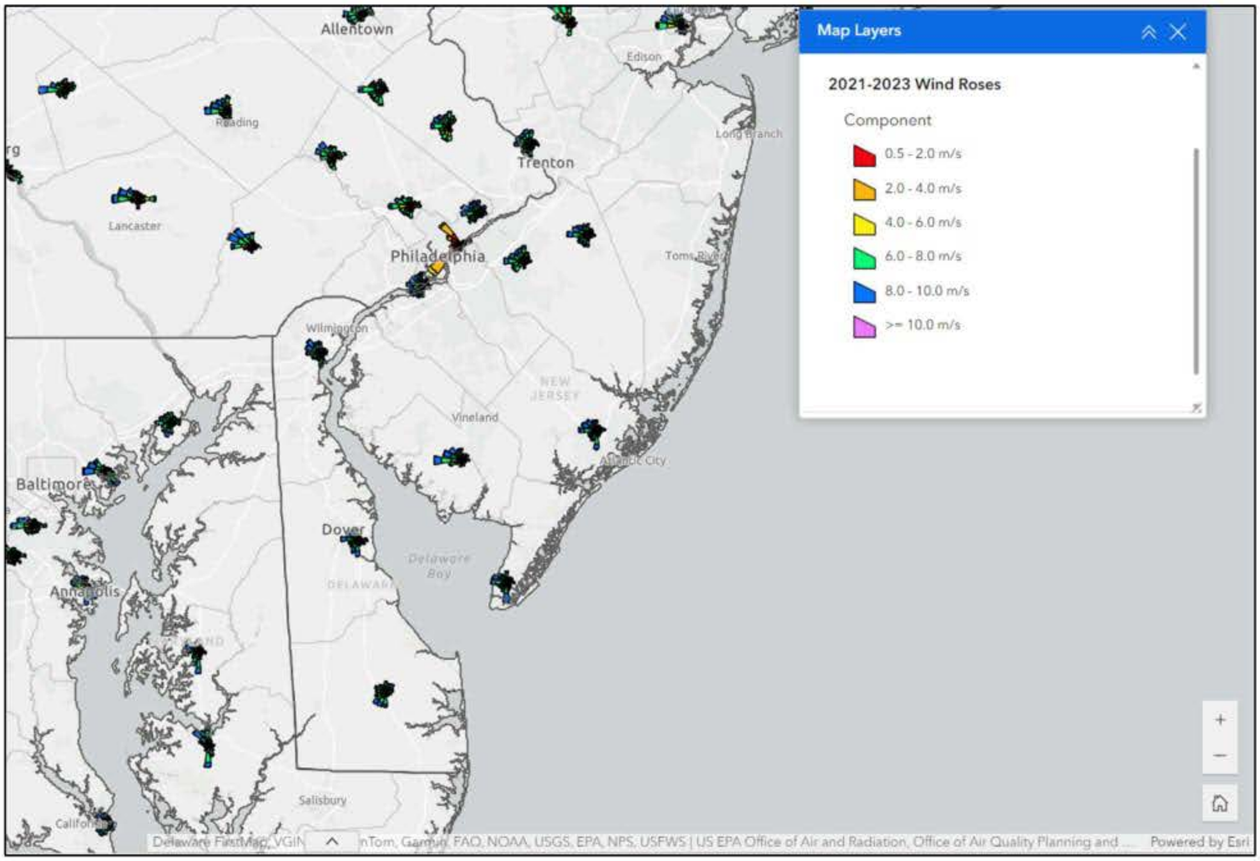


Figure 4-13: Regional Wind Roses

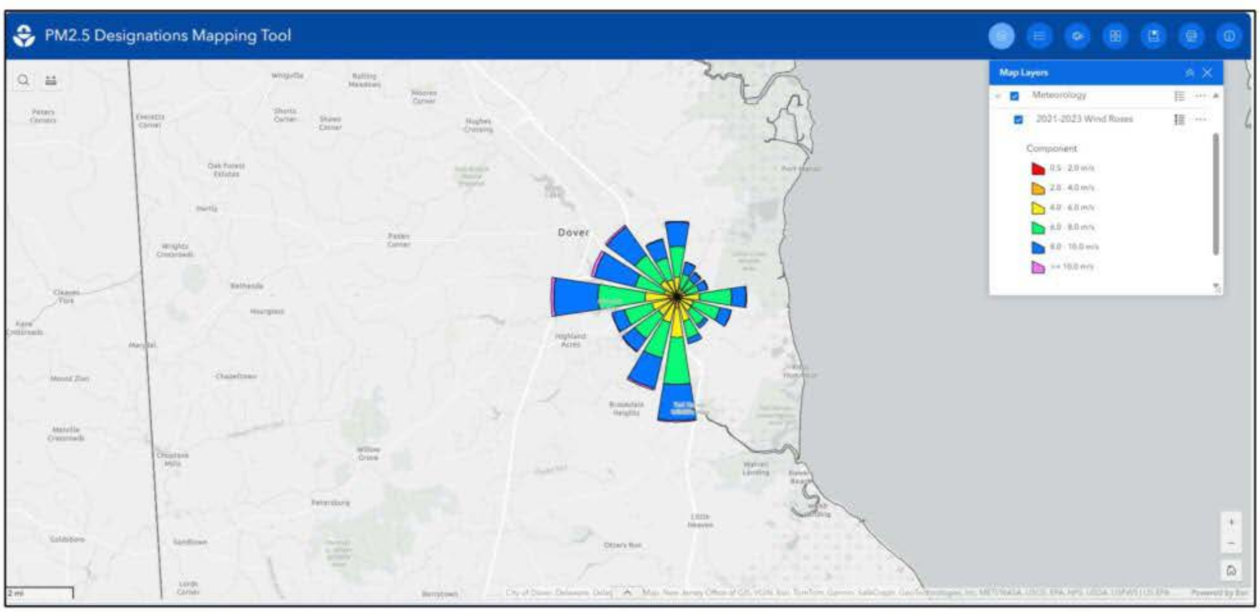


Figure 4-14: Kent County, DE - Wind Rose

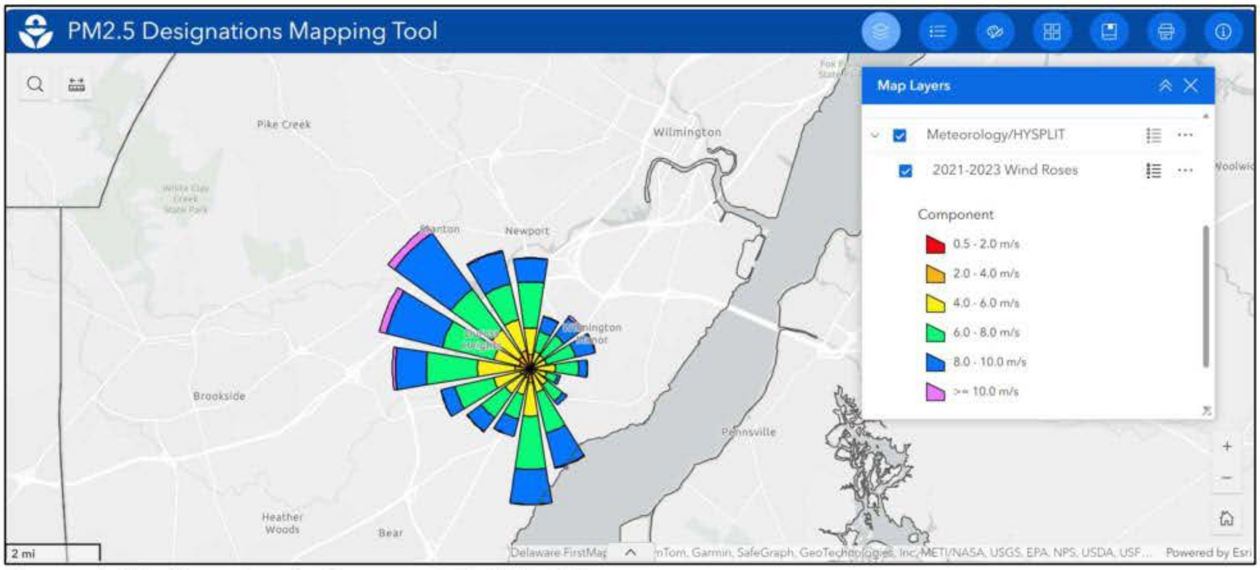


Figure 4-15: New Castle County, DE - Wind Rose

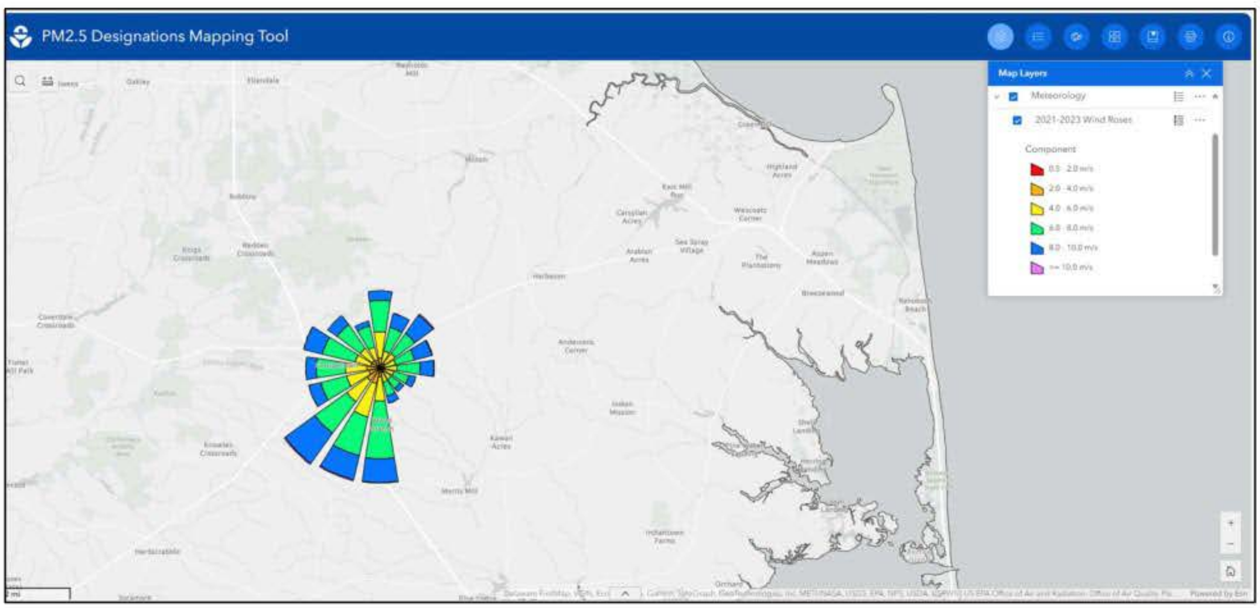


Figure 4-16: Sussex County, DE - Wind Rose

5.0 Geography/ Topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. The EPA recommends that analyses examine the physical features of the land that might define the airshed and, therefore, affect the formation and distribution of $PM_{2.5}$ concentrations over an area.

Delaware is on a level plain, with the lowest mean elevation of any state in the nation. It is bounded to the north by Pennsylvania; to the east by the Delaware River, Delaware Bay, part of New Jersey, and the Atlantic Ocean; and to the west and south by Maryland. Beyond Maryland to the west of Delaware is the Chesapeake Bay. The distance between the Chesapeake Bay and the Delaware River is less than 20 miles across Maryland and Delaware at the narrowest land area around the Chesapeake & Delaware Canal (C&D Canal). New Castle County is separated from New Jersey by about 1 mile of water at its closest and about 5 miles of water at its furthest (at the southern most boundary of New Castle County).

Together, Delaware's geography and the land, water, and air interactions play an important part in Delaware's air quality. The two bays on either side of Delaware potentially segregate local and transported emissions, by both blocking some emissions yet concentrating other emissions. Delaware is unique in this aspect, in that it is the only state which is almost entirely surrounded by water, thus making it geographically different from the Philadelphia region.

Land, sea, mountain and valley breezes, can have an important influence on local air quality. These local winds are driven by a difference in temperature that produces a difference in pressure. For example, the sea breeze forms in the afternoon when the land is considerably hotter than the ocean or bay. Air then flows from the high pressure over the ocean toward the low pressure over land. At night, the opposite may happen as the land cools to below the ocean's temperature, and a land breeze blows out to sea.

6.0 Jurisdictional Boundaries

All of Delaware's air quality management is under the jurisdictional authority of the State of Delaware. Air quality issues are handled by a single agency, the Division of Air Quality within the Delaware Department of Natural Resources and Environmental Control.

7.0 Summary of Recommendation

Delaware recommends a classification of "attainment" for all three counties, New Castle, Kent, and Sussex, under the 2024 $PM_{2.5}$ NAAQS. This recommendation is due to two compelling lines of evidence. 1) All Delaware $PM_{2.5}$ air quality monitor design values are well under the 2024 $PM_{2.5}$ NAAQS level of 9.0 µg/m^3 (see Section 2.1). 2) Delaware does not appear to contribute to nonattainment of any adjacent or nearby county, as this document demonstrates.

In regard to Delaware's contribution, a number of points support Delaware's position:

- Regional Haze modeling has shown that Delaware's contribution to local Class I areas is low (Section 3.1.6).
- EPA's HYSPLIT maps indicate that Delaware is not having a large contribution to violating $PM_{2.5}$ monitors (Section 4.1).
- Wind Roses for Delaware counties generally show that the predominant winds would move pollutants away from violating $PM_{2.5}$ monitors that are located near the City of Philadelphia (Section 4.2).

Delaware is also recommending that all three counties continue to be evaluated for designation status independently. Particularly, it is Delaware's position that New Castle County continues to be a separate and distinct from any nonattainment in the Philadelphia CBSA/CBSA+. This is consistent with EPA's decision for the 2012 $PM_{2.5}$ NAAQS designation.

FLORIDA DEPARTMENT OF
Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Alexis A. Lambert
Secretary

Via Electronic Mail and the State Planning Electronic Collaboration System (SPECS)

January 8, 2025

Ms. Jeaneanne Gettle
Acting Regional Administrator
U. S. Environmental Protection Agency (EPA) – Region 4
61 Forsyth Street, SW – Mail Code: 9T25
Atlanta, GA 30303-8909

Re: Florida Area Designation Recommendations for the 2024 Revised Primary National Ambient Air Quality Standard for Fine Particulate Matter ($PM_{2.5}$)

Dear Ms. Gettle:

Pursuant to section 107(d)(1)(A) of the Clean Air Act, the State of Florida recommends that the entire State of Florida be designated as "attainment" for the 2024 revised primary annual National Ambient Air Quality Standard (NAAQS) for fine particulate matter ($PM_{2.5}$).

Florida bases this recommendation upon the most recent complete three years (2021-2023) of certified $PM_{2.5}$ ambient air quality monitoring data, which show that Florida meets the revised standard of 9.0 micrograms per cubic meter ($\mu g/m^3$) statewide (see attached Map and Table reflecting the design values at each monitoring location). Florida understands that the United States Environmental Protection Agency (EPA) will likely base its final area designations upon 2022-2024 air quality monitoring data, and the Florida Department of Environmental Protection is confident that the state's certified 2024 ambient air quality monitoring data will also support Florida's recommendation of a statewide attainment designation.

At present, the Department's recommendation of statewide attainment is not based on any monitoring data sets that have excluded data that were determined to have been impacted by "exceptional events" during calendar years 2021 through 2023. The Department does believe there were days in each of these calendar years (2021, 2022, and 2023) that were influenced by Canadian wildfire events, domestic wildfire events, fireworks, or Saharan dust transport events to degrees that may qualify as exceptional events. The Department has not, however, submitted to EPA any formal exceptional events demonstrations for these instances because the Department does not anticipate that these events will meet the threshold of "regulatory significance" as detailed EPA's

February 7, 2024, memorandum, "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard." In the unlikely circumstance that events that occurred during these years are determined to have regulatory significance for EPA's final designations decisions for the 2024 revised primary annual $PM_{2.5}$ NAAQS, the Department will work with EPA to provide additional information consistent with the requirements of EPA's Exceptional Events Rule, which is codified at 40 CFR §§ 50.1, 50.14 and 51.930.

Florida gathers its $PM_{2.5}$ data through a robust network of twenty-nine (29) monitoring sites. Florida's $PM_{2.5}$ design values at these sites historically have been well below the applicable standard, and the Department is confident that Florida will remain in attainment with the revised standard. These facts speak to Florida's ongoing commitment to enhancing and maintaining air quality for the benefit of its citizens and visitors.

If you have any questions, please contact Hastings Read at (850) 717-9017 or by email at Hastings.Read@FloridaDEP.gov.

Sincerely,

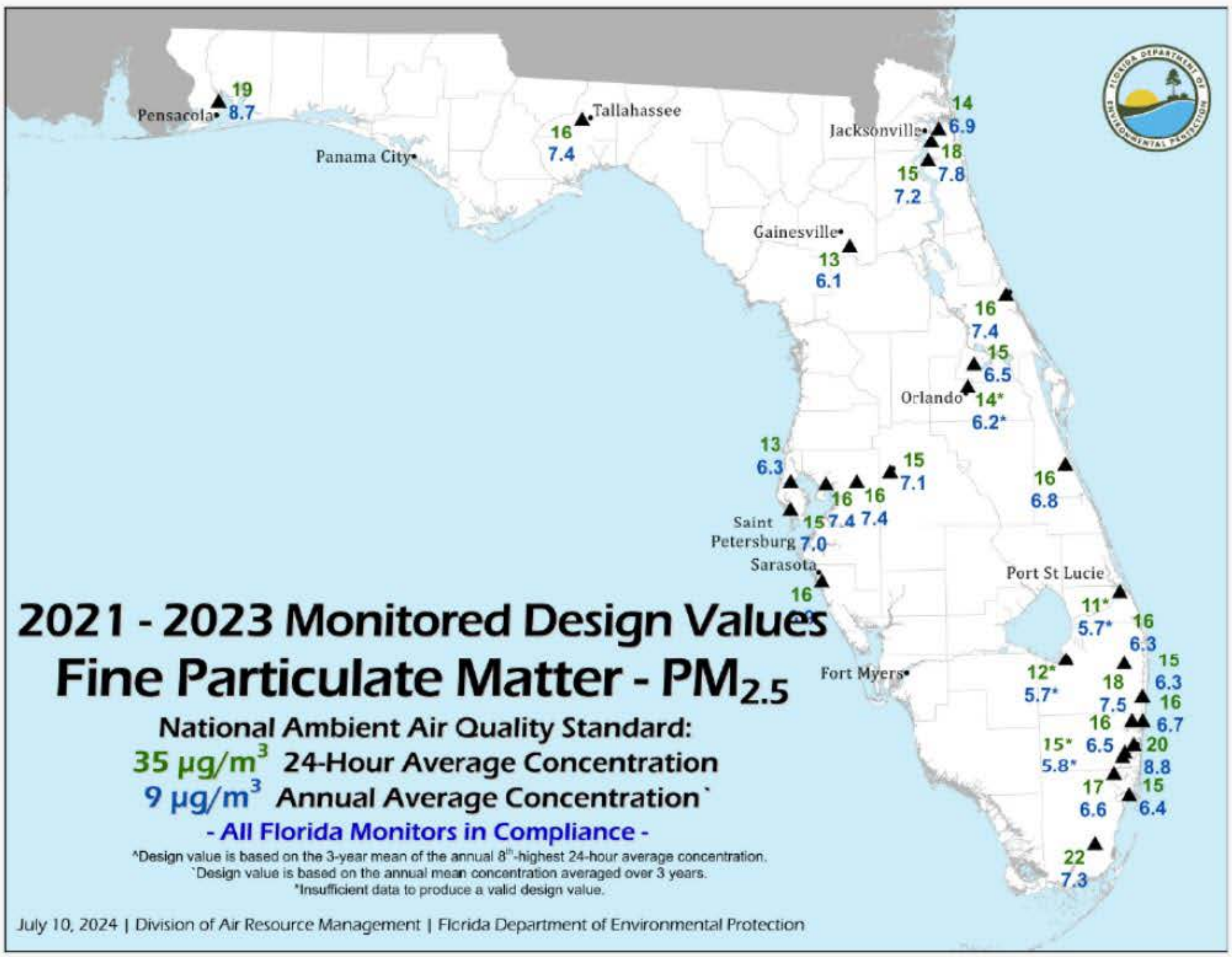
Jeffery F. Koerner, Director
Division of Air Resource Management

JFK/tl

cc:
Jane Spann, EPA Region 4;
Joel Huey, EPA Region 4.

Enclosures:
State of Florida – Primary $PM_{2.5}$ NAAQS Design Value Map (2021-2023)
State of Florida – Primary $PM_{2.5}$ NAAQS Annual Means and Design Values for Florida Monitoring Locations (2021-2023)

State of Florida
Primary $PM_{2.5}$ NAAQS Design Value Map (2021-2023)



State of Florida
Primary $PM_{2.5}$ NAAQS Annual Means and Design Values for Florida Monitoring Locations (2021-2023)

Site Name	Site Number	City/County	2021 $PM_{2.5}$ Annual Average	2022 $PM_{2.5}$ Annual Average	2023 $PM_{2.5}$ Annual Average	2023 $PM_{2.5}$ Design Value
Paynes Prairie Farm	12-001-3012	Gainesville/Alachua	5.9	6.0	6.3	**6.1**
Melbourne	12-009-0007	Melboune/Brevard	7.3	6.5	6.5	**6.8**
Vista View Park	12-011-0033	Davie/Broward	5.6	5.5	6.4*	**5.8**
Daniela Banu (NCore)	12-011-0034	Davie/Broward	6.5	5.9	7.2	**6.5**
Fort Lauderdale Near Road	12-011-0035	Ft. Lauderdale/Broward	8.5	8.5	9.4	**8.8**
Pompano Highlands Fire House	12-011-2003	Pompano/Broward	7.1	6.1	6.9	**6.7**
Coconut Creek	12-011-5005	Coconut Creek/Broward	6.4	7.4	8.7	**7.5**
Mandarin	12-031-0098	Jacksonville/Duval	7.1	7.2	7.3*	**7.2**
Sunny Acres	12-031-0099	Jacksonville/Duval	6.5	6.9	7.2	**6.9**
Pepsi Place	12-031-0108	Jacksonville/Duval	7.5	7.7	7.9	**7.8**
Ellyson Industrial Park	12-033-0004	Pensacola/Escambia	8.3	8.3	9.5	**8.7**
Munro Street	12-057-0113	Tampa/Hillsborough	7.5	7.0	7.8	**7.4**
Sydney	12-057-3002	Valrico/Hillsborough	7.6	7.4	7.2	**7.4**
Winkler Pump Station	12-071-0005	Ft. Myers/Lee	6.4	6.5*		**6.4**
Tallahassee Community College	12-073-0012	Tallahassee/Leon	7.0	7.2	8.1	**7.4**
Stuart	12-085-0007	Stuart/Martin		4.7*	6.8	**5.7**
Palm Springs Fire Station	12-086-0033	Palm Springs/Miami-Dade	7.1	6.1	6.7*	**6.6**
Miami Fire Station	12-086-1016	Miami/Miami-Dade	4.9	6.9	7.5	**6.4**
Wittkop Park	12-086-6002	Homestead/Miami-Dade	7.7	6.6	7.6	**7.3**
Winter Park	12-095-2002	Winter Park/Orange		5.6*	6.8	**6.2**
Belle Glade	12-099-0008	Belle Glade/Palm Beach	4.8*	5.7	6.5	**5.7**
Lamstein Lane	12-099-0022	Royal Palm Beach/Palm Beach	6.4	5.8	6.7	**6.3**
Delray Beach	12-099-2005	Delray Beach/Palm Beach	5.9	6.4	6.7	**6.3**
St. Petersburg College	12-103-0004	Clearwater/Pinellas	6.3	6.0	6.5	**6.3**
Azalea Park	12-103-0018	St. Petersburg/Pinellas	6.8	6.5*	7.5	**7.0**
Baptist Children's Home	12-105-6006	Lakeland/Polk	7.5	6.9	7.0*	**7.1**
Bee Ridge Park	12-115-0013	Sarasota/Sarasota	7.0	6.8*	7.0	**6.9**
Sanford	12-117-1002	Sanford/Seminole	6.6	6.5	6.5	**6.5**
Daytona - Blind Services	12-127-5002	Daytona Beach/Volusia	7.5	7.3	7.5	**7.4**

* Incomplete data

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Jeffrey W. Cown, Director

EPD Director's Office
2 Martin Luther King, Jr. Drive
Suite 1456, East Tower
Atlanta, Georgia 30334
404-656-4713

February 7, 2025

Jeaneanne Gettle
Acting Regional Administrator
U.S. EPA, Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-3104

Re: Georgia's Designation Recommendations for the 2024 Annual $PM_{2.5}$ NAAQS

Dear Ms. Gettle:

On February 7, 2024, the United States Environmental Protection Agency (EPA) promulgated a revised primary annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS). Section 107(d)(1)(A) of the Clean Air Act requires each state to submit to EPA, no later than one year following promulgation of a new or revised NAAQS, its designation recommendations for each area of the state as attainment, nonattainment, or unclassifiable under the standard.

In accordance with U.S. EPA's memorandum "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard" (dated February 7, 2024), the Georgia Environmental Protection Division (EPD) recommends that all counties in the State of Georgia be designated as "attainment/unclassifiable" as shown in Appendix B. Georgia's recommendations are based on 2021-2023 $PM_{2.5}$ design values calculated using certified monitoring data and account for exceptional event demonstrations submitted to EPA on February 7, 2025. Details on the rationale and justification used to support the Georgia designation recommendations are provided in the technical analysis document entitled "Georgia's Designation Recommendations for the 2024 Annual $PM_{2.5}$ NAAQS."

Once the 2024 $PM_{2.5}$ ambient monitoring data becomes available and is certified, Georgia EPD will review the data and make revisions to this recommendation, as appropriate. If you have any questions or need more information, please contact James Boylan at James.Boylan@dnr.ga.gov or (470) 524-0697.

Sincerely,

Jeffrey W. Cown

Jeffrey W. Cown
Director

Attachments

c: Brad Akers, U.S. EPA Region 4
Josue Ortiz, U.S. EPA Region 4
James Boylan, Branch Chief, Air Protection Branch

Appendix A
2021-2023 Annual $PM_{2.5}$ Arithmetic Means and Design Values

CSA/CBSA/County	AQS ID	Without EPA Concurrence for Exceptional Events				With EPA Concurrence for Exceptional Events			
		Annual Mean 2021 (μg/m³)	Annual Mean 2022 (μg/m³)	Annual Mean 2023 (μg/m³)	DV 2023 (μg/m³)	Annual Mean 2021 (μg/m³)	Annual Mean 2022 (μg/m³)	Annual Mean 2023 (μg/m³)	DV 2023 (μg/m³)
Albany, GA CBSA	13-095-0007	9.4	8.3	9.3	**9.0**	-	-	-	-
Atlanta--Athens-Clarke County--Sandy Springs, GA-AL CSA	13-059-0002	8.9	7.9	9.3	**8.7**	-	-	-	-
	13-063-0091	8.9	8.1	9.7	**8.9**	-	-	-	-
	13-067-0003	8.8	8.0	9.8	**8.9**	-	-	-	-
	13-089-0002	8.7	8.4	9.2	**8.7**	-	-	-	-
	13-121-0039	9.0	8.2	10.2	**9.1**	9.0	8.2	9.7	**9.0**
	*13-121-0056^*	*9.7*	*8.8*	*10.6*	***9.7***	-	-	-	-
	13-135-0002	8.5*	7.3	9.7	**8.5***	-	-	-	-
	13-139-0003#	--	--	8.9	**8.9**	-	-	-	-
Augusta-Richmond County, GA-SC CBSA	13-245-0091	10.8	8.5	9.8	**9.7**	9.5	8.2	9.2	**9.0**
	45-037-0001	8.1	7.5	8.7	**8.1**	-	-	-	-
Brunswick-St. Simons, GA CBSA	13-127-0006	7.5	8.0	8.0	**7.9**	-	-	-	-
Chattanooga-Cleveland-Dalton, TN-GA-AL CSA	13-295-0004#	-	8.4	10.3	**9.4**	-	8.4	9.6	**9.0**
	47-065-0031	8.7	7.9*	-	**8.3***	-	-	-	-
	47-065-4002	8.4	7.4	9.5	**8.4**	-	-	-	-
	47-107-1002	7.6	7.7	8.3	**7.8**	-	-	-	-
Columbus-Auburn-Opelika, GA-AL CSA	01-113-0003	9.8	9.1	9.5	**9.5**	9.3	8.6	9.2	**9.0**
	13-215-0008	8.7	8.0	8.9	**8.5**	-	-	-	-
	13-215-0012	11.1	8.9	10.1	**10.0**	9.2	8.3	9.5	**9.0**
Douglas, GA CBSA	13-069-0002	6.9	7.0	7.9	**7.3**	-	-	-	-
Macon-Bibb County--Warner Robins, GA CSA	13-021-0007	9.8	8.5	10.0	**9.4**	9.5	8.3	9.2	**9.0**
	13-021-0012	8.3	7.6	9.3	**8.4**	-	-	-	-
	13-153-0001	8.8	8.0	9.2	**8.7**	-	-	-	-
Savannah-Hinesville-Statesboro, GA CSA	13-051-1002	8.9	8.5*	8.8	**8.7***	-	-	-	-
Valdosta, GA CBSA	13-185-0003	7.8	8.6	9.3	**8.6**	-	-	-	-
Washington County, GA	13-303-0001	9.5	10.1	10.4	**10.0**	9.3	9.1	8.8	**9.0**

** Invalid per 40 CFR 50 Appendix N.*

 # FEM data has NAAQS exclusion per EPA letter dated December 20, 2024. The design value was manually calculated based on FRM data only.

^ Not comparable to the annual $PM_{2.5}$ NAAQS per 40 CFR 58.30.

APPENDIX B
Designation Recommendations by County in Georgia for the 2024 Annual $PM_{2.5}$ NAAQS

County Name	Designation
Appling	Attainment/Unclassifiable
Atkinson	Attainment/Unclassifiable
Bacon	Attainment/Unclassifiable
Baker	Attainment/Unclassifiable
Baldwin	Attainment/Unclassifiable
Banks	Attainment/Unclassifiable
Barrow	Attainment/Unclassifiable
Bartow	Attainment/Unclassifiable
Ben Hill	Attainment/Unclassifiable
Berrien	Attainment/Unclassifiable
Bibb	Attainment/Unclassifiable
Bleckley	Attainment/Unclassifiable
Brantley	Attainment/Unclassifiable
Brooks	Attainment/Unclassifiable
Bryan	Attainment/Unclassifiable
Bulloch	Attainment/Unclassifiable
Burke	Attainment/Unclassifiable
Butts	Attainment/Unclassifiable
Calhoun	Attainment/Unclassifiable
Camden	Attainment/Unclassifiable
Candler	Attainment/Unclassifiable
Carroll	Attainment/Unclassifiable
Catoosa	Attainment/Unclassifiable
Charlton	Attainment/Unclassifiable
Chatham	Attainment/Unclassifiable
Chattahoochee	Attainment/Unclassifiable
Chattooga	Attainment/Unclassifiable
Cherokee	Attainment/Unclassifiable
Clarke	Attainment/Unclassifiable
Clay	Attainment/Unclassifiable
Clayton	Attainment/Unclassifiable
Clinch	Attainment/Unclassifiable
Cobb	Attainment/Unclassifiable
Coffee	Attainment/Unclassifiable
Colquitt	Attainment/Unclassifiable
Columbia	Attainment/Unclassifiable
Cook	Attainment/Unclassifiable
Coweta	Attainment/Unclassifiable
Crawford	Attainment/Unclassifiable
Crisp	Attainment/Unclassifiable
Dade	Attainment/Unclassifiable
Dawson	Attainment/Unclassifiable
Decatur	Attainment/Unclassifiable

APPENDIX B
Designation Recommendations by County in Georgia for the 2024 Annual $PM_{2.5}$ NAAQS

County Name	Designation
DeKalb	Attainment/Unclassifiable
Dodge	Attainment/Unclassifiable
Dooly	Attainment/Unclassifiable
Dougherty	Attainment/Unclassifiable
Douglas	Attainment/Unclassifiable
Early	Attainment/Unclassifiable
Echols	Attainment/Unclassifiable
Effingham	Attainment/Unclassifiable
Elbert	Attainment/Unclassifiable
Emanuel	Attainment/Unclassifiable
Evans	Attainment/Unclassifiable
Fannin	Attainment/Unclassifiable
Fayette	Attainment/Unclassifiable
Floyd	Attainment/Unclassifiable
Forsyth	Attainment/Unclassifiable
Franklin	Attainment/Unclassifiable
Fulton	Attainment/Unclassifiable
Gilmer	Attainment/Unclassifiable
Glascock	Attainment/Unclassifiable
Glynn	Attainment/Unclassifiable
Gordon	Attainment/Unclassifiable
Grady	Attainment/Unclassifiable
Greene	Attainment/Unclassifiable
Gwinnett	Attainment/Unclassifiable
Habersham	Attainment/Unclassifiable
Hall	Attainment/Unclassifiable
Hancock	Attainment/Unclassifiable
Haralson	Attainment/Unclassifiable
Harris	Attainment/Unclassifiable
Hart	Attainment/Unclassifiable
Heard	Attainment/Unclassifiable
Henry	Attainment/Unclassifiable
Houston	Attainment/Unclassifiable
Irwin	Attainment/Unclassifiable
Jackson	Attainment/Unclassifiable
Jasper	Attainment/Unclassifiable
Jeff Davis	Attainment/Unclassifiable
Jefferson	Attainment/Unclassifiable
Jenkins	Attainment/Unclassifiable
Johnson	Attainment/Unclassifiable
Jones	Attainment/Unclassifiable
Lamar	Attainment/Unclassifiable
Lanier	Attainment/Unclassifiable

APPENDIX B
Designation Recommendations by County in Georgia for the 2024 Annual $PM_{2.5}$ NAAQS

County Name	Designation
Laurens	Attainment/Unclassifiable
Lee	Attainment/Unclassifiable
Liberty	Attainment/Unclassifiable
Lincoln	Attainment/Unclassifiable
Long	Attainment/Unclassifiable
Lowndes	Attainment/Unclassifiable
Lumpkin	Attainment/Unclassifiable
McDuffie	Attainment/Unclassifiable
McIntosh	Attainment/Unclassifiable
Macon	Attainment/Unclassifiable
Madison	Attainment/Unclassifiable
Marion	Attainment/Unclassifiable
Meriwether	Attainment/Unclassifiable
Miller	Attainment/Unclassifiable
Mitchell	Attainment/Unclassifiable
Monroe	Attainment/Unclassifiable
Montgomery	Attainment/Unclassifiable
Morgan	Attainment/Unclassifiable
Murray	Attainment/Unclassifiable
Muscogee	Attainment/Unclassifiable
Newton	Attainment/Unclassifiable
Oconee	Attainment/Unclassifiable
Oglethorpe	Attainment/Unclassifiable
Paulding	Attainment/Unclassifiable
Peach	Attainment/Unclassifiable
Pickens	Attainment/Unclassifiable
Pierce	Attainment/Unclassifiable
Pike	Attainment/Unclassifiable
Polk	Attainment/Unclassifiable
Pulaski	Attainment/Unclassifiable
Putnam	Attainment/Unclassifiable
Quitman	Attainment/Unclassifiable
Rabun	Attainment/Unclassifiable
Randolph	Attainment/Unclassifiable
Richmond	Attainment/Unclassifiable
Rockdale	Attainment/Unclassifiable
Schley	Attainment/Unclassifiable
Screven	Attainment/Unclassifiable
Seminole	Attainment/Unclassifiable
Spalding	Attainment/Unclassifiable
Stephens	Attainment/Unclassifiable
Stewart	Attainment/Unclassifiable
Sumter	Attainment/Unclassifiable

APPENDIX B

Designation Recommendations by County in Georgia for the 2024 Annual $PM_{2.5}$ NAAQS

County Name	**Designation**
Talbot	Attainment/Unclassifiable
Taliaferro	Attainment/Unclassifiable
Tattnall	Attainment/Unclassifiable
Taylor	Attainment/Unclassifiable
Telfair	Attainment/Unclassifiable
Terrell	Attainment/Unclassifiable
Thomas	Attainment/Unclassifiable
Tift	Attainment/Unclassifiable
Toombs	Attainment/Unclassifiable
Towns	Attainment/Unclassifiable
Treutlen	Attainment/Unclassifiable
Troup	Attainment/Unclassifiable
Turner	Attainment/Unclassifiable
Twiggs	Attainment/Unclassifiable
Union	Attainment/Unclassifiable
Upson	Attainment/Unclassifiable
Walker	Attainment/Unclassifiable
Walton	Attainment/Unclassifiable
Ware	Attainment/Unclassifiable
Warren	Attainment/Unclassifiable
Washington	Attainment/Unclassifiable
Wayne	Attainment/Unclassifiable
Webster	Attainment/Unclassifiable
Wheeler	Attainment/Unclassifiable
White	Attainment/Unclassifiable
Whitfield	Attainment/Unclassifiable
Wilcox	Attainment/Unclassifiable
Wilkes	Attainment/Unclassifiable
Wilkinson	Attainment/Unclassifiable
Worth	Attainment/Unclassifiable

Georgia's Designation Recommendations for the 2024 $PM_{2.5}$ NAAQS - Technical Analysis Document -

In Section 107(d) of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) requires states to submit area designation recommendations by a date specified by EPA. On February 7, 2024, EPA published a guidance memorandum entitled "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard" (EPA's Designation Guidance) which sets the deadline for submitting designation recommendations as February 7, 2025. The following discussion is the Georgia Environmental Protection Division's (EPD's) technical analysis to support its designation recommendations.

EPA's Designation Guidance recommends that designation recommendation analysis start with counties included in each Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA), and EPA "intends to use the most recent list of CBSAs and CSAs in this designations process, published in March 2020." As such, Georgia EPD will also use the most recent list of CBSAs and CSAs in its recommendation process. In July 2023, the US Census published a new definition of CBSA or CSA.[1] Therefore, the following technical analysis is based on the July 2023 definition of CBSA and CSA. For 2021-2023, Georgia operated and maintained 21 fine particulate matter ($PM_{2.5}$) sites in 10 CBSAs or CSAs and one additional site located in an area that is not part of a CBSA. In addition, five non-Georgia sites are located in multi-state CSAs or CBSAs. The 2021-2023 $PM_{2.5}$ annual $PM_{2.5}$ arithmetic means and design values for each monitor contained in these CBSAs, CSAs, and other areas are shown in Appendix A.

Although EPA's Designation Guidance recommends the use of 2021 to 2023 data for state recommendations (p. 3), the memorandum also states that "The EPA expects that in making final designations decisions, the EPA will rely on air quality data from 2022 to 2024." (p. 3). In addition, EPA lays out expectations and processes for exceptional events demonstrations in initial designation recommendations by a state, and final designation determinations by EPA in the section entitled "Exceptional Events and Designations" of EPA's Designation Guidance. On February 7, 2025, Georgia EPD submitted 129 exceptional events demonstrations[2] via EPA's State Planning Electronic Collaboration System. In making our designation recommendations, Georgia EPD has assumed that EPA will concur with Georgia EPD's submitted exceptional events demonstrations for 2021-2023. These exceptional events have been excluded in the calculation of design values for Georgia's designation recommendations provided in this document. Georgia EPD will also submit exceptional events demonstrations for 2024 along with an updated technical analysis document for the updated initial designation recommendation that will be submitted by September 30, 2025. Georgia EPD also assumes that EPA will concur with all of Georgia EPD's 2024 exceptional events. The following sections present technical analysis results for $PM_{2.5}$ air quality in each of the CBSAs, CSAs, and other areas in Appendix A followed by Georgia's designation recommendations.

[1] https://www2.census.gov/programs-surveys/metro-micro/geographies/reference-files/2023/delineation-files/list1_2023.xlsx
[2] https://epd.georgia.gov/air-protection-branch/air-branch-programs/planning-and-support-program/exceptional-event

Air Quality Data

Albany, GA CBSA

The Albany, GA CBSA (Albany CBSA) consists of Dougherty, Lee, Terrell, and Worth Counties. There is one $PM_{2.5}$ monitoring site (AQS ID: **13-095-0007**) in the Albany CBSA.

At the **13-095-0007** $PM_{2.5}$ site (Albany), there are two Federal Reference Method (FRM) monitors and one Federal Equivalent Method (FEM) monitor. One FRM monitor collected data on a one in three-day schedule until August 8, 2022, and from that point on, began collecting data on a daily schedule. A collocated FRM monitor collected data on a one in twelve-day schedule until September 10, 2022, at which point it began collecting data on a one in three-day schedule. In addition, the FEM monitor located at this site collected data continuously throughout the 2021-2023 monitoring period. From January 1, 2022, to July 31, 2023, there was a National Ambient Air Quality Standard (NAAQS) exclusion for testing the data network alignment on the FEM monitor. There is an additional NAAQS exclusion approved for August 1, 2023, to August 1, 2025, for testing the data network alignment on the same monitor.

As provided in Appendix A, the 2023 design value for this site is equal to 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all counties in the Albany, GA CBSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Atlanta--Athens-Clarke County--Sandy Springs, GA-AL CSA

The Atlanta--Athens-Clarke County--Sandy Springs CSA (Atlanta CSA) consists of 10 CBSAs:

1. Athens-Clark County, GA CBSA - Clarke, Madison, Oconee, and Oglethorpe Counties
2. Atlanta-Sandy Springs-Roswell, GA CBSA - Barrow, Bartow, Butts, Carroll, Cherokee, Clayton, Cobb, Coweta, Dawson, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Haralson, Heard, Henry, Jasper, Lumpkin, Meriwether, Morgan, Newton, Paulding, Pickens, Pike, Rockdale, Spalding, and Walton Counties
3. Calhoun, GA CBSA - Gordon County
4. Cedartown, GA CBSA - Polk County
5. Cornelia, GA CBSA - Habersham County
6. Gainesville, GA CBSA - Hall County
7. Jefferson, GA CBSA - Jackson County
8. LaGrange, GA-AL CBSA - Chambers County, AL and Troup County, GA
9. Rome, GA CBSA - Floyd County
10. Thomaston, GA CBSA - Upson County

There are eight $PM_{2.5}$ monitoring sites (AQS IDs: **13-059-0002, 13-063-0091, 13-067-0003, 13-089-0002, 13-121-0039, 13-121-0056, 13-135-0002,** and **13-139-0003**) in the Atlanta CSA. One site is a near-road microscale site (**AQS ID: 13-121-0056**) that is not suitable for comparison with 2024 annual $PM_{2.5}$ NAAQS.

At the **13-059-0002** $PM_{2.5}$ site (Athens), there are two FEM monitors that collected data continuously during the 2021-2023 monitoring period. The 2021-2023 annual $PM_{2.5}$ design value is 8.7 $\mu g/m^3$.

At the **13-063-0091** $PM_{2.5}$ site (Forest Park), there is an FRM monitor that collected data on a one in three-day schedule during the 2021-2023 monitoring period. The 2021-2023 annual $PM_{2.5}$ design value is 8.9 $\mu g/m^3$.

At the **13-067-0003** $PM_{2.5}$ site (Kennesaw), there is an FRM monitor that collected data on a one in three-day schedule during the 2021-2023 monitoring period. On October 25, 2023, an FEM monitor also began collecting data. A NAAQS exclusion was approved for the FEM monitor from October 25, 2023, to

October 24, 2025, for testing the data network alignment. The 2021-2023 annual $PM_{2.5}$ design value is 8.9 μg/m^3.

At the **13-089-0002** $PM_{2.5}$ site (South DeKalb), there are two FRM monitors and one FEM monitor. One FRM monitor collected data on a one in three-day schedule from 2021 to September 6, 2022. After September 6, 2022, this FRM monitor began collecting data on a daily schedule. The collocated second FRM monitor collected data during the 2021-2023 period on a one in three-day schedule. The FEM monitor at this site also collected data during the 2021-2023 monitoring period. The 2021-2023 annual $PM_{2.5}$ design value is 8.7 μg/m^3.

At the **13-121-0039** $PM_{2.5}$ site (Fire Station #8), there is an FRM monitor that collected data on a one in three-day schedule during the 2021-2023 monitoring period. Georgia EPD submitted 2 exceptional events demonstrations to EPA for approval involving 2 Canadian wildfire events. The 2021-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 9.1 μg/m^3. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 μg/m^3.

At the **13-121-0056** $PM_{2.5}$ site (NR-GA Tech), there is an FRM monitor that collected data on a one in three-day schedule during the 2021-2023 monitoring period; however, this site is not comparable to the annual $PM_{2.5}$ NAAQS as discussed below. The 2021-2023 annual $PM_{2.5}$ design value is 9.7 μg/m^3. However, this microscale monitor is not eligible for comparison to the annual $PM_{2.5}$ NAAQS.

At the **13-135-0002** $PM_{2.5}$ site (Gwinnett Tech), there is an FEM monitor that collected data continuously during the 2021-2023 monitoring period. The 2021-2023 annual $PM_{2.5}$ design value is 8.5 μg/m^3.

At the **13-139-0003** $PM_{2.5}$ site (Gainesville), there are an FEM monitor and an FRM monitor. The FEM monitor collected data continuously during the 2021-2023 monitoring period and was the primary monitor from 2021 to March 23, 2023. However, a NAAQS exclusion was approved for the FEM monitor from January 1, 2021, to July 31, 2025, for testing the network data alignment. On March 24, 2023, the FRM monitor began collecting data as the primary monitor on a daily schedule. Therefore, the design value is based on 2023 FRM data only. The 2023 annual $PM_{2.5}$ design value is 8.9 μg/m^3.

As provided in Appendix A, the 2023 design values for all sites in the Atlanta CSA are equal to or less than 9.0 μg/m^3, with the exception of one site (NR-GA Tech). This near-road site is classified as a "microscale" site[3] and has a 2023 design value of 9.7 μg/m^3. According to 40 CFR 58.30, "$PM_{2.5}$ measurement data from sites that are not representative of area-wide air quality but rather of relatively unique micro-scale, or localized hot spot, or unique middle-scale impact sites are not eligible for comparison to the annual $PM_{2.5}$ NAAQS." 40 CFR 58.30 also notes that "Approval of sites that are suitable and sites that are not suitable for comparison with the annual $PM_{2.5}$ NAAQS is provided for as part of the annual monitoring network plan described in § 58.10." Georgia EPD publishes its Ambient Air Monitoring Plan, conforming to 40 CFR 58.10,[4] and has established that this site is not representative of area-wide air quality and is not suitable for comparison with the annual $PM_{2.5}$ NAAQS. Georgia EPD's Ambient Air Monitoring Plan specifically states:

> "Since the site was established in 2014, it has been one of GA AAMP's near-road sites and classified as a "microscale" site. The site is located seven meters from the nearest lane of interstate, within a unique hotspot, along the corridor of Interstate 75 and Interstate 85. There is continuous bumper-to-bumper, heavy traffic flow almost 24 hours a day along this corridor. Per the siting guidance for near-road ambient monitoring sites, the first near-road site in an MSA had to be located near the highest traffic counts in the MSA and placed "as near as

[3] https://airgeorgia.org/docs/2024%20Addendum%20to%20Annual%20Plan.pdf

[4] https://airgeorgia.org/networkplans.html

practicable to the outside nearest edge of the traffic lanes of the target road segment" and should be within 20 meters of the nearest traffic lane (Table 4.3 of the Near-road NO_2 Technical Assistance Document, 2012). Due to the requirement of the near road network, the $PM_{2.5}$ measurements at the highest traffic count in the MSA and within 20 m of the interstate as near as practicable to the edge of the traffic are not representative of the $PM_{2.5}$ concentrations across the Atlanta-Sandy Springs-Alpharetta MSA. The traffic counts at the Interstate 75/85 corridor are not uniform across all of the Atlanta-Sandy Springs-Alpharetta MSA. Therefore, the NR-GA Tech $PM_{2.5}$ monitors should not be used for $PM_{2.5}$ attainment decisions for the annual $PM_{2.5}$ NAAQS, and should be reclassified as a non-regulatory, non-NAAQS monitor for the purpose of comparison to the annual $PM_{2.5}$ NAAQS."

As a result, Georgia EPD recommends that all Georgia counties in the Atlanta CSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Augusta-Richmond County, GA-SC CBSA

The Augusta-Richmond County, GA-SC CBSA (Augusta CBSA) consists of Burke, Columbia, Lincoln, McDuffie, and Richmond Counties in GA and Aiken and Edgefield Counties in SC. There are two $PM_{2.5}$ monitoring sites (AQS IDs: **13-245-0091** and **45-037-0001**) in the Augusta CBSA.

At the **13-245-0091** $PM_{2.5}$ site (Augusta), there are an FEM monitor and two collocated FRM monitors. The FEM monitor collected data during the 2021-2023 monitoring period with a NAAQS exclusion beginning in January of 2022. The primary FRM monitor operated on a one in three-day schedule from January 2022 to August 2022, and then on a daily schedule starting in August of 2022. The collocated secondary FRM monitor began collecting data in September of 2022 on a one in three-day schedule. In 2023, the two collocated FRM monitors continued to collect data, with a daily schedule for the primary FRM monitor and one in three-day schedule for the collocated secondary FRM monitor. The FEM monitor also continued to collect data with its NAAQS exclusion through 2023. Georgia EPD submitted 40 exceptional events demonstrations to EPA for approval involving 8 Canadian wildfire events, 29 prescribed fire events, and 3 holiday fireworks events. The 2021-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 9.7 $\mu g/m^3$. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 $\mu g/m^3$.

At the **45-037-0001** $PM_{2.5}$ site (Trenton, SC), there are an FRM monitor and an FEM monitor. The FRM monitor collected data on a one in three-day schedule during the 2021-2023 monitoring period. In addition to the FRM monitor, an FEM monitor has collected data continuously since June 7, 2022. The 2021-2023 annual $PM_{2.5}$ design value is 8.1 $\mu g/m^3$.

As provided in Appendix A, the 2023 design values for these sites are equal to or less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all GA counties in the Augusta CBSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Brunswick, GA CBSA

The Brunswick, GA CBSA (Brunswick CBSA) consists of Brantley, Glynn, and McIntosh Counties. There is one $PM_{2.5}$ monitoring site (AQS ID: **13-127-0006**) in the Brunswick CBSA.

At the **13-127-0006** $PM_{2.5}$ site (Brunswick), there are an FRM monitor and an FEM monitor. The FRM monitor collected data on a one in three-day schedule during the 2021-2023 monitoring period. Starting October 21, 2021, the FEM monitor began collecting data continuously. The 2021-2023 annual $PM_{2.5}$ design value is 7.9 $\mu g/m^3$.

As provided in Appendix A, the 2023 design value for this site is less than 9.0 µg/m^3, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all counties in the Brunswick CBSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Chattanooga-Cleveland-Dalton, TN-GA-AL CSA

The Chattanooga-Cleveland-Dalton, TN-GA-AL CSA (Chattanooga CSA) consists of six CBSAs:

1. Athens, TN CBSA - McMinn and Meigs Counties, TN
2. Chattanooga, TN-GA CBSA - Catoosa, Dade and Walker Counties, GA, and Hamilton, Marion, and Sequatchie Counties, TN
3. Cleveland, TN CBSA - Bradley and Polk Counties, TN
4. Dalton, GA CBSA - Murray and Whitfield Counties, GA
5. Scottsboro, AL CBSA - Jackson County, AL
6. Summerville, GA CBSA - Chattooga County, GA

There are four $PM_{2.5}$ monitoring sites (AQS IDs: **13-295-0004**, **47-065-0031**, **47-065-4002**, and **47-107-1002**) in the Chattanooga CSA.

At the **13-295-0004** $PM_{2.5}$ site (Rossville), there are an FRM monitor and an FEM monitor. This site was relocated and did not become operational until April 2021 when the FEM began collecting data. The FRM monitor collected data on a one in three-day sampling schedule beginning in May 2021. These two monitors continued collecting data through 2023. A NAAQS exclusion was approved for the FEM monitor starting April 2021 through July 31, 2025. Therefore, the design value is based only on the 2022-2023 FRM data. Georgia EPD submitted 4 exceptional events demonstrations to EPA for approval involving 4 Canadian wildfire events. The 2022-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 9.4 µg/m^3. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 µg/m^3.

At the **47-065-0031** $PM_{2.5}$ site (East Ridge, TN), one FRM monitor collected data on a one in three-day schedule until May 9, 2022. The 2021-2023 annual $PM_{2.5}$ design value is 8.3 µg/m^3.

At the **47-065-4002** $PM_{2.5}$ site (Chattanooga, TN), there are two FRM monitors and one FEM monitor. One FRM monitor collected data on a one in three-day schedule during the 2021-2023 period. A second collocated FRM monitor collected data at the site on a one in twelve-day schedule. The FEM monitor continuously collected data during the 2021-2023 monitoring period. For the FEM monitor, a NAAQS exclusion was approved from February 17, 2018, through September 30, 2022, for use as a special purpose monitor. Another second NAAQS exclusion approval for this monitor was made from September 30, 2023, to September 29, 2025, to evaluate new firmware and data alignment. The 2021-2023 annual $PM_{2.5}$ design value is 8.4 µg/m^3.

At the **47-107-1002** $PM_{2.5}$ site (Athens, TN), there is an FEM monitor that collected data continuously during the 2021-2023 monitoring period. The 2021-2023 annual $PM_{2.5}$ design value is 7.8 µg/m^3.

As provided in Appendix A, the 2023 design values for these sites are equal to or less than 9.0 µg/m^3, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all GA counties in the Chattanooga CSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Columbus-Auburn-Opelika, GA-AL CSA

The Columbus-Auburn-Opelika CSA (Columbus CSA) consists of three CBSAs:

1. Alexander City, AL CBSA - Tallapoosa County, AL
2. Auburn-Opelika, AL CBSA - Lee and Macon Counties, AL

3. Columbus, GA-AL CBSA - Chattahoochee, Harris, Marion, Muscogee, Stewart, and Talbot Counties, GA, and Russell County, AL

There are three $PM_{2.5}$ monitoring sites (AQS IDs: **01-113-0003**, **13-215-0008**, and **13-215-0012**) in the Columbus CSA.

At the **01-113-0003** $PM_{2.5}$ site (Phenix City, AL), there are two FRM monitors and an FEM monitor. One FRM monitor collected data on a one in six-day schedule starting in January of 2021. In addition, an FEM monitor collected data from 2021 through February 2023 and was the primary monitor from January 2021 until February 2023. A second collocated FRM monitor started collecting data in March of 2023 on a one in three-day schedule. The Alabama Department of Environmental Management submitted 22 exceptional events demonstrations to EPA for approval involving 1 Canadian wildfire event, 20 prescribed fire events, and 1 holiday fireworks event. The 2022-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 9.5 $\mu g/m^3$. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 $\mu g/m^3$.

At the **13-215-0008** $PM_{2.5}$ site (Columbus-Airport), there are an FRM monitor and an FEM monitor. The FRM monitor collected data on a one in three-day schedule until August 8, 2022, and then on a daily schedule starting on August 9, 2022. The FEM monitor collected data continuously beginning on November 9, 2021. From January 1, 2022, to July 31, 2023, a NAAQS exclusion was approved for testing data network alignment on the FEM. A second NAAQS exclusion has been approved for August 1, 2023, to September 30, 2024. The 2021-2023 annual $PM_{2.5}$ design value is 8.5 $\mu g/m^3$.

At the **13-215-0012** $PM_{2.5}$ site (Columbus-Baker), there are an FRM monitor and an FEM monitor. The FRM monitor has operated since March of 2021 on a one in three-day schedule. The FEM monitor started collecting data in June 2023 with a NAAQS exclusion. Georgia EPD submitted 9 exceptional events demonstrations to EPA for approval involving 2 Canadian wildfire events and 7 prescribed fire events. The 2021-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 10.0 $\mu g/m^3$. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 $\mu g/m^3$.

As provided in Appendix A, the 2023 design values for these sites are equal to or less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all GA counties in the Columbus CSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Douglas, GA CBSA

Douglas, GA CBSA consists of Atkinson and Coffee Counties. There is one $PM_{2.5}$ monitoring site (AQS ID: **13-069-0002**) in the Douglas CBSA.

At the **13-069-0002** $PM_{2.5}$ site (General Coffee), there are an FRM monitor and an FEM monitor. The FRM monitor collected data during the 2021-2023 monitoring period. Until October 16, 2023, this FRM monitor collected data on a one in three-day schedule. Starting on October 17, 2023, it began collecting data on a daily schedule. An FEM monitor began collecting data continuously on September 8, 2023. The 2021-2023 annual $PM_{2.5}$ design value is 7.3 $\mu g/m^3$.

As provided in Appendix A, the 2023 design value for this site is less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all GA counties in Douglas CBSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Macon-Warner Robins, GA CSA

The Macon-Warner Robins CSA (Macon CSA) consists of two CBSAs:

1. Macon-Bibb County, GA CBSA - Bibb, Crawford, Jones, Monroe, and Twiggs Counties

2. Warner Robins, GA CBSA - Houston and Peach Counties

There are three $PM_{2.5}$ monitoring sites (AQS IDs: **13-021-0007**, **13-021-0012**, and **13-153-0001**) in the Macon CSA.

At the **13-021-0007** $PM_{2.5}$ site (Macon-Allied), there are two collocated FRM monitors and one FEM monitor. The two FRM monitors operated during the 2021-2023 monitoring period. The primary FRM monitor collected data on a one in three-day schedule while the collocated FRM monitor collected data on a one in twelve-day schedule. In addition, an FEM monitor started collecting data in June of 2023, with a NAAQS exclusion on the data. Georgia EPD submitted 11 exceptional events demonstrations to EPA for approval involving 5 Canadian wildfire events and 6 prescribed fire events. The 2021-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 9.4 $\mu g/m^3$. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 $\mu g/m^3$.

At the **13-021-0012** $PM_{2.5}$ site (Macon-Forestry), there are an FRM monitor and an FEM monitor. The FRM monitor collected data on a one in three-day schedule during the 2021-2023 monitoring period. The FEM monitor also ran from 2021-2023 collecting data continuously. From 2021 to September 30, 2024, the FEM monitor acted as the primary monitor. The 2021-2023 annual $PM_{2.5}$ design value is 8.4 $\mu g/m^3$.

At the **13-153-0001** $PM_{2.5}$ site (Warner Robins), there are an FRM monitor and an FEM monitor. The FRM monitor collected data on a one in three-day schedule during the 2021-2023 monitoring period. The FEM monitor also collected data continuously from 2021-2023. The 2021-2023 annual $PM_{2.5}$ design value is 8.7 $\mu g/m^3$.

As provided in Appendix A, the 2023 design values for these sites are equal to or less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all counties in the Macon CSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Savannah-Hinesville-Statesboro, GA CSA

The Savannah-Hinesville-Statesboro CSA (Savannah CSA) consists of four CBSAs:

1. Hinesville, GA CBSA - Liberty and Long Counties
2. Jesup, GA CBSA - Wayne County
3. Savannah, GA CBSA - Bryan, Chatham, and Effingham Counties
4. Statesboro, GA CBSA – Bulloch and Evans Counties

There is one $PM_{2.5}$ monitoring site (AQS: **13-051-1002**) in the Savannah CSA.

At the **13-051-1002** $PM_{2.5}$ site (Savannah-L&A), there are an FEM monitor and an FRM monitor. The FEM monitor collected data continuously during the 2021-2023 monitoring period. In addition, the FRM monitor began collecting data on a daily schedule as of March 13, 2023. The data collected in 2022 by the FEM monitor did not meet the completeness requirements of 40 CFR Part 50, Appendix N and is therefore not considered valid data. The 2021-2023 annual $PM_{2.5}$ design value is 8.7 $\mu g/m^3$.

As provided in Appendix A, the 2023 design value for this site is less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all counties in the Savannah CSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Valdosta, GA CBSA

The Valdosta, GA CBSA (Valdosta CBSA) consists of Brooks, Echols, Lanier, and Lowndes Counties. There is one $PM_{2.5}$ monitoring site (AQS ID: **13-185-0003**) in the Valdosta, GA CBSA.

At the **13-185-0003** $PM_{2.5}$ site (Valdosta), there are an FRM monitor and an FEM monitor. The FRM monitor collected data on a one in three-day schedule during the 2021-2023 monitoring period. The FEM monitor collected data continuously from 2021-2023. The 2021-2023 annual $PM_{2.5}$ design value is 8.6 $\mu g/m^3$.

As provided in Appendix A, the 2023 design value for this site is less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that all counties in the Valdosta CBSA be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Washington County, GA

Washington County, GA is not part of a CBSA. There is one $PM_{2.5}$ monitoring site (AQS ID: **13-303-0001**) in Washington County.

At the **13-303-0001** $PM_{2.5}$ site (Sandersville), there are two FEM monitors. One continuous FEM monitor collected data during the 2021-2023 monitoring period, and an additional collocated FEM monitor started collecting data in March 2023. Georgia EPD submitted 63 exceptional events demonstrations to EPA for approval involving 16 Canadian wildfire events and 47 prescribed fire events. The 2021-2023 annual $PM_{2.5}$ design value (without EPA concurrence for the exceptional events) is 10.0 $\mu g/m^3$. The 2021-2023 annual $PM_{2.5}$ design value (with EPA concurrence for the exceptional events) is 9.0 $\mu g/m^3$.

As provided in Appendix A, the 2023 design value for this site is equal to or less than 9.0 $\mu g/m^3$, which indicates attainment with the 2024 $PM_{2.5}$ annual NAAQS. Therefore, Georgia EPD recommends that Washington County be designated attainment for the 2024 $PM_{2.5}$ annual NAAQS.

Summary and Recommendations

The technical analysis results presented above, along with the exceptional events demonstrations submitted to EPA on February 7, 2025, show that Georgia EPD has no sites with 2021-2023 design values over the 2024 annual $PM_{2.5}$ standard (Appendix A). Therefore, Georgia EPD recommends that all counties in Georgia be designated attainment/unclassifiable for the 2024 $PM_{2.5}$ annual NAAQS (Appendix B).

EXECUTIVE CHAMBERS
KE KEʻENA O KE KIAʻĀINA

JOSH GREEN, M.D.
GOVERNOR
KE KIAʻĀINA

January 27, 2025

Ms. Cheree Peterson
Acting Regional Administrator
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

Aloha Ms. Peterson:

On behalf of the State of Hawaiʻi, I am submitting our recommended designation for the newly promulgated National Ambient Air Quality Standards (NAAQS) for fine particulate matter ($PM_{2.5}$), issued on February 7, 2024. Our recommendations are based on a review of the most recent air quality monitoring data from our ambient air quality monitoring stations.

Pursuant to Section 107(d)(1) of the Clean Air Act, we recommend the following designations for areas within the State of Hawaiʻi:

<u>Attainment Areas</u>:

- Hawaiʻi County – Big Island of Hawaiʻi
- Honolulu County – Island of Oʻahu
- Maui County – Covers the islands of Maui, Molokaʻi, Lānaʻi, and Kahoʻolawe

<u>Unclassifiable Areas</u>:

- Kauai County – Includes the islands of Kauaʻi and Niʻihau

Our analysis is based on data collected during calendar years 2021 through 2023, performed in accordance with EPA's guidance for area designations. Attached to this letter is a summary of monitored data supporting our designation recommendation.

We appreciate EPA, Region IX's collaboration in this process and look forward to working together to finalize designations. Should you have any questions or require additional information, please contact Ms. Kathleen Ho, Deputy Director for Environmental Health Administration at (808) 586-4424.

Mahalo,

Josh Green M.D.

Josh Green, M.D.
Governor, State of Hawaiʻi

Attachment

c: Dena Vallano, Ph.D., U.S. EPA, Region 9, Manager, Monitoring and Analysis Section (AIR-2-3)
Julia Carlstad, Ph.D., U.S. EPA, Region 9, Monitoring and Analysis Section (AIR-2-3)
Marianne Rossio, P.E., Manager, Clean Air Branch
Lisa Young, Supervisor, Clean Air Branch

ATTACHMENT I

State of Hawaii Designation Recommendation for the Annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS)

I. Recommendation

The U.S. Environmental Protection Agency (EPA) revised the primary health based Fine Particulate Matter ($PM_{2.5}$) annual National Ambient Air Quality Standard (NAAQS) on February 7, 2024. Pursuant to the Federal Clean Air Act Section 107(d)(1), states are required to make attainment, nonattainment, or unclassifiable recommendations one year after promulgation of a new or revised standard.

As detailed in this document, it is recommended that Hawaii County, Maui County and the City and County of Honolulu all be initially designated as in attainment and Kauai County be designated as unclassifiable for the new annual $PM_{2.5}$ NAAQS.

II. Basis for the Recommendation

The annual $PM_{2.5}$ standard is attained when the three-year average at each monitor does not exceed 9 micrograms per cubic meter (μg/m^3). The annual averages used to determine compliance with the revised standard are 2021, 2022 and 2023, collectively called the 2023 annual design value (DV).

The State of Hawaii Department of Health (DOH) currently operates fourteen (14) air monitoring stations that monitor $PM_{2.5}$. Three (3) are State and Local Air Monitoring Stations (SLAMS) and eleven (11) are Special Purpose Monitoring Stations (SPMS).

All of the SLAMS (Honolulu, Kapolei/NCore, and Sand Island) are in the City and County of Honolulu, which is the largest Metropolitan Statistical Area (MSA) in the state and where the majority of anthropogenic sources are located. The 2023 DV show that all three (3) SLAMS have complete data and are in attainment of the annual standard. A fourth SLAM, previously operated by DOH (the Pearl City station) was discontinued on April 6, 2022, and does not have enough data to be used for the attainment designation.

Maui County (the second and smallest MSA) has two (2) SPMS located in Kihei and Kahului. The 2023 DV for the Kahului station shows the SPMS in attainment of the annual standard. The Kihei station had previously been a SLAMS but was discontinued on March 30, 2022, and was later started up again on August 22, 2023, as a SPMS due to windblown dust and brush fire events. As a result, the DOH does not have enough data to make a designation determination for this station. Both stations are primarily to monitor the effects of agricultural activities and wildfires.

Nine (9) $PM_{2.5}$ SPMS are located in Hawaii County and monitor the impact of emissions from the Kilauea volcano. The 2023 DVs for Kona, Pahala, Ocean View, Mountain View, and Kailua-Kona stations are in attainment of the annual standard.

The $PM_{2.5}$ monitor at the Hilo station had data completeness of <50% in the 1st quarter of 2021, and therefore a data substitution test per Appendix N to 40 CFR 50 was not allowed. The initial DV for the Hilo station is therefore invalid; the available data is included in Table 1. The $PM_{2.5}$ monitor at the Waikoloa station only operated during the fourth quarter of 2021 and the $PM_{2.5}$ monitor at the Naalehu station only began operating in December of 2022. The Keaau station was only established at its current location in June 2022. These four stations, along with the discontinued Honaunau station, do not have enough data to be used for attainment designation.

The remaining SPMS is in Kauai County and was established to monitor cruise ship emissions. The Niumalu station began operating in April 2011 and $PM_{2.5}$ sampling was discontinued there on March 31, 2022. This station has an incomplete 2023 DV and is therefore unclassifiable because there is not enough data to make a designation determination.

All $PM_{2.5}$ monitoring stations listed in this document show that the annual averages are in attainment and are well below the new standard of 9 µg/m^3. Note that even the stations with incomplete 2023 DVs that are not listed on Table 1 (including Pearl City, Niumalu, Kihei, Waikoloa, Honaunau, Naalehu temporary and Naalehu current) all had annual averages no higher than 3.4 µg/m^3 per AQS AMP 480 design value report.

III. Annual $PM_{2.5}$ NAAQS Data

Counties in Attainment for the Annual $PM_{2.5}$ NAAQS (9 µg/m^3)

1. The 2023 DVs for the stations in the City and County of Honolulu, Maui County, and Hawaii County are shown in *Table 1*.

Table 1. 2023 DVs for the City and County of Honolulu, Maui County and Hawaii County

Station	2021 Annual Mean (µg/m^3)	2022 Annual Mean (µg/m^3)	2023 Annual Mean (µg/m^3)	3-year average (2023 DV) (µg/m^3)
City & County of Honolulu				
Honolulu (150031001)	2.9	3.3	4.1	3.4
Kapolei (150030010)	2.9	3.8	4.5	3.7
Sand Island (150031004)	3.3	3.7	3.9	3.6
Maui County				
Kahului (150090025)	3.9	4.0	4.0	4.0
Hawaii County				
Hilo (150011006)	3.7*	3.4	2.9	3.3*
Kona (150011012)	3.6	4.7	3.2	3.9
Pahala (150012016)	2.5	3.6	3.6	3.2
Ocean View (150012020)	3.5	4.6	2.6	3.6
Mt. View (150012023)	1.7	2.4	2.1	2.1
Kailua-Kona (150013034)	4.7	5.3	3.4	4.4

* Annual mean did not meet completeness criteria, substitution test not allowed due to <50% data completeness in 1st quarter. DV not valid for only Hilo.

Counties Unclassifiable for the Annual $PM_{2.5}$ NAAQS

$PM_{2.5}$ monitoring a the Niumalu station was discontinued on March 31, 2022, and does not have enough data for designation determination and therefore is currently unclassifiable. The available data is presented in *Table 3.*

Table 3. 2023 DV for Kauai County

Station	2021 Annual Mean (µg/m³)	2022 Annual Mean (µg/m³)	2023 Annual Mean (µg/m³)	3-year average (2023 DV) (µg/m³)
Kauai County				
Niumalu (150070007)	3.2	2.3*	None	2.7*

*$PM_{2.5}$ monitoring at the Niumalu station was discontinued on March 31, 2022.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: XGSWU

DESIGN VALUE REPORT

Report Request ID: 2246036 Report Code: AMP480 Dec. 13, 2024

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	15										

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
DESIGN VALUE	88101		

SELECTED OPTIONS

Option Type	Option Value
SINGLE EVENT PROCESSING	EXCLUDE REGIONALLY CONCURRED EVENTS
MERGE PDF FILES	YES
AGENCY ROLE	PQAO
USER SITE METADATA	STREET ADDRESS
QUARTERLY DATA IN WORKFILE	NO
WORKFILE DELIMITER	,
USE LINKED SITES	YES

DATE CRITERIA

Start Date	End Date
2023	2023

APPLICABLE STANDARDS

Standard Description
PM25 24-hour 2024
PM25 Annual 2024

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

Report Date: Dec. 13, 2024

Pollutant: Site-LevelPM2.5 - Local Conditions(88101)
Standard Units: Micrograms/cubic meter (LC)(105)
NAAQS Standard: PM25 24-hour 2024 / PM25 Annual 2024
Statistic: Annual Weighted Mean **Level:** 9
Statistic: Annual 98th Percentile **Level:** 35

Design Value Year: 2023

REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

State Name: Hawaii

Site_ID / STREET ADDRESS	2023					2022					2021					24-Hour		Annual	
	Cred. Days	*Comp. Qrtrs*	*98th Perctil*	*Wtd. Mean*	*Cert& Eval*	*Cred. Days*	*Comp. Qrtrs*	*98th Perctil*	*Wtd. Mean*	*Cert& Eval*	*Cred. Days*	*Comp. Qrtrs*	*98th Perctil*	*Wtd. Mean*	*Cert& Eval*	*Design Value*	*Valid Ind.*	*Design Value*	*Valid Ind.*
15-001-1006	343	4	6.2	2.9	Y	324	4	7.0	3.4	Y	238	1	6.5*	3.7*	Y	7	N	3.3	N
1099 WAIANUENUE AVE, HILO																			
15-001-1012	365	4	11.5	3.2	Y	350	4	9.1	4.7	Y	364	4	10.0	3.6	Y	10	Y	3.9	Y
81-1043 KONAWAENA SCHOOL RD																			
15-001-2016	359	4	7.0	3.6	Y	357	4	7.0	3.6	Y	351	4	6.7	2.5	Y	7	Y	3.2	Y
96-3150 PIKAKE ST																			
15-001-2020	360	4	10.2	2.6	Y	346	4	9.3	4.6	Y	342	4	9.6	3.5	Y	10	Y	3.6	Y
ORCHID PARKWAY, HAWAIIAN OCEAN VIEW ESTATES																			
15-001-2021	357	4	9.9	2.8	Y	347	4	6.4	2.3	Y	92	1	8.4*	1.8*	Y	8	N	2.3	N
UNNAMED ROAD, 1.5 MILES FROM QUEEN KAAHUNAMU HWY																			
15-001-2023	359	4	5.3	2.1	Y	347	4	6.8	2.4	Y	336	4	4.6	1.7	Y	6	Y	2.1	Y
18-1235 VOLCANO ROAD																			
15-001-3027	355	4	5.3	2.5	Y	346	4	6.6	2.7	Y	328	4	5.6	2.7	Y	6	Y	2.6	Y
16-714 Volcano Road, Keaau, HI 96749																			
15-001-3028		0		*		30	0	9.1*	2.7 *	Y	341	4	5.3	2.4	Y	7	N	2.5	N
95-5545 Mamalahoa Hwy Naalehu, HI 96772																			
15-001-3032		0		*		4	0	2.2*	1.1 *	Y	332	4	9.5	1.8	Y	6	N	1.5	N
Hoonaunau																			
15-001-3033	364	4	6.7	3.0	Y	27	0	5.7*	3.3 *	Y		0		*		6	N	3.2	N
95-5545 Mamalahoa Hwy Naalehu, HI 96772																			
15-001-3034	360	4	11.2	3.4	Y	337	4	10.2	5.3	Y	345	4	11.2	4.7	Y	11	Y	4.4	Y
Kailua-Kona																			

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
PRELIMINARY DESIGN VALUE REPORT

Report Date: Dec. 13, 2024

Pollutant: Site-LevelPM2.5 - Local Conditions(88101)
Standard Units: Micrograms/cubic meter (LC)(105)
NAAQS Standard: PM25 24-hour 2024 / PM25 Annual 2024
Statistic: Annual Weighted Mean **Level:** 9
Statistic: Annual 98th Percentile **Level:** 35

Design Value Year: 2023

REPORT EXCLUDES MEASUREMENTS WITH REGIONALLY CONCURRED EVENT FLAGS.

State Name: Hawaii

	2023					2022					2021					24-Hour		Annual	
Site_ID / STREET ADDRESS	**Cred.** ***Days***	**Comp.** ***Qrtrs***	**98th** ***Perctil***	**Wtd.** ***Mean***	**Cert&** ***Eval***	**Cred.** ***Days***	**Comp.** ***Qrtrs***	**98th** ***Perctil***	**Wtd.** ***Mean***	**Cert&** ***Eval***	**Cred.** ***Days***	**Comp.** ***Qrtrs***	**98th** ***Perctil***	**Wtd.** ***Mean***	**Cert&** ***Eval***	**Design** ***Value***	**Valid** ***Ind.***	**Design** ***Value***	**Valid** ***Ind.***
15-003-0010 2052 LAUWILIWILI ST	336	3	10.0	4.5*	Y	344	4	8.1	3.8	Y	336	3	6.7	2.9*	Y	8	Y	3.7	Y
15-003-0099 2052 LAUWILIWILI ST	170	2	8.5*	3.9*	Y	301	3	7.6*	3.6 *	Y		0		*		8	N	3.8	N
15-003-1001 1250 PUNCHBOWL ST, HONOLULU	365	4	8.3	4.1	Y	354	4	7.2	3.3	Y	349	4	5.9	2.9	Y	7	Y	3.4	Y
15-003-1004 1039 SAND ISLAND PARKWAY	356	4	10.0	3.9	Y	350	4	8.2	3.7	Y	357	4	6.2	3.3	Y	8	Y	3.6	Y
15-003-2004 860 4TH ST, PEARL CITY		0		*		86	1	6.3*	3.4 *	Y	340	4	6.1	3.2	Y	6	N	3.3	N
15-007-0007 2342 HULEMALU ROAD, KAUAI		0		*		90	1	5.2*	2.3 *	Y	342	4	7.2	3.2	Y	6	N	2.7	N
15-009-0006 KAIHOI ST AND KAIOLOHIA ST		0		*		86	1	6.9*	2.3 *	Y	355	4	5.7	2.5	Y	6	N	2.4	N
15-009-0025 TMK 9-8-013:029	341	4	8.3	4.0	Y	358	4	7.7	4.0	Y	338	4	7.3	3.9	Y	8	Y	4.0	Y

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

CERTIFICATION EVALUATION AND CONCURRENCE FLAG MEANINGS

FLAG	MEANING
M	The monitoring organization has revised data from this monitor since the most recent certification letter received from the state.
N	The certifying agency has submitted the certification letter and required summary reports, but the certifying agency and/or EPA has determined that issues regarding the quality of the ambient concentration data cannot be resolved due to data completeness, the lack of performed quality assurance checks or the results of uncertainty statistics shown in the AMP255 report or the certification and quality assurance report.
S	The certifying agency has submitted the certification letter and required summary reports. A value of "S" conveys no Regional assessment regarding data quality per se. This flag will remain until the Region provides an "N" or "Y" concurrence flag.
U	Uncertified. The certifying agency did not submit a required certification letter and summary reports for this monitor even though the due date has passed, or the state's certification letter specifically did not apply the certification to this monitor.
X	Certification is not required by 40 CFR 58.15 and no conditions apply to be the basis for assigning another flag value
Y	The certifying agency has submitted a certification letter, and EPA has no unresolved reservations about data quality (after reviewing the letter, the attached summary reports, the amount of quality assurance data submitted to AQS, the quality statistics, and the highest reported concentrations).

Notes: 1. Computed design values are a snapshot of the data at the time the report was run (may not be all data for year).
2. Some PM2.5 24-hour DVs for incomplete data that are marked invalid here may be marked valid in the Official report due to additional analysis.
3. Annual Values not meeting completeness criteria are marked with an asterisk ('*').

OFFICE OF THE GOVERNOR OF IOWA

Governor Kim Reynolds

January 27, 2025

Meghan A. McCollister
Regional Administrator
U.S. Environmental Protection Agency, Region 7
11201 Renner Blvd
Lenexa, KS 66219

RE: Iowa's Designation Recommendations for the 2024 Annual $PM_{2.5}$ National Ambient Air Quality Standard

Dear Administrator McCollister:

On February 7, 2024, the U.S. Environmental Protection Agency (EPA) promulgated a revision to the national ambient air quality standards (NAAQS) for fine particulate matter ($PM_{2.5}$). In that action, EPA strengthened the primary annual $PM_{2.5}$ standard from 12.0 to 9.0 micrograms per cubic meter.

Within one year of a NAAQS revision, section 107(d)(1)(A) of the federal Clean Air Act requires the Governor of each state to submit a list to EPA recommending a designation of attainment, nonattainment, or unclassifiable for each area in the state.

A review of Iowa's 2021-2023 $PM_{2.5}$ monitoring data in the enclosed document confirms all eligible sites measured values that meet the revised annual $PM_{2.5}$ standard. I therefore recommend that EPA designate each of Iowa's 99 counties as attainment for the 2024 $PM_{2.5}$ NAAQS.

Please do not hesitate to contact my office with any questions regarding this topic.

Sincerely,

Kim Reynolds
Governor of Iowa

Enclosure

$PM_{2.5}$ Annual Design Values (DV) for Iowa Monitors: 2021-2023 (Design values of 9.0 micrograms per cubic meter ($\mu g/m^3$) or less attain the standard)		
Monitoring Location[1]	**Monitor Site ID**	**Annual $PM_{2.5}$ DV ($\mu g/m^3$)**
Waterloo, Water Tower	190130009	8.4
Clinton, Rainbow Park	190450021	8.3
Iowa City, Hoover School	191032001	8.4
Cedar Rapids, Public Health	191130040	8.6
Viking Lake State Park	191370002	7.2
Muscatine HS – East Campus	191390015	8.6
Muscatine, Greenwood Cemetery	191390016	8.3
Des Moines, Health Department	191530030	8.2
Council Bluffs, Franklin School	191550009	8.7
Davenport, Jefferson School	191630015	8.4
Davenport, Hayes School	191630020	8.9
Lake Sugema State Park	191770006	7.5
Sioux City, Irving School	191930021	8.6

[1] Per 40 CFR 58.30(a), $PM_{2.5}$ measurement data from monitors that are not representative of area-wide air quality but rather of relatively unique micro-scale, or localized hot spot, or unique middle-scale impact sites are not eligible for comparison to the annual $PM_{2.5}$ NAAQS. This table thus appropriately excludes the source-oriented sites in Clinton (Chancy Park, Monitor ID 190450019) and Muscatine (Musser Park, Monitor ID 191390020).

1410 N Hilton Street
Boise, ID 83706 • (208) 373-0502

Brad Little, Governor
Jess Byrne, Director

January 30, 2025

Dan Opalski
Acting Regional Administrator
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

Dear Mr. Opalski:

On behalf of the Governor of the State of Idaho, and as Director of Idaho Department of Environmental Quality (DEQ), I am submitting Idaho's recommendations for area designations related to the February 7, 2024, Reconsideration of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM).

The U.S. Environmental Protection Agency (EPA) strengthened the annual health-based $PM_{2.5}$ NAAQS by lowering the annual mean, averaged over 3-years, from 12 $\mu g/m^3$ to 9 $\mu g/m^3$. According to the February 7, 2024, Federal Register (89 FR 16202), attainment designations should be based on the most recent complete three consecutive years of quality-assured, certified air quality data. Idaho's recommendation is based on the most recent certified data, 2021 – 2023.

On January 24, 2025, DEQ submitted demonstrations and concurrence requests for exceptional events during the 2022 and 2023 wildfire seasons. Based on concurrence, the 2021 - 2023 design values for all regulatory $PM_{2.5}$ monitors operated by DEQ demonstrate compliance with the 2024 $PM_{2.5}$ NAAQS.

Table 1 lists the three-year average design values based on certified monitoring data with the monitor values listed Attachments A and B flagged as "exceptional events" (EE) removed for Salmon, Pinehurst, and St Maries.

Table 1. 2021-2023 PM2.5 annual design values (µg/m3) with exceptional events monitor values removed.

Site Name	County/AQS ID	Design Value
Meridian–St. Luke's	Ada/160010010	7.6
Nampa	Canyon/160270002	8.9
St. Maries	Benewah/160090010	8.9
Preston	Franklin/160410002	6.6
Salmon	Lemhi/160590004	8.9
Pinehurst	Shoshone/160790017	8.9

Idaho's recommendation of attainment for Pinehurst, Salmon, and St. Maries is based on DEQ's assessment of exceptional events for 2021, 2022, and 2023. DEQ submitted initial notification for 2021-2023 exceptional event days on March 13, 2024, and submitted demonstrations for 2022 and 2023 requesting EPA's concurrence on January 24, 2025.

While DEQ believes that the 2021 exceedance days at the Pinehurst and St. Maries monitors were likely influenced by wildfire to a degree that might otherwise trigger regulatory significance, DEQ has not submitted formal exceptional events demonstrations for such events because DEQ does not anticipate that events in 2021 will have regulatory significance as indicated in the EPA's memorandum, Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard, issued on February 7, 2024. In the unlikely circumstance that events in 2021 are determined to have regulatory significance for final designations decisions for the 2024 revised primary annual $PM_{2.5}$ NAAQS, DEQ will work with the EPA to provide additional information consistent with the requirements of the EPA's Exceptional Events Rule. Further information on 2021 events can be found in the attachment "2021 Days Flagged as Exceptional Events for Wildfire Smoke Impacts."

On behalf of the Governor of the State of Idaho, Brad Little, I recommend attainment designation for Ada, Benewah, Canyon, Franklin, Lemhi, and Shoshone counties and unclassifiable designation for all remaining counties for the 2024 annual $PM_{2.5}$ NAAQS.

If there are any further questions, please coordinate through Michael Simon, Acting Air Quality Division Administrator at (208) 373-0212.

Sincerely,

Jess Byrne

Jess Byrne
Director

c: Brad Little, Governor of Idaho
Michael Simon, Acting Air Quality Division Administrator

Attachment A:

2021 Days Flagged as Exceptional Events for Wildfire Smoke Impacts

The days flagged for wildfire smoke (EE) impacts in 2021 in AQS are listed in Table 1 for the Pinehurst and St. Maries monitors. Figures 1-5 show smoke impacts from surrounding state and local wildfires at the Idaho monitors for several days from July to September 2021 using the AirNow Tech Navigator tool to capture satellite images from NASA's MODIS Terra. DEQ did not include satellite imagery for every day as it is not required for 2021.

Table 1. 2021 Days Flagged as Exceptional Events for Wildfire Smoke Impacts.

Date	Daily Average Concentration ($\mu g/m^3$)	Monitor Site	Monitor ID
7/13/2021	27.6	Pinehurst	160790017
7/14/2021	41.3	Pinehurst	160790017
7/18/2021	29	Pinehurst	160790017
7/19/2021	40.4	Pinehurst	160790017
7/24/2021	23.2	Pinehurst	160790017
7/25/2021	22.2	Pinehurst	160790017
7/30/2021	33.2	Pinehurst	160790017
7/31/2021	41.2	Pinehurst	160790017
8/1/2021	42.1	Pinehurst	160790017
8/2/2021	69.6	Pinehurst	160790017
8/3/2021	65.1	Pinehurst	160790017
8/4/2021	45.5	Pinehurst	160790017
8/5/2021	57.8	Pinehurst	160790017
8/6/2021	29.3	Pinehurst	160790017
8/12/2021	81.1	Pinehurst	160790017
8/13/2021	91.1	Pinehurst	160790017
8/14/2021	86	Pinehurst	160790017
8/15/2021	42.4	Pinehurst	160790017
8/17/2021	37	Pinehurst	160790017
9/8/2021	28.9	Pinehurst	160790017
9/9/2021	33.8	Pinehurst	160790017
9/10/2021	38.8	Pinehurst	160790017
9/5/2021	22.2	Pinehurst	160790017
7/19/2021	35.2	St. Maries	160090010
7/30/2021	44.4	St. Maries	160090010
7/31/2021	55.1	St. Maries	160090010
8/1/2021	49	St. Maries	160090010
8/2/2021	66.7	St. Maries	160090010

8/3/2021	63.9	St. Maries	160090010
8/4/2021	36.4	St. Maries	160090010
8/12/2021	86.7	St. Maries	160090010
8/13/2021	112.3	St. Maries	160090010
8/14/2021	81.2	St. Maries	160090010
8/15/2021	46.1	St. Maries	160090010
9/9/2021	37.8	St. Maries	160090010
9/10/2021	34.8	St. Maries	160090010

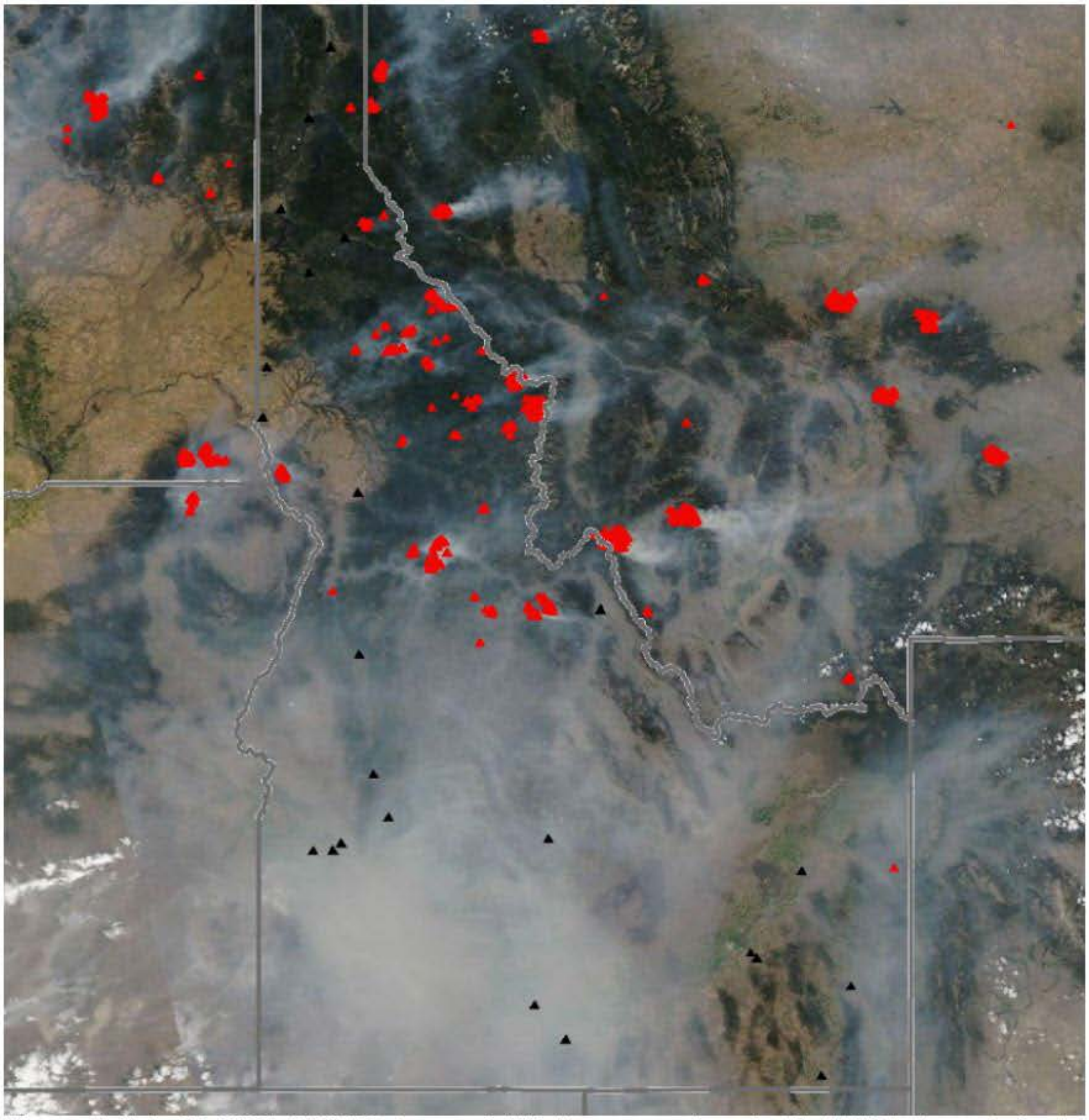


Figure 1. July 25, 2021- MODIS Terra satellite image overlayed with HMS hot spots (red triangles) and 24-hour PM2.5 observed at active Idaho monitors (black triangles).

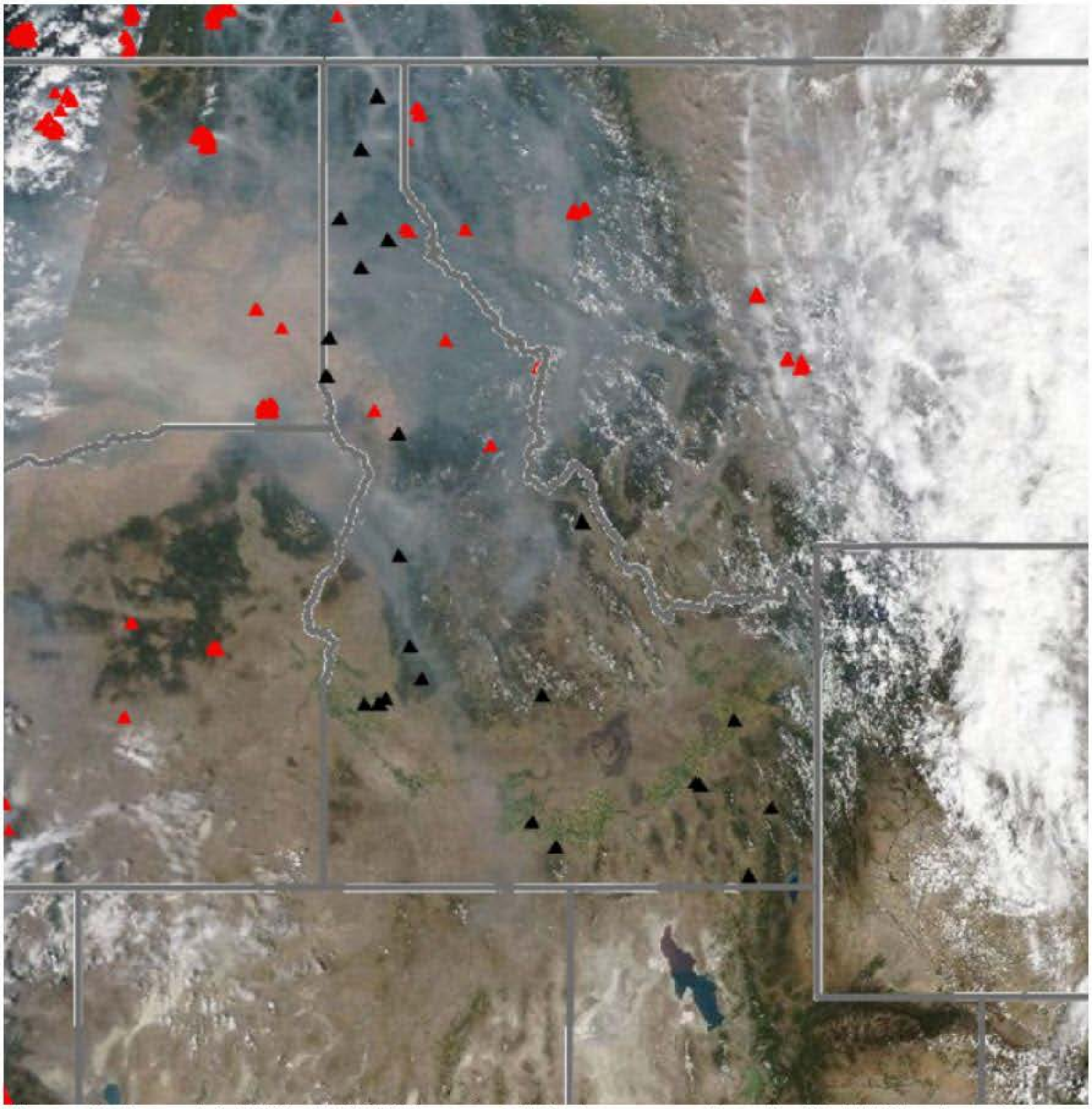


Figure 2. August 3, 2021- MODIS Terra satellite image overlayed with HMS hot spots (red triangles) and 24-hour PM2.5 observed at active Idaho monitors (black triangles).

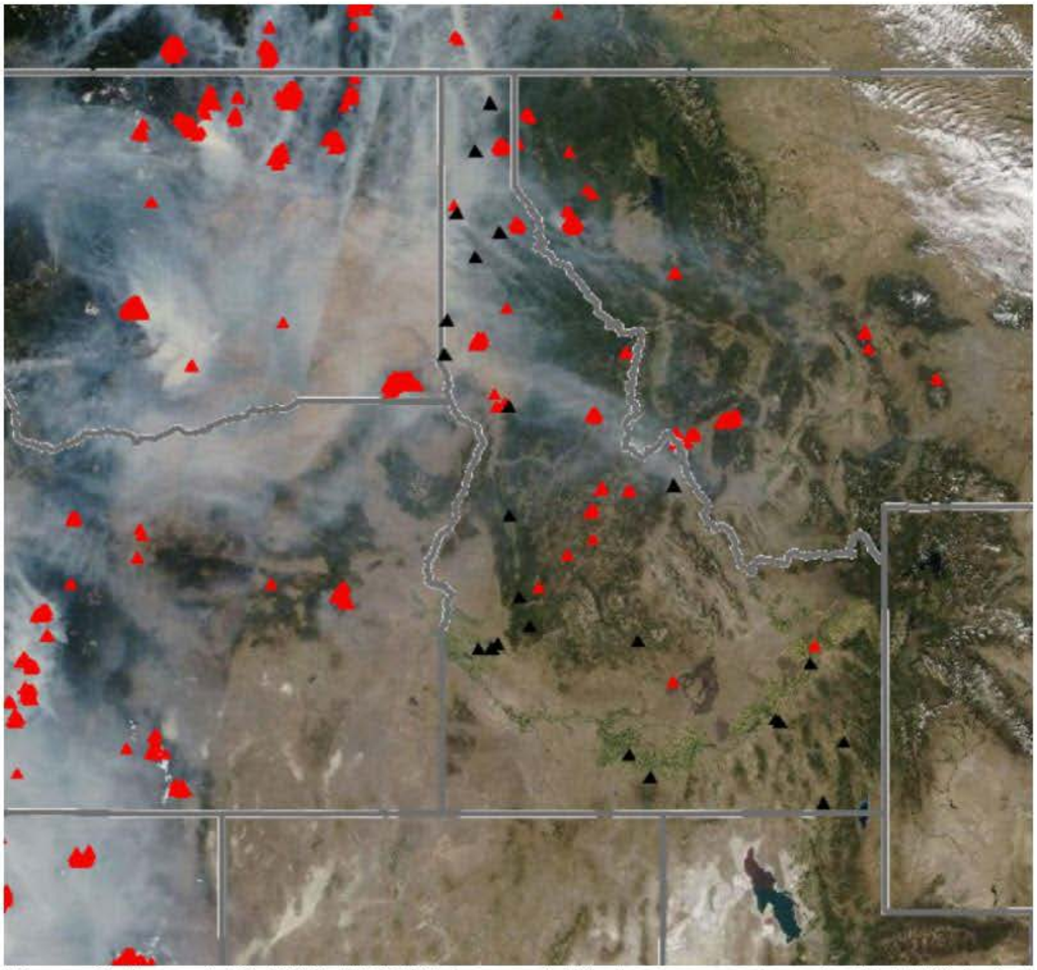


Figure 3. August 12, 2021- MODIS Terra satellite image overlayed with HMS hot spots (red triangles) and 24-hour PM2.5 observed at active Idaho monitors (black triangles).

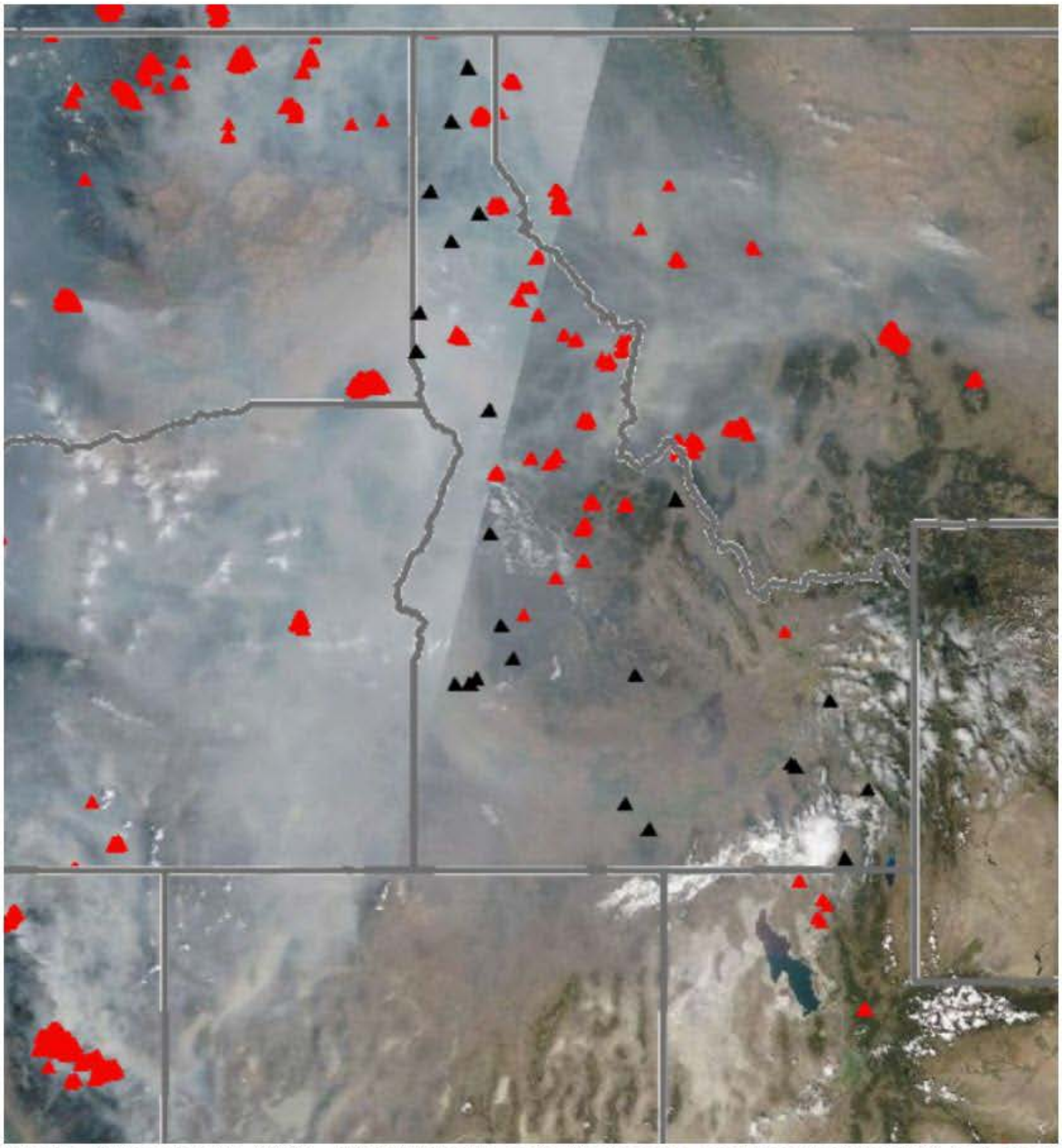


Figure 4 August 15, 2021 - MODIS Terra satellite image overlayed with HMS hot spots (red triangles) and 24-hour PM2.5 observed at active Idaho monitors (black triangles).

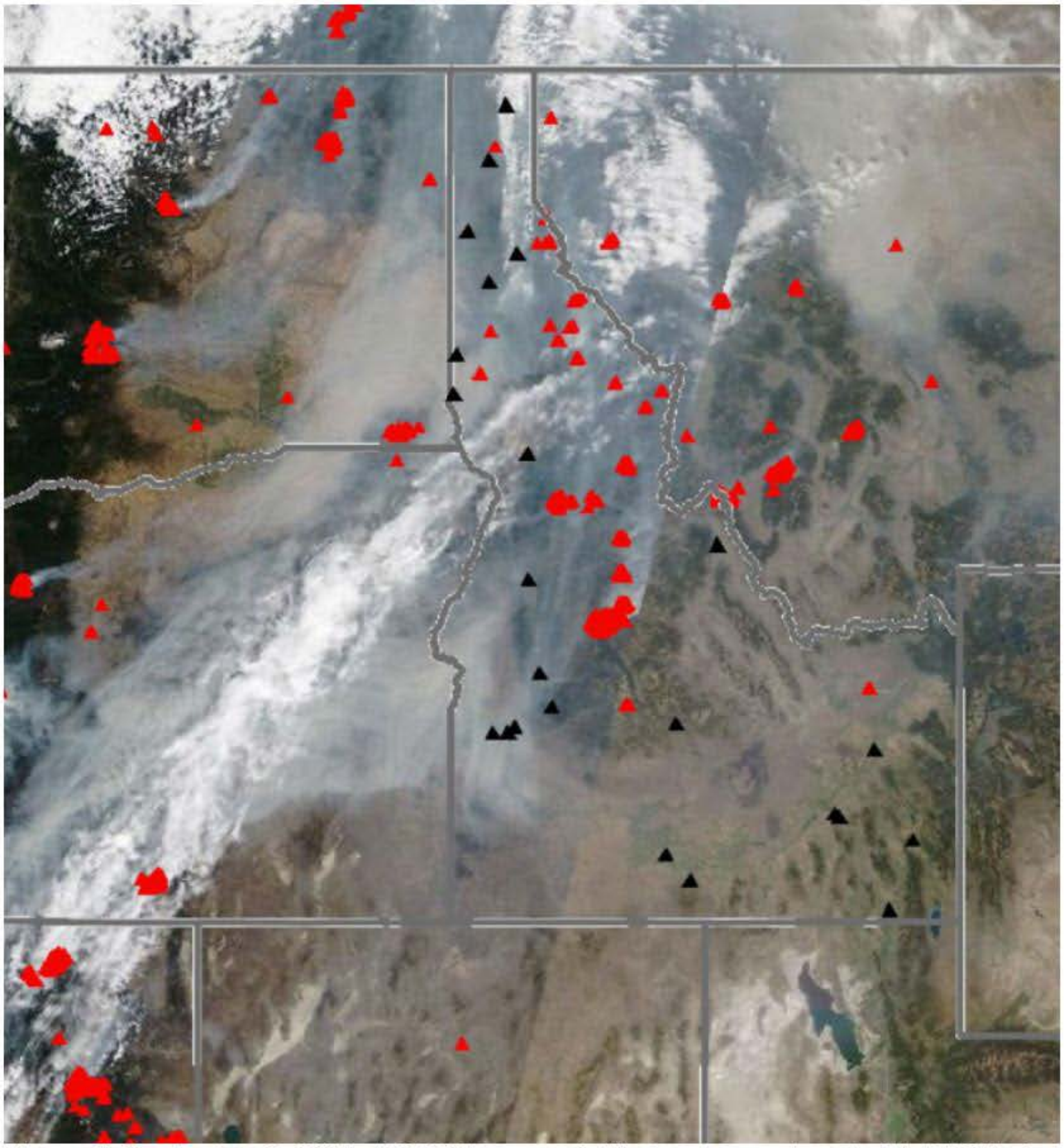


Figure 5. September 8, 2021 - MODIS Terra satellite image overlayed with HMS hot spots (red triangles) and 24-hour PM2.5 observed at active Idaho monitors (black triangles).

Attachment B

2022 and 2023 Monitor Values Submitted for Concurrence as Exceptional Events for Wildfire Smoke Impacts

Tables 1 and 2 list the dates and monitor values that DEQ has submitted demonstrations and concurrence request for the 2022 and 2023 wildfire seasons respectively.

Table 1. 2022 Monitor values for which DEQ has submitted for EPA concurrence.

Date	Daily Average Concentration	Monitor Site	Monitor ID
7/19/2022	46.3	Salmon	160590004
7/20/2022	40.8	Salmon	160590004
7/21/2022	41.5	Salmon	160590004
7/23/2022	99.0	Salmon	160590004
7/24/2022	44.1	Salmon	160590004
7/25/2022	42.1	Salmon	160590004
7/26/2022	38.5	Salmon	160590004
7/27/2022	36.0	Salmon	160590004
7/31/2022	40.5	Salmon	160590004
8/1/2022	37.1	Salmon	160590004
8/2/2022	60.2	Salmon	160590004
8/5/2022	52.6	Salmon	160590004
8/8/2022	34.6	Salmon	160590004
8/9/2022	31.8	Salmon	160590004
8/16/2022	45.0	Salmon	160590004
8/17/2022	42.8	Salmon	160590004
8/18/2022	35.8	Salmon	160590004
9/1/2022	33.6	Salmon	160590004
9/2/2022	34.5	Salmon	160590004
9/3/2022	35.9	Salmon	160590004
9/4/2022	71.7	Salmon	160590004
9/5/2022	68.0	Salmon	160590004
9/6/2022	58.5	Salmon	160590004
9/7/2022	90.7	Salmon	160590004
9/8/2022	123	Salmon	160590004
9/9/2022	75.7	Salmon	160590004
9/10/2022	32.0	Salmon	160590004
9/11/2022	40.3	Salmon	160590004
9/12/2022	109.3	Salmon	160590004
9/13/2022	116.5	Salmon	160590004
9/14/2022	70.0	Salmon	160590004
9/10/2022	39.5	St. Maries	160090010
9/11/2022	82.1	St. Maries	160090010

Date	Daily Average Concentration	Monitor Site	Monitor ID
9/12/2022	87.3	St. Maries	160090010
9/13/2022	73.3	St. Maries	160090010
9/14/2022	39.5	St. Maries	160090010
8/19/2022	13.6	Pinehurst	160790017
8/20/2022	14.8	Pinehurst	160790017
9/1/2022	14.0	Pinehurst	160790017
9/2/2022	17.1	Pinehurst	160790017
9/3/2022	25.1	Pinehurst	160790017
9/4/2022	14.4	Pinehurst	160790017
9/8/2022	13.0	Pinehurst	160790017
9/9/2022	21.6	Pinehurst	160790017
9/10/2022	18.8	Pinehurst	160790017
9/11/2022	65.0	Pinehurst	160790017
9/12/2022	84.6	Pinehurst	160790017
9/13/2022	70.3	Pinehurst	160790017
9/14/2022	35.8	Pinehurst	160790017
9/15/2022	18.5	Pinehurst	160790017
9/16/2022	12.4	Pinehurst	160790017
9/28/2022	15.4	Pinehurst	160790017

Table 2. 2023 Monitor values for which DEQ has submitted for EPA concurrence.

Date	Daily Average Concentration	Monitor Site	Monitor ID
5/17/2023	18.6	Pinehurst	160790017
5/18/2023	21.8	Pinehurst	160790017
5/19/2023	22.5	Pinehurst	160790017
5/20/2023	16.0	Pinehurst	160790017
6/16/2023	17.1	Pinehurst	160790017
8/16/2023	21.5	Pinehurst	160790017
8/17/2023	23.3	Pinehurst	160790017
8/19/2023	58.2	Pinehurst	160790017
8/20/2023	63.0	Pinehurst	160790017
8/21/2023	18.5	Pinehurst	160790017
8/22/2023	29.9	Pinehurst	160790017
8/23/2023	22.7	Pinehurst	160790017
8/24/2023	16.5	Pinehurst	160790017
8/25/2023	18.7	Pinehurst	160790017
8/26/2023	15.0	Pinehurst	160790017
8/27/2023	14.3	Pinehurst	160790017
8/29/2023	12.3	Pinehurst	160790017
5/18/2023	24.5	St. Maries	160090010

Date	Daily Average Concentration	Monitor Site	Monitor ID
5/19/2023	21.9	St. Maries	160090010
8/17/2023	28.4	St. Maries	160090010
8/19/2023	55.0	St. Maries	160090010
8/20/2023	69.9	St. Maries	160090010
8/22/2023	32.0	St. Maries	160090010

STATE OF KANSAS

CAPITOL BUILDING, ROOM 241 SOUTH
TOPEKA, KS 66612

PHONE: (785) 296-3232
GOVERNOR.KANSAS.GOV

GOVERNOR LAURA KELLY

February 5, 2025

Meg McCollister, Regional Administrator
USEPA, Region VII
11201 Renner Boulevard
Lenexa, KS 66219

Dear Ms. McCollister:

On February 7, 2024, the Environmental Protection Agency (EPA) promulgated a revised primary annual $PM_{2.5}$ national ambient air quality standard (NAAQS) [89 FR 16202]. The process for designations following promulgation of new or revised NAAQS is contained in Section 107(d) of the Clean Air Act (Act). This section of the Act provides a process for the Governor to submit area designation recommendations of attainment, nonattainment, or unclassifiable, with appropriate boundaries, to EPA within one year of promulgation of a new or revised NAAQS. Kansas has until February 7, 2025, to submit designation recommendations for the 2024 Primary Annual $PM_{2.5}$ NAAQS to EPA. This letter and enclosure are intended to fulfill this obligation for the State of Kansas.

Based on 2021-2023 quality assured complete ambient air quality data for all Kansas and nearby $PM_{2.5}$ monitors, it was determined that there are three areas in Kansas (Wyandotte, Neosho and Sedgwick Counties) that are currently not meeting the 2024 Primary Annual $PM_{2.5}$ National Ambient Air Quality Standard. The State of Kansas recommends that these three areas should be deemed as "unclassifiable" based on the discussion and analysis presented in the body of the attached technical document. In addition, Johnson County should be classified as "attainment" based on that monitor meeting the new standard and the remainder of the 101 counties in Kansas (as listed in Table 1 of the technical document) be designated individually as "unclassifiable/attainment" for the 2024 Primary Annual $PM_{2.5}$ NAAQS. Please see enclosure for details supporting these designation recommendations.

These designation recommendations do not include any of the following Indian Country within Kansas: the Kickapoo Tribe in Kansas, the Sac and Fox Nation of Missouri in Kansas and Nebraska, the Prairie Band Potawatomi Nation and the Iowa Tribe in Kansas and Nebraska.

Please feel free to contact Leo Henning, Deputy Secretary and Director of the Division of Environment, at (785) 296-1534 or leo.henning@ks.gov if you have any questions regarding these designation recommendations.

Sincerely,

Laura Kelly
Governor of Kansas

Enclosure
cc: Janet Stanek, Secretary, KDHE
William Stone, USEPA, Region VII
Leo Henning, Deputy Secretary and Director, Division of Environment
Douglas Watson, Director, Bureau of Air

2024 Primary Annual Fine Particulate Matter ($PM_{2.5}$) National Ambient Air Quality Standard Designation Recommendations for Kansas

February 7, 2025

Kansas Department of Health and Environment
Division of Environment
Bureau of Air
1000 SW Jackson, Suite 310
Topeka, Kansas 66612
(785) 296-6024

Overview

On February 7, 2024, the Environmental Protection Agency (EPA) promulgated a revised primary annual $PM_{2.5}$ national ambient air quality standard (NAAQS). The $PM_{2.5}$ NAAQS was published in the Federal Register on March 6, 2024 [89 FR 16202][1]. In that action, the EPA revised the primary annual $PM_{2.5}$ standard, strengthening it from 12.0 micrograms per cubic meter ($\mu g/m^3$) to 9.0 $\mu g/m^3$. In that same action, EPA retained the existing secondary annual standard for $PM_{2.5}$, the existing primary and secondary 24-hour standards for $PM_{2.5}$, and the existing primary and secondary standards for particulate matter with aerodynamic diameters of 10 microns or less (PM_{10}).

Section 107(d) of the Clean Air Act requires each state to submit area designation recommendations of attainment, nonattainment, or unclassifiable, with appropriate boundaries, to EPA within one year of promulgation of a new or revised NAAQS. EPA can either accept the recommendations or make modifications, as necessary. Section 107(d)(1)(A) of the Clean Air Act defines a nonattainment area as any area that does not meet or that contributes to nearby areas not meeting the NAAQS.

Kansas has until February 7, 2025, to submit designation recommendations for the 2024 Primary Annual $PM_{2.5}$ NAAQS to EPA. EPA will then notify Kansas concerning any modifications to the recommendations and allow for comments to their changes by Mid-October 2025. Kansas then has until Mid-November 2025 to comment on the EPA modified recommendations, which will be finalized by February 6, 2026.

The purpose of this document is to summarize the analysis prepared to support the Kansas 2024 Primary Annual $PM_{2.5}$ designation recommendations to EPA. This analysis is based on information and data collected for calendar years 2021 – 2023, and the February 7, 2024 EPA Memorandum *Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard.*[2]

Summary of Recommendation

Based on 2021 – 2023 quality assured complete ambient air quality data for all Kansas and nearby $PM_{2.5}$ monitors, it was determined that there are three areas in Kansas (Wyandotte, Neosho, and Sedgwick Counties) that are currently not meeting the 2024 Primary Annual $PM_{2.5}$ National Ambient Air Quality Standard. The State of Kansas recommends that these three areas should be deemed as "unclassifiable" based on the discussion and analysis presented in the body of this document. In addition, Johnson County should be classified as "attainment" and the remainder of the 101 counties in Kansas (as listed in Table 1) be designated individually as "unclassifiable/attainment" for the 2024 Primary Annual $PM_{2.5}$ NAAQS.

These designation recommendations do not include any of the following areas of Indian Country within Kansas: the Prairie Band of the Potawatomi Indian Reservation, the Kickapoo Nation Indian Reservation, the Sac and Fox Tribe Indian Reservation, and the Iowa Tribe Indian Reservation.

[1] https://www.epa.gov/system/files/documents/2024-04/2024-pm-naaqs-fr-published.pdf
[2] https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf

Table 1. Kansas Classification Recommendations for the 2024 Primary Annual $PM_{2.5}$ NAAQS	
County	Classification Recommendation
Allen	unclassifiable/attainment
Anderson	unclassifiable/attainment
Atchison	unclassifiable/attainment
Barber	unclassifiable/attainment
Barton	unclassifiable/attainment
Bourbon	unclassifiable/attainment
Brown	unclassifiable/attainment
Butler	unclassifiable/attainment
Chase	unclassifiable/attainment
Chautauqua	unclassifiable/attainment
Cherokee	unclassifiable/attainment
Cheyenne	unclassifiable/attainment
Clark	unclassifiable/attainment
Clay	unclassifiable/attainment
Cloud	unclassifiable/attainment
Coffey	unclassifiable/attainment
Comanche	unclassifiable/attainment
Cowley	unclassifiable/attainment
Crawford	unclassifiable/attainment
Decatur	unclassifiable/attainment
Dickinson	unclassifiable/attainment
Doniphan	unclassifiable/attainment
Douglas	unclassifiable/attainment
Edwards	unclassifiable/attainment
Elk	unclassifiable/attainment
Ellis	unclassifiable/attainment
Ellsworth	unclassifiable/attainment
Finney	unclassifiable/attainment
Ford	unclassifiable/attainment
Franklin	unclassifiable/attainment
Geary	unclassifiable/attainment
Gove	unclassifiable/attainment
Graham	unclassifiable/attainment
Grant	unclassifiable/attainment
Gray	unclassifiable/attainment
Greeley	unclassifiable/attainment
Greenwood	unclassifiable/attainment
Hamilton	unclassifiable/attainment
Harper	unclassifiable/attainment
Harvey	unclassifiable/attainment

County	Classification Recommendation
Haskell	unclassifiable/attainment
Hodgeman	unclassifiable/attainment
Jackson	unclassifiable/attainment
Jefferson	unclassifiable/attainment
Jewell	unclassifiable/attainment
Johnson	attainment
Kearny	unclassifiable/attainment
Kingman	unclassifiable/attainment
Kiowa	unclassifiable/attainment
Labette	unclassifiable/attainment
Lane	unclassifiable/attainment
Leavenworth	unclassifiable/attainment
Lincoln	unclassifiable/attainment
Linn	unclassifiable/attainment
Logan	unclassifiable/attainment
Lyon	unclassifiable/attainment
Marion	unclassifiable/attainment
Marshall	unclassifiable/attainment
McPherson	unclassifiable/attainment
Meade	unclassifiable/attainment
Miami	unclassifiable/attainment
Mitchell	unclassifiable/attainment
Montgomery	unclassifiable/attainment
Morris	unclassifiable/attainment
Morton	unclassifiable/attainment
Nemaha	unclassifiable/attainment
Neosho	unclassifiable
Ness	unclassifiable/attainment
Norton	unclassifiable/attainment
Osage	unclassifiable/attainment
Osborne	unclassifiable/attainment
Ottawa	unclassifiable/attainment
Pawnee	unclassifiable/attainment
Phillips	unclassifiable/attainment
Pottawatomie	unclassifiable/attainment
Pratt	unclassifiable/attainment
Rawlins	unclassifiable/attainment
Reno	unclassifiable/attainment
Republic	unclassifiable/attainment
Rice	unclassifiable/attainment
Riley	unclassifiable/attainment

County	Classification Recommendation
Rooks	unclassifiable/attainment
Rush	unclassifiable/attainment
Russell	unclassifiable/attainment
Saline	unclassifiable/attainment
Scott	unclassifiable/attainment
Sedgwick	unclassifiable
Seward	unclassifiable/attainment
Shawnee	unclassifiable/attainment
Sheridan	unclassifiable/attainment
Sherman	unclassifiable/attainment
Smith	unclassifiable/attainment
Stafford	unclassifiable/attainment
Stanton	unclassifiable/attainment
Stevens	unclassifiable/attainment
Sumner	unclassifiable/attainment
Thomas	unclassifiable/attainment
Trego	unclassifiable/attainment
Wabaunsee	unclassifiable/attainment
Wallace	unclassifiable/attainment
Washington	unclassifiable/attainment
Wichita	unclassifiable/attainment
Wilson	unclassifiable/attainment
Woodson	unclassifiable/attainment
Wyandotte	unclassifiable

Technical Considerations

These recommendations have been developed based on a review of the technical information as suggested by the February 7, 2024 EPA guidance and a separate review of available information and analysis by the State. The following is a summary of the ambient air quality monitoring data in all relevant Kansas counties and in all relevant counties in nearby states.

Figure 1 displays the Kansas $PM_{2.5}$ ambient air monitoring network. Table 2 lists the 2021–2023 design values for all equivalent method ambient $PM_{2.5}$ monitors.

Figure 2 displays the $PM_{2.5}$ annual mean values from 2002–2023 for all monitors in Kansas for comparison to the annual $PM_{2.5}$ NAAQS. As seen in this figure, there was an evident overall decline in annual $PM_{2.5}$ concentrations from 2002 until the approximate 2016 to 2018 timeframe in Kansas. It is during that same time (2016-2018) that the state began transitioning from a filter-based $PM_{2.5}$ network to a continuous monitor network. The Teledyne Advanced Pollution Instrumentation (TAPI) Model T640 PM mass monitor (T640) and TAPI Model T640 with 640X option (T640X) were each approved as Federal Equivalency Method (FEM) monitors for $PM_{2.5}$ by the EPA's Reference and Equivalency Program and

Figure 1. Kansas $PM_{2.5}$ Monitoring Network (2021–2023)

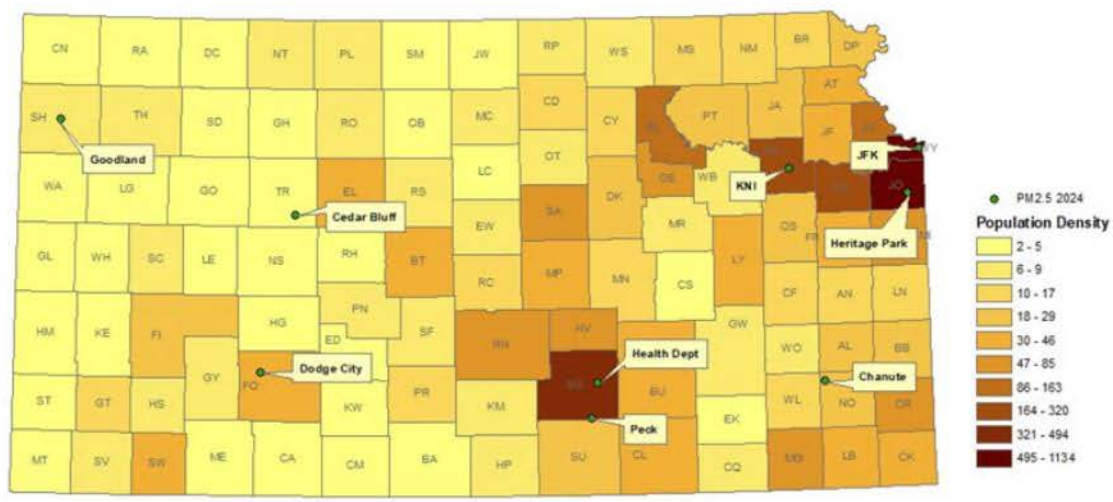


Table 2. Kansas Ambient $PM_{2.5}$ Monitor Design Values (2021–2023)			
Site Name	**AQS Site ID**	**County**	**2021–2023 Annual $PM_{2.5}$ Design Value ($\mu g/m^3$)**
Dodge City	20-057-0002	Ford	***
Heritage Park	20-091-0010	Johnson	8.3
Chanute	20-133-0003	Neosho	9.3
Wichita Health Department	20-173-0010	Sedgwick	9.7
KNI	20-177-0013	Shawnee	8.8*
Goodland	20-181-0003	Sherman	4.3**
Peck	20-191-0002	Sumner	8.9*
Cedar Bluff	20-195-0001	Trego	6.8*
JFK	20-209-0021	Wyandotte	9.6

*- Did not meet data completeness requirements
**- New monitor installed March 21, 2023
***- New monitor installed September 19, 2023

announced in the *Federal Register* on July 13, 2016 (81 FR 45285). By early 2017, state monitoring agencies began operating T640 and T640X PM FEMs in their networks and reporting data to EPA's Air Quality System (AQS) database. The adoption of T640 and T640X $PM_{2.5}$ FEMs proceeded across the country with states reporting at least some data for about 30 such monitors in 2017, and more recently reporting data for about 400 T640 and T640X $PM_{2.5}$ FEMs in 2023 (Figure 3). The State chose TAPI T640(x) continuous

Figure 2. PM2.5 Annual Mean Values for Kansas Monitors (2002-2023)

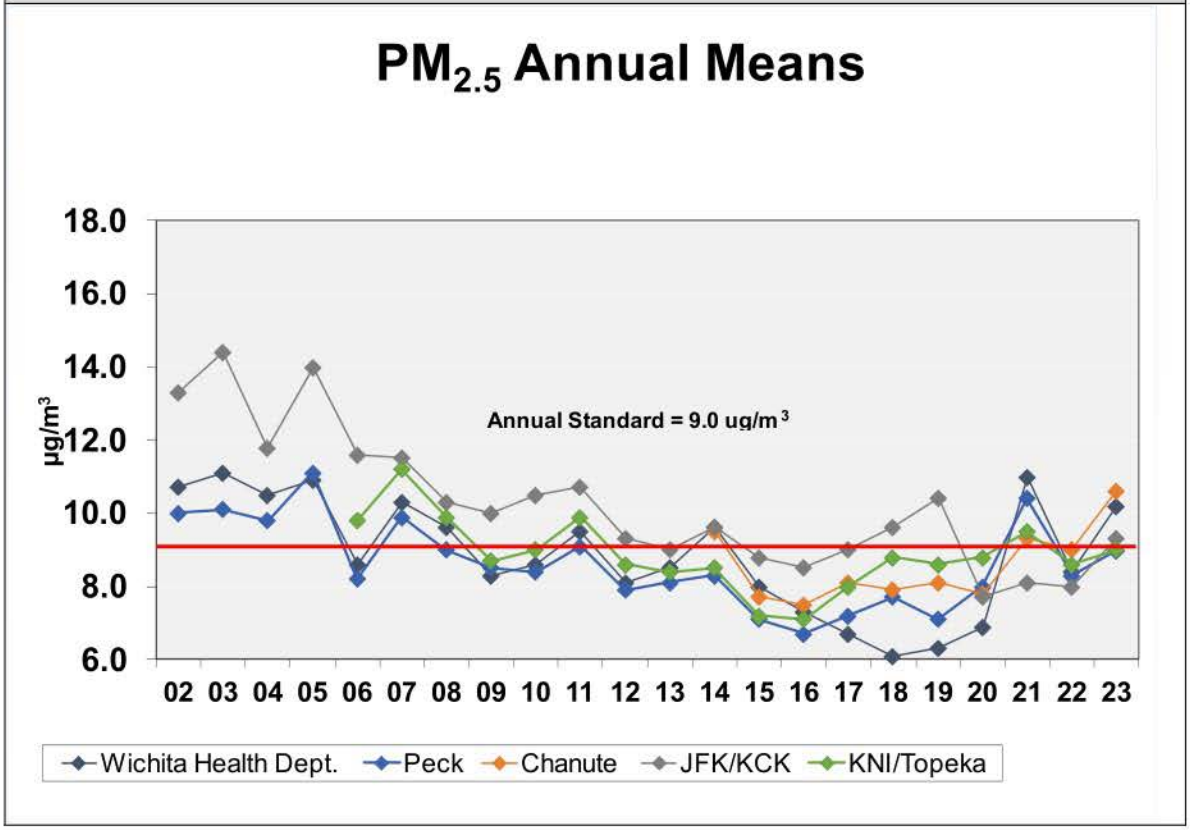
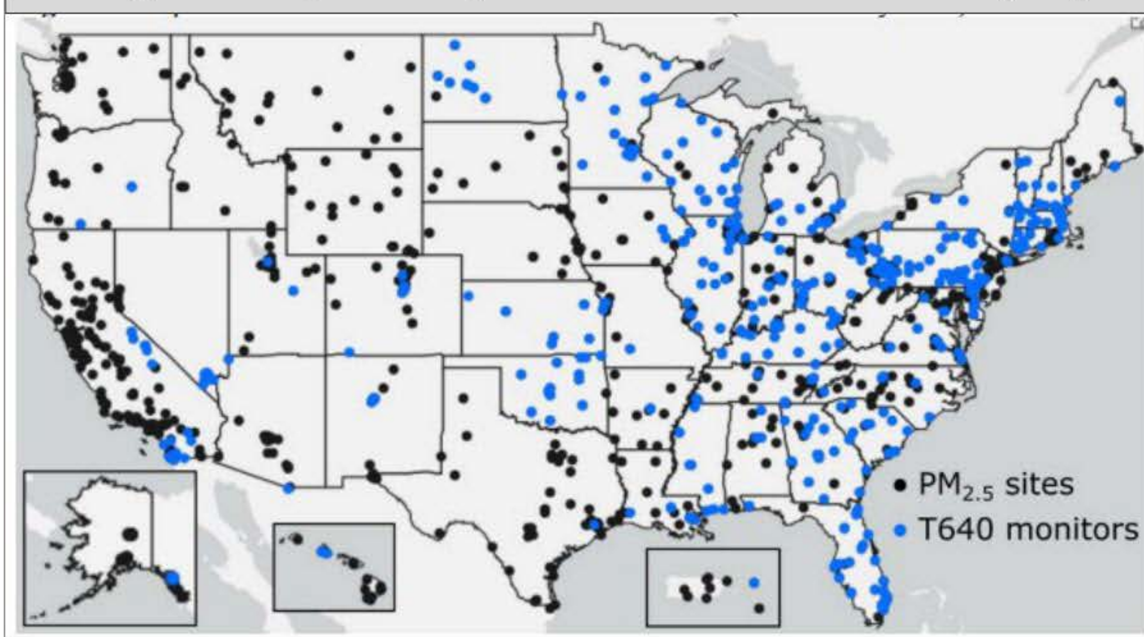


Figure 3. PM2.5 Monitoring Sites and Location of T640 Monitors (2023)



monitors to operate in place of the filter-based monitors that had been in place since the beginning of the $PM_{2.5}$ monitoring program in the state. This monitor is an EPA-approved FEM and was chosen for its ease of use that required fewer operator visits, lower maintenance requirements, operational dependability, and allowed the ability to provide multiple PM metrics from one instrument (i.e., the T640X provides data for PM_{10}, $PM_{2.5}$, and $PM_{10\text{-}2.5}$). In addition, the State believed that transitioning to a continuous $PM_{2.5}$ network would be beneficial to both the State and the public as it could potentially allow for more alerts of $PM_{2.5}$ events as they occurred. Table 3 shows the $PM_{2.5}$ monitoring locations in the state and the timeframe that the State installed TAPI T640(X) at each location, and the date that the data alignment firmware update at each site was accomplished (this firmware update will be explained in more detail later in this document).

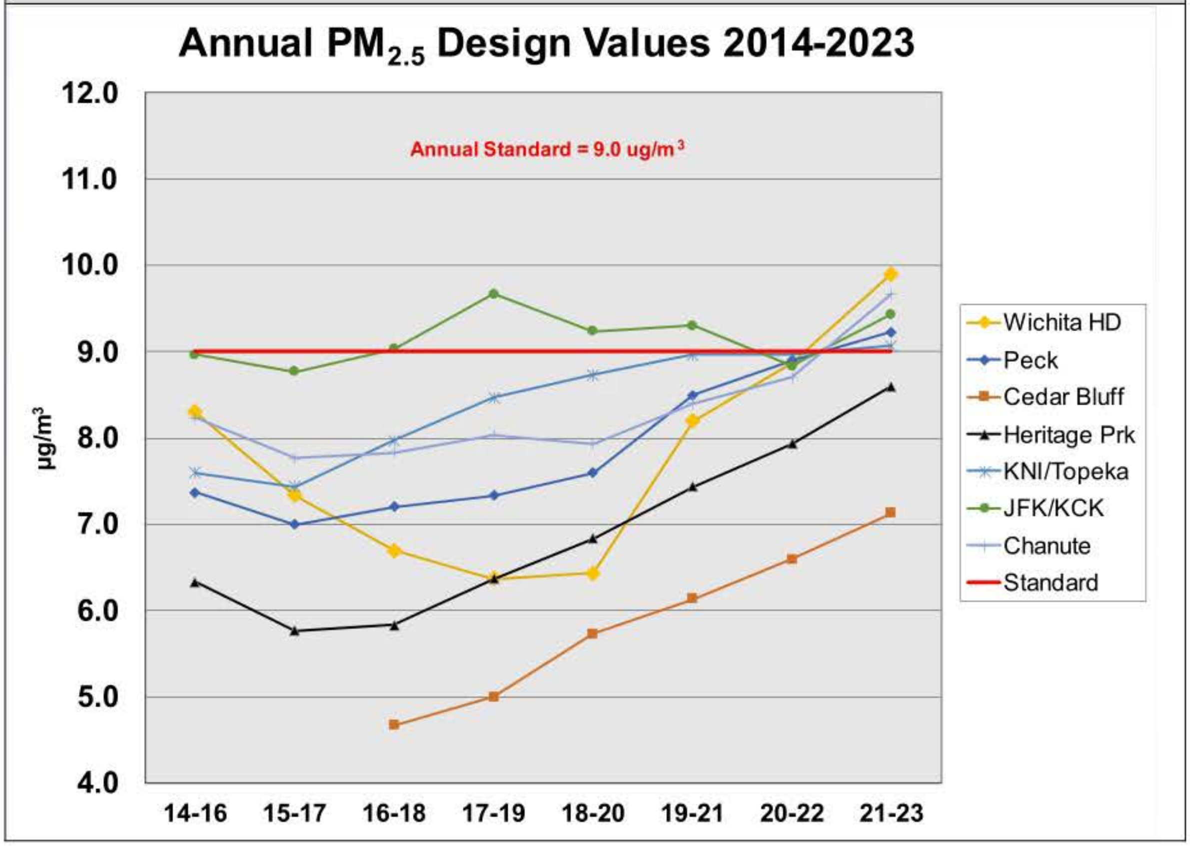
Table 3. T640X Begin Operation Dates and Data Alignment Dates

Site Name	AQS Site ID	County	Method Code	Begin Date	End Date
Heritage Park	20-091-0010	Johnson	238	7/10/2020	8/29/2023
Data Align			638	8/30/2023	
Chanute	20-133-0003	Neosho	238	11/14/2018	9/11/2023
Data Align			638	9/12/2023	
Wichita HD	20-173-0010	Sedgwick	238	7/7/2021	9/12/2023
Data Align			638	9/13/2023	
KNI-Topeka	20-177-0013	Shawnee	236(T640)	6/1/2017	9/15/2020
			238(T640X)	9/16/2020	8/22/2023
Data Align			638	8/23/2023	
Peck	20-191-0002	Sumner	238	9/12/2019	10/16/2023
Data Align			638	10/17/2023	
Cedar Bluff	20-195-0001	Trego	238	5/19/2020	9/19/2023
Data Align			638	9/20/2023	
JFK-KCK	20-209-0021	Wyandotte	238	11/7/2019	8/23/2023
Data Align			638	8/24/2023	

Figure 4 shows the 3-year annual design values for the period 2014 to 2023 for the Kansas $PM_{2.5}$ network. Like the annual means, the design values have been increasing since the 2017 to 2019 period across the network. The State believes this is related to the installation of the T640X monitoring equipment and a significant increase in the number of smoke intrusion days across Kansas from both prescribed fires and wildfires.

From early in the use of the T640(X), monitoring agencies, including Kansas, reported a positive bias resulting in higher PM concentrations relative to collocated Federal Reference Method (FRM) monitors. The bias of T640 and T640X $PM_{2.5}$ FEMs has been reported as relatively consistent across sites and methods with continuous FEMs reading about 20% higher than collocated FRMs. Even higher positive biases have been reported for sites with smoke impacts from fires. In addition to evaluating bias by comparing continuous FEMs collocated with FRMs operated by the same monitoring agency, the EPA and the states run an independent audit program for $PM_{2.5}$ methods known as the Performance

Figure 4. Annual $PM_{2.5}$ Design Values for Kansas Monitors (2014-2023)



Evaluation Program (PEP). This program brings portable $PM_{2.5}$ FRM samplers to sites across the country each year where a primary sampler of a subset of sites in each Primary Quality Assurance Organization (PQAO) are independently audited. Data from the $PM_{2.5}$ Performance Evaluation Program (PEP) had indicated a consistent positive bias for the T640 and T640X $PM_{2.5}$ FEMs compared to audit FRMs; however, this bias was not as pronounced as the bias data from FRM samplers run by the monitoring agencies.[3]

In April 2023, under the Reference and Equivalent Method Program at 40 CFR 53.14, the EPA approved a modification of the FEM designation for the TAPI Model T640 PM mass monitor, including the T640X option, to allow operation of the monitors with or without a Network Data Alignment. At that time, the potential need for a Network Data Alignment of the T640 and T640X $PM_{2.5}$ concentrations had been identified in peer-reviewed literature reporting a generally high bias for the T640 and T640X monitors relative to the Federal Reference Method (FRM) and other FEM monitors.[4,5] Subsequently, TAPI developed a Network Data Alignment utilizing a national dataset from routinely operated

---

[3] https://www.epa.gov/system/files/documents/2024-05/2_supplemental-info_t640-data-update_final-05-13-2024.pdf

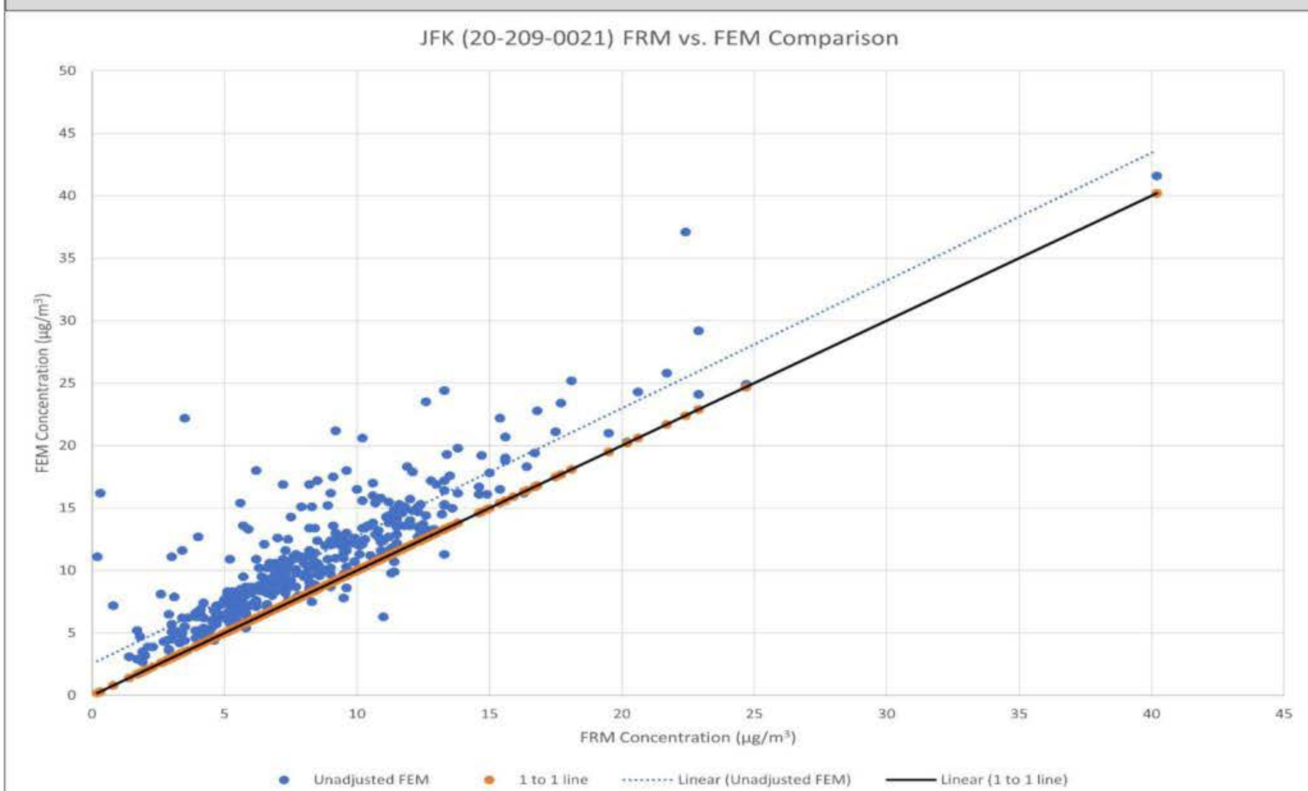
[4] Hagler, G.; Hanley, T.; Hassett-Sipple, B.; Vanderpool, R.; Smith, M.; Wilbur, J.; Wilbur, T.; Oliver, T.; Shand, D.; Vidacek, V.; Johnson, C.; Allen, R.; D'Angelo, C.: Evaluation of two collocated federal equivalent method PM2.5 instruments over a wide range of concentrations in Sarajevo, Bosnia and Herzegovina. Atmospheric Pollution. Research, 13(4), 101374, 2022.

[5] Long, R.; Urbanski, S.; Lincoln, E.; Colón, M.; Kaushik, S.; Krug, J.; Vanderpool R.; Landis, M.: Summary of PM2.5 measurement artifacts associated with the Teledyne T640 PM Mass Monitor under controlled chamber experimental conditions using polydisperse ammonium sulfate aerosols and biomass smoke, Journal of the Air & Waste Management Association, 73(4), 295-312, 2023.

collocated $PM_{2.5}$ FRMs and T640 and T640X FEMs. Because of the importance of these data for regulatory, scientific, and public use, the EPA retroactively applied the Network Data Alignment equations to all the hourly unaligned T640 and T640X $PM_{2.5}$ concentrations in the EPA's Air Quality System (AQS) for data beginning in 2017, when the T640 and T640X monitors started being deployed across the U.S. Based on the State's reading of TAPI's data adjustment, only temperature and PM concentrations were used to correct the data.[6] Neither TAPI nor EPA corrected the data for the known smoke bias in the T640X monitor.

To get a better understanding of the bias between the T640X and the FRM, an analysis of the data from collocated monitors is preferred. Unfortunately, since the State adopted the continuous monitors across the network, there remains only one site in Kansas City, KS (JFK, Site 20-209-0021) where both a T640X and a FRM exist for analysis. Figure 5 compares the JFK unadjusted 24-hour FEM data with the 24-hour FRM data from late November 2019 through early August 2023. The Teledyne firmware update was applied across Kansas' network between late August and mid-October 2023. JFK was updated on August 24, 2023 (Table 3). The high bias is clearly shown with most of the FEM concentrations reading significantly higher than the FRM concentrations. Teledyne created an adjustment factor to be applied to the FEM data with the expectation to correct the known bias issue.

Figure 5. JFK Unadjusted FEM vs. FRM Comparison



The Teledyne T640/T640X alignment algorithm implemented by EPA in the federal air quality system (AQS) database is shown in Table 4.

[6] https://www.regulations.gov/document/EPA-HQ-OAR-2023-0642-0029

- If the ambient temperature is at or below 20°C
- - T640/x raw PM value is less than or equal to 10ug/m3, then multiply the T640/x raw PM value by 0.813233
- - T640/x raw PM value is greater than 10ug/m3, then use the equation (T640/x raw PM – 1.861)

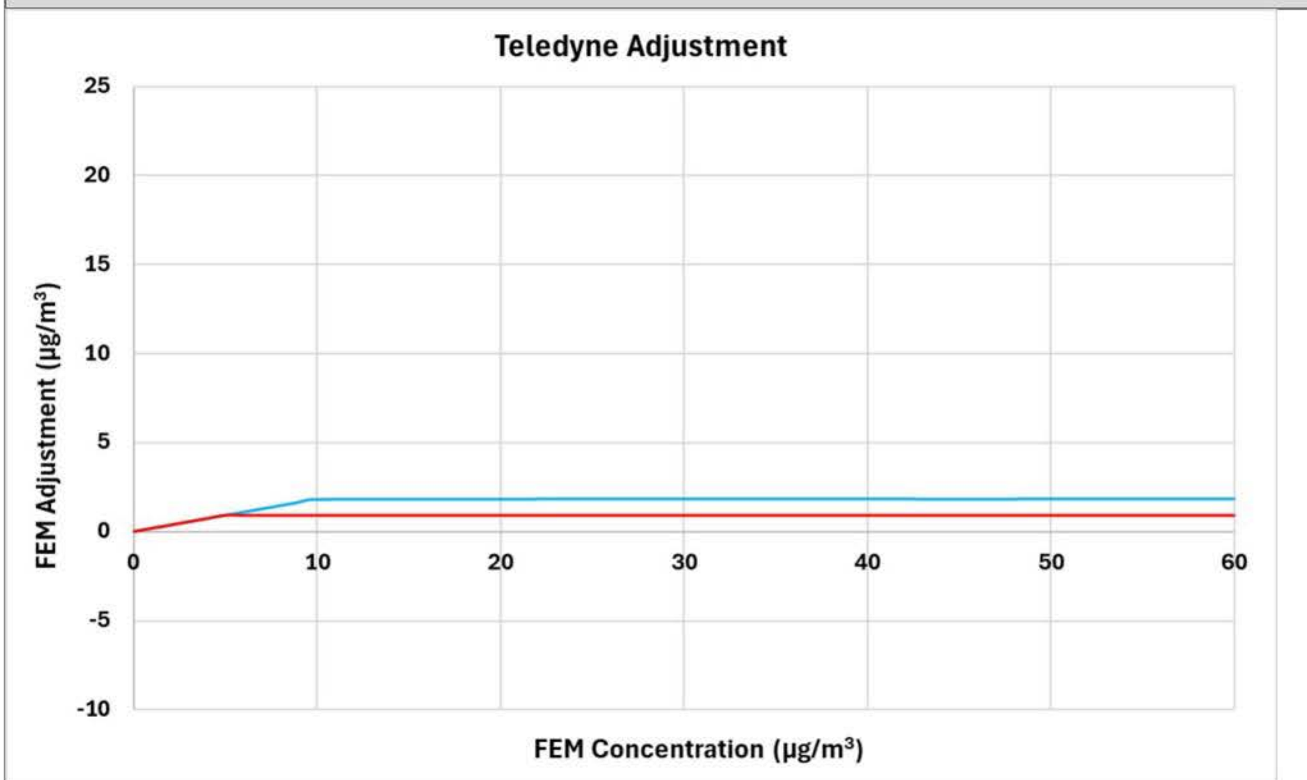
- If the ambient temperature is above 20°C
- - T640/x raw PM value is less than or equal to 5ug/m3, then multiply the T640/x raw PM value by 0.813233
- - T640/x raw PM value is greater than 5ug/m3, then use the equation (T640/x raw PM – 0.925)

Table 4. Teledyne T640/T640X Alignment Algorithm Implemented by EPA

CASE	$PM_{2.5}$ Conc.	Temp. ≤ 20° C	CASE	$PM_{2.5}$ Conc.	Temp. > 20° C
A	≤ 10 μg/m³	T640/x * 0.813233	C	≤ 5 μg/m³	T640/x * 0.813233
B	> 10 μg/m³	T640/x – 1.861	D	> 5 μg/m³	T640/x – 0.925

Figure 6 graphically displays the expected bias correction needed as a function of uncorrected FEM concentration and temperature based on the equations listed in Table 4. This alignment algorithm calculation depends on the ambient temperature at the time the data was collected, as well as the raw

Figure 6. Teledyne Adjustment to FEM Data



FEM concentrations that were collected. According to the alignment factor calculations that were implemented in the new T640/T640X software, the adjustment for the FEM data would fall along the blue line for $PM_{2.5}$ FEM data collected with the ambient temperature ≤ 20ºC (Cases A and B from Table 4), and along the red line for $PM_{2.5}$ FEM data collected with the temperature >20ºC (Cases C and D from Table 4).

Figure 7 shows the difference between the unadjusted FEM concentrations and the FRM concentrations (y-axis) at JFK as a function of unadjusted FEM concentration (x-axis) from late November 2019 through early August 2023. The figure clearly shows that the bias increases as the uncorrected FEM concentration increases. However, the Teledyne adjustment algorithm applies a fixed adjustment of 0.925 µg/m^3 when the temperature is above 20ºC and the FEM concentration is above 5 µg/m^3, and 1.861 µg/m^3 when the temperature is at or below 20ºC and the FEM concentration is above 10 µg/m^3. The form of the Teledyne bias adjustment algorithm does not match the actual bias shown in the JFK data.

Figure 7. Teledyne Adjustment vs. Actual Adjustment Needed

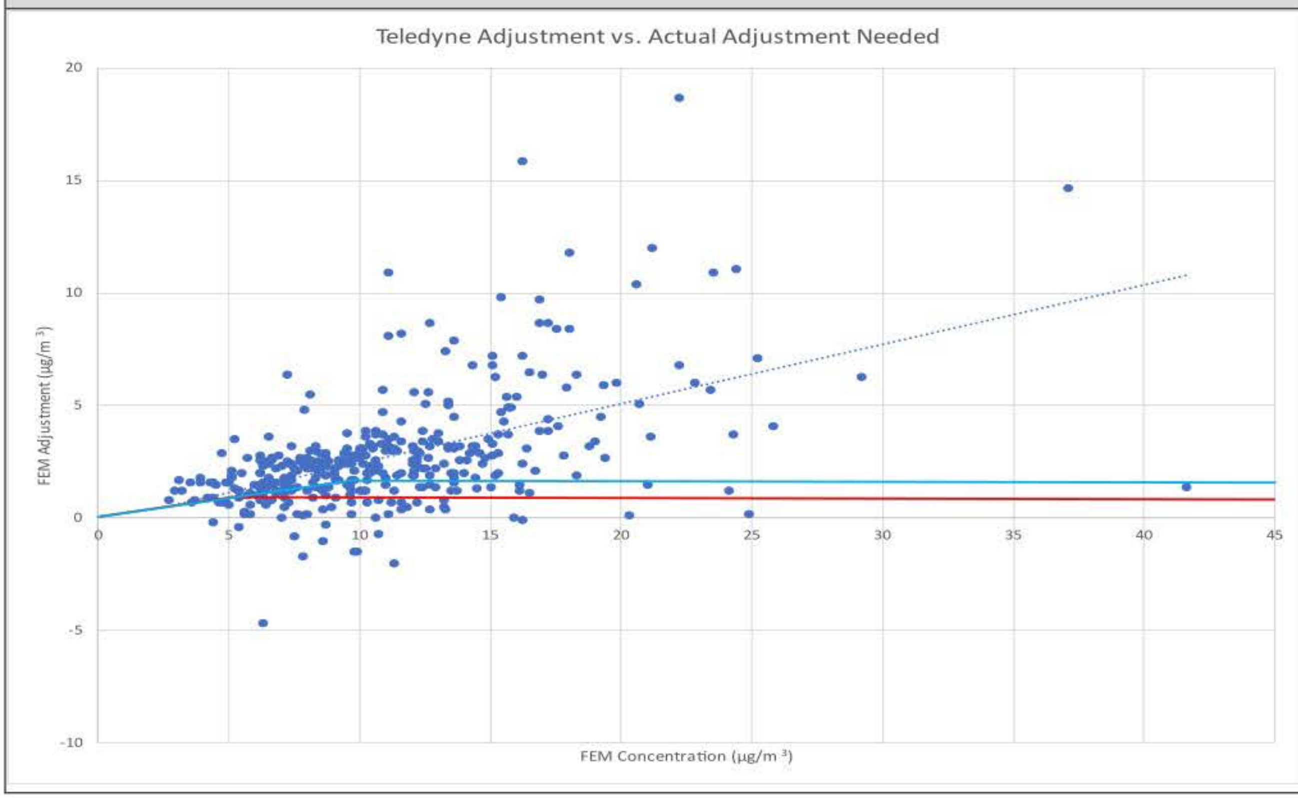
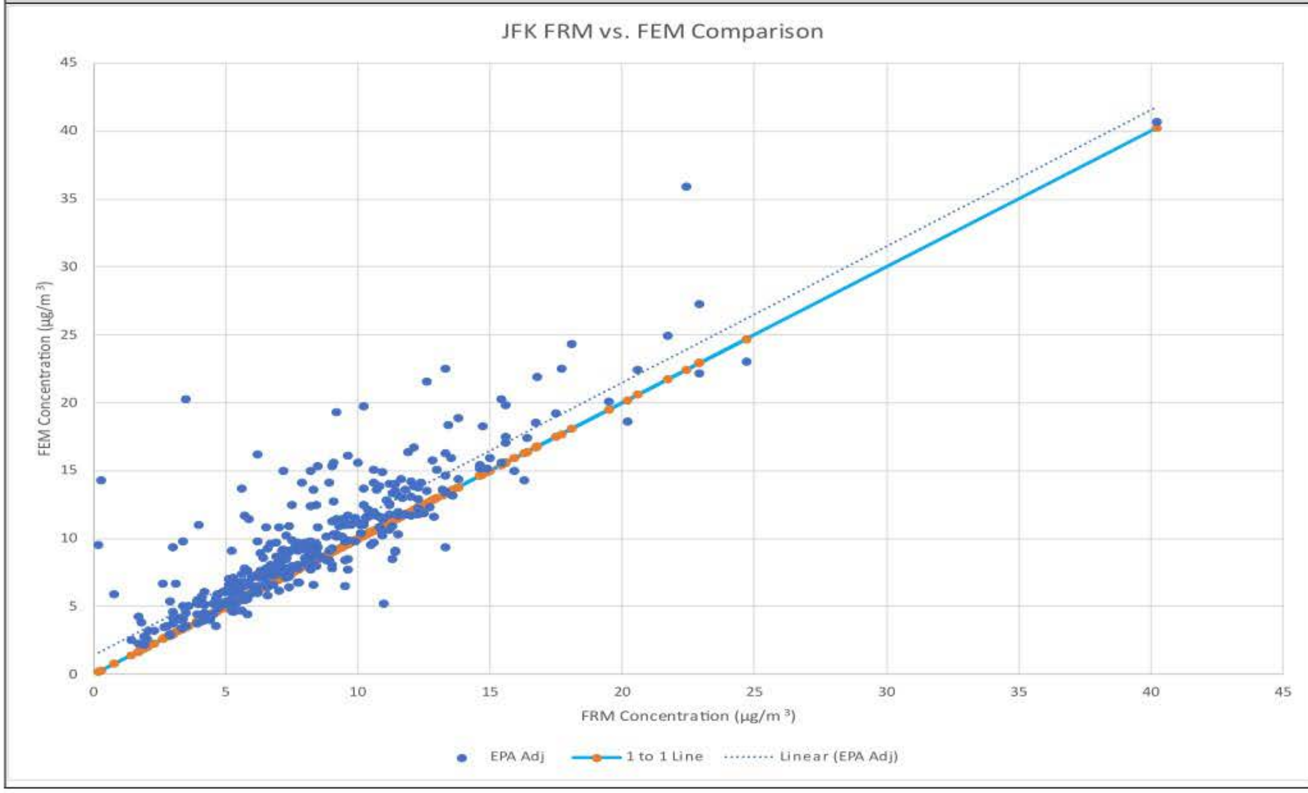


Figure 8 displays the JFK FEM concentrations that have been corrected by EPA with the Teledyne alignment algorithm (y-axis) compared to the FRM concentrations (x-axis) from late November 2019 through early August 2023. Ideally, the best fit regression line and the 1:1 line should overlap each other. In this analysis, the best fit regression line continues to be above the 1:1 line indicating the "corrected" FEM measurements are still higher than the FRM measurements after the FEM data has been adjusted with the Teledyne alignment algorithm. Kansas is aware the State of Georgia has undertaken a comprehensive review of EPA's implementation of the alignment factor on historical data, and has found numerous errors, as well as

Figure 8. JFK FRM vs. FEM EPA Adj Comparison



continuing lack of good comparison between FRMs and the corrected FEM data. The state of Georgia examined a simpler version of the Teledyne alignment algorithm that used a single equation regardless of temperature and concentration. The alternative alignment algorithm simply multiplies the uncorrected FEM concentration by a single value of 0.813233. Georgia's alternate alignment factor allows the FEM data to match more closely with FRM data. Figure 9 displays the JFK FEM concentrations that have been corrected by using the Georgia algorithm (y-axis) compared to the FRM concentrations (x-axis) from late November 2019 through early August 2023. Although not a perfect match with the 1:1 line, the Georgia adjustment algorithm appears to adjust the JFK FEM data better than the EPA/Teledyne adjustment. We can also see this change by examining the normalized mean bias between the FEM and FRM concentrations (from late November 2019 through early August 2023) using the following formula:

- Normalized Mean Bias (%) = (average FEM – average FRM)/(average FRM).

Table 5 shows the unadjusted FEM bias in the second column, the EPA Adjusted FEM bias with the Teledyne alignment algorithm in the third column, and the Georgia Adjusted FEM bias using the 0.813233 factor in the fourth column. The unadjusted T640/T640X FEM data at JFK is biased high by 32.78% as compared to the JFK FRM data. The EPA alignment algorithm reduces the bias at JFK to 17.54%. The Georgia Adjusted FEM approach reduced the bias at JFK to 7.98%. The State believes that this bias is still unacceptably high at 17.54% using the EPA/Teledyne correction algorithm and would be reduced even more at this site if additional adjustments were made to the T640X data like the Georgia technique and for the monitor's known smoke bias.

Figure 9. JFK FRM vs. FEM Georgia Adj

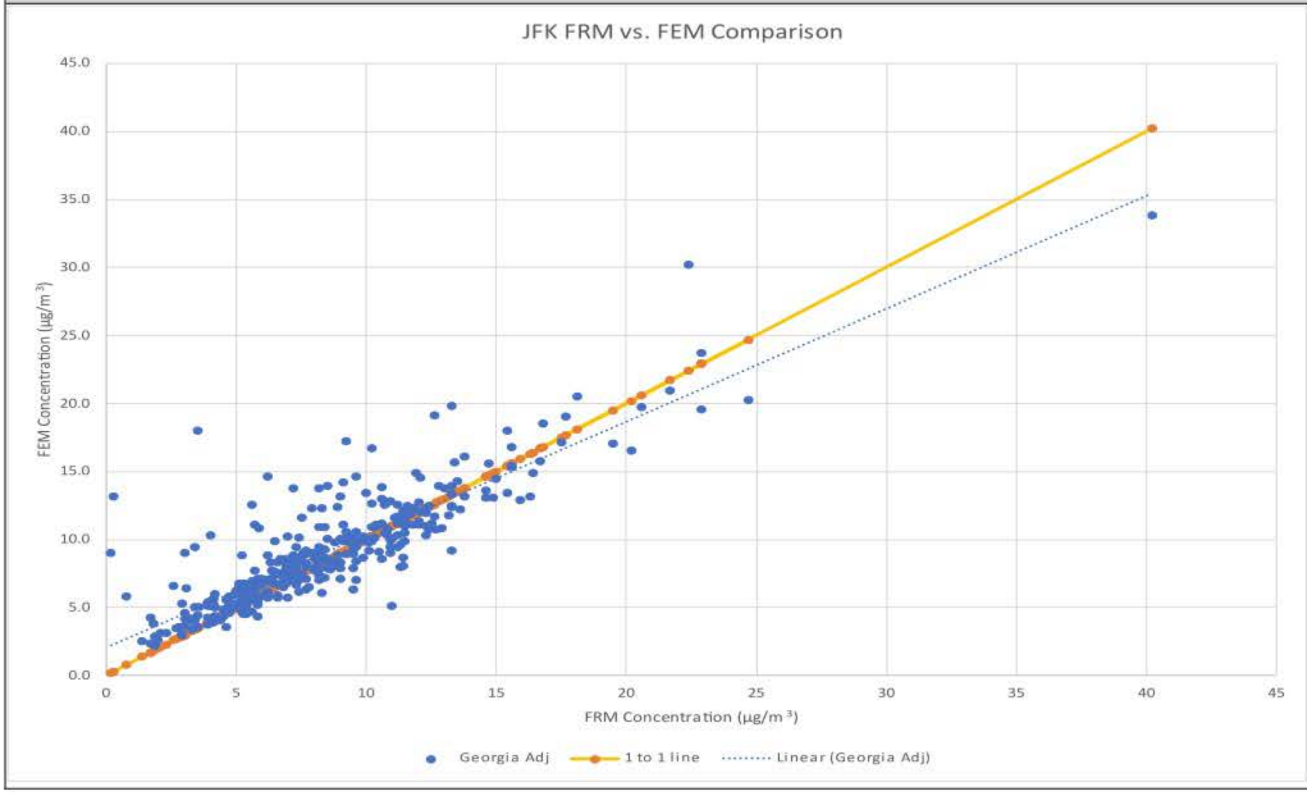
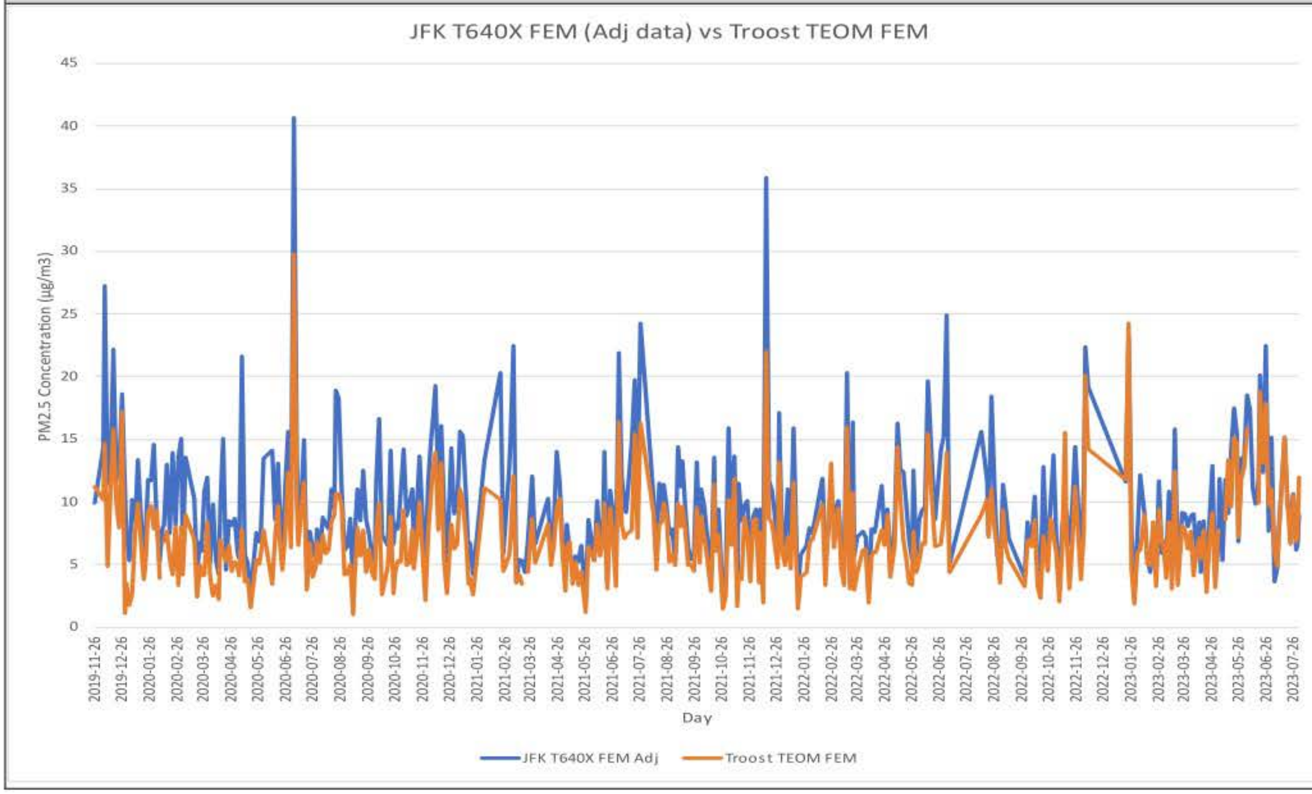


Table 5. Normalized Mean Bias at JFK Monitor			
Site Name	**Unadjusted FEM**	**EPA Adjusted FEM (POC 23)**	**Georgia Adjusted FEM**
JFK-KCK (20-209-0021)	32.78%	17.54%	7.98%

The State also compared data from the T640X FEM at JFK to a TEOM-1405-F FEM and T640X run by the State of Missouri Department of Natural Resources Air Pollution Control Program (APCP). This monitor is known as the Troost Air Monitoring Site (29-095-0034) and is in Kansas City, Missouri approximately 3.6 miles east-southeast of the JFK monitoring site in Kansas City, Kansas. The APCP is running the TEOM as a NAAQS monitor and the T640X as a Method Performance Evaluation/Research monitor (Not for NAAQS Compliance Determination). Figure 10 is a comparison of the 24-hour JFK T640X FEM adjusted data versus the Troost TEOM FEM for days when both the T640X and JFK FRM ran from late November 2019 through early August 2023. As can be seen, the JFK T640X FEM was

Figure 10. JFK T640X FEM (Adj Data) vs. Troost TEOM FEM



significantly higher during these comparison days over a three-and-a-half-year period. In fact, the overall 24-hour average of the Troost TEOM FEM over this period was 7.17 $\mu g/m^3$ compared to 9.76 $\mu g/m^3$ for the T640X FEM (adjusted data) average. Even though APCP does not have a FRM running at the Troost site, a comparison between the Troost site monitors and the JFK FRM were calculated. Figure 11 shows a comparison between the JFK FRM and Troost TEOM FEM concentrations. On average, the TEOM is running slightly below the values of the FRM at JFK as seen on Figure 11. If one looks at a comparison between the T640 FEM and the TEOM FEM at the Troost site, the T640 data on specific days analyzed was significantly higher. Figure 12 shows the specific days of this comparison between these two FEM monitors located at the same location. The average $PM_{2.5}$ concentration for the Troost TEOM over the analyzed days was 7.2 $\mu g/m^3$ while the Troost T640 (adj) recorded an average concentration of 9.5 $\mu g/m^3$, a difference of 2.3 $\mu g/m^3$. A comparison of these average values to the T640X and the FRM at JFK shows the T640X recorded an average value of 9.76 $\mu g/m^3$, very similar to the T640 at the Troost Monitor. The JFK FRM recorded an average value of 8.2 $\mu g/m^3$ during this time frame. In short, both the Kansas and Missouri T640(X) monitors are still recording significantly higher values than the Troost TEOM FEM and the JFK FRM even after being adjusted by Teledyne and EPA.

In a recent study, *Evaluation of Fine Particulate Matter (PM2.5) Concentrations Measured by Collocated Federal Reference Method and Federal Equivalent Method Monitors in the U.S.*[7], the authors investigated

[7] Atmosphere 2024, 15(8), 978, 15 August 2024, Tanvir R. Khan, Zachery I. Emerson, Karen H. Mentz

Figure 11. JFK FRM vs. Troost TEOM FEM

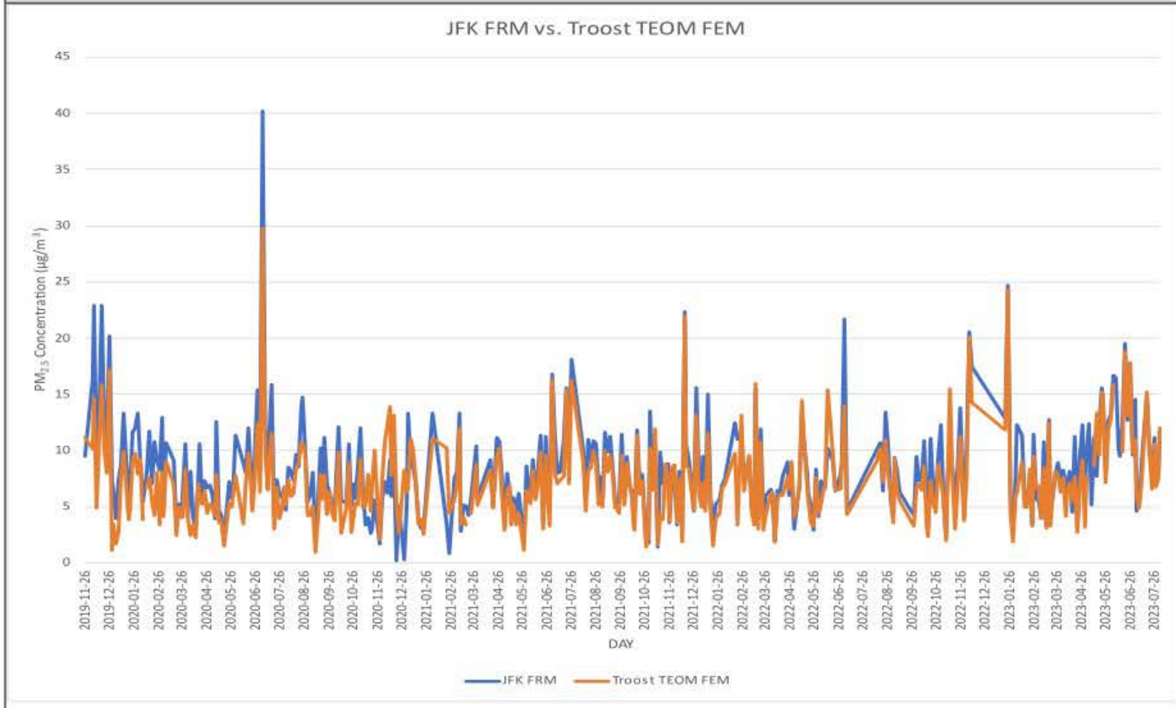
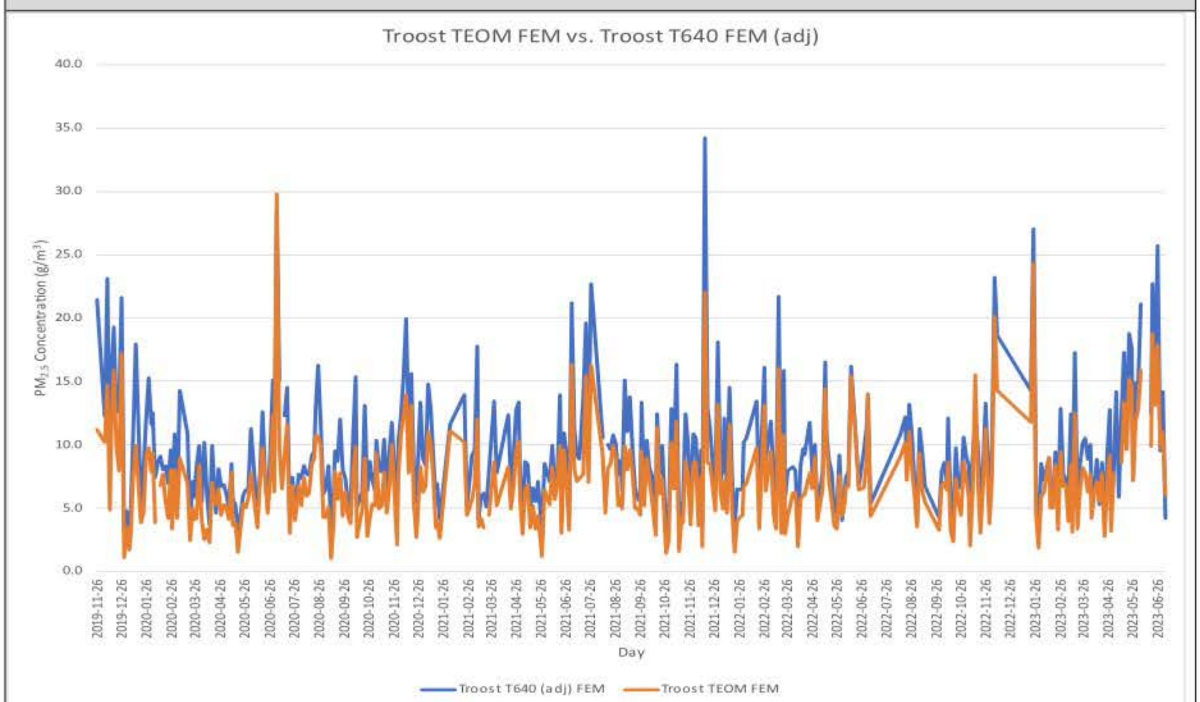
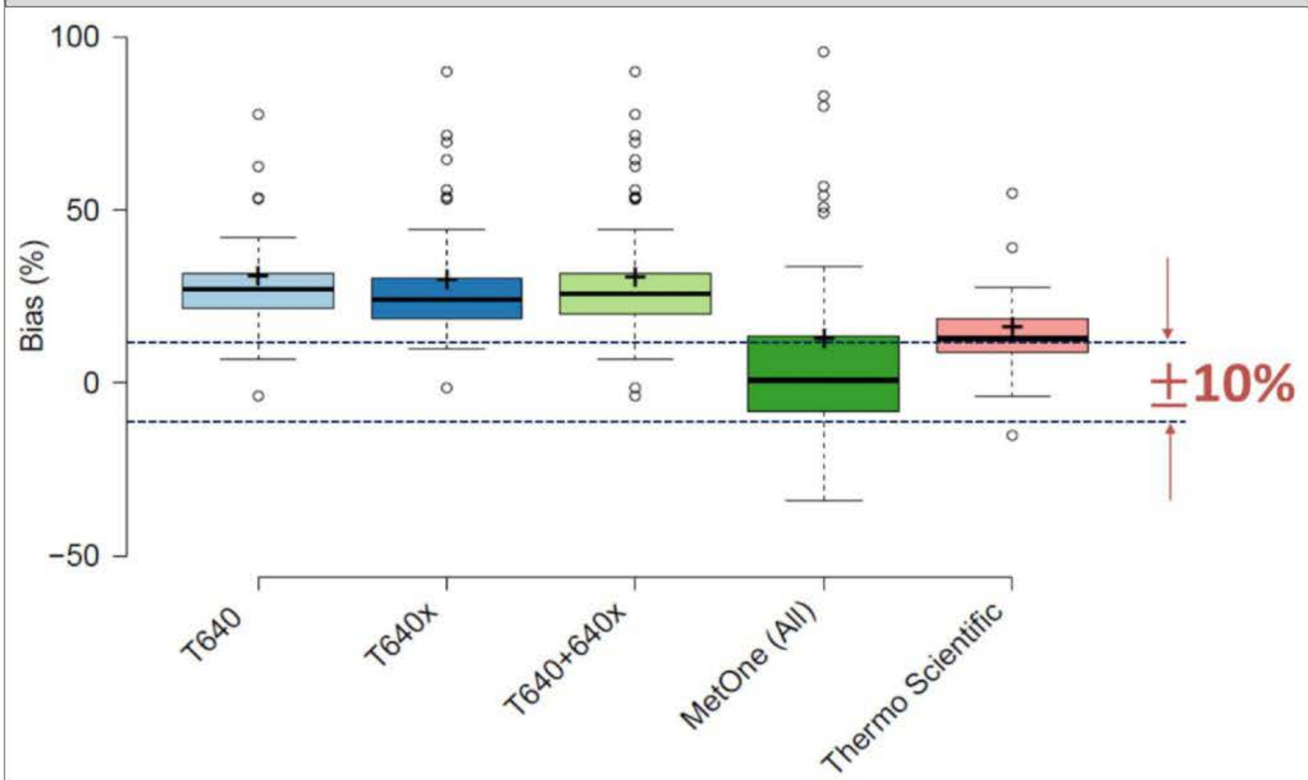


Figure 12. Troost TEOM FEM (NAAQS) vs. Troost T640 (adj) FEM



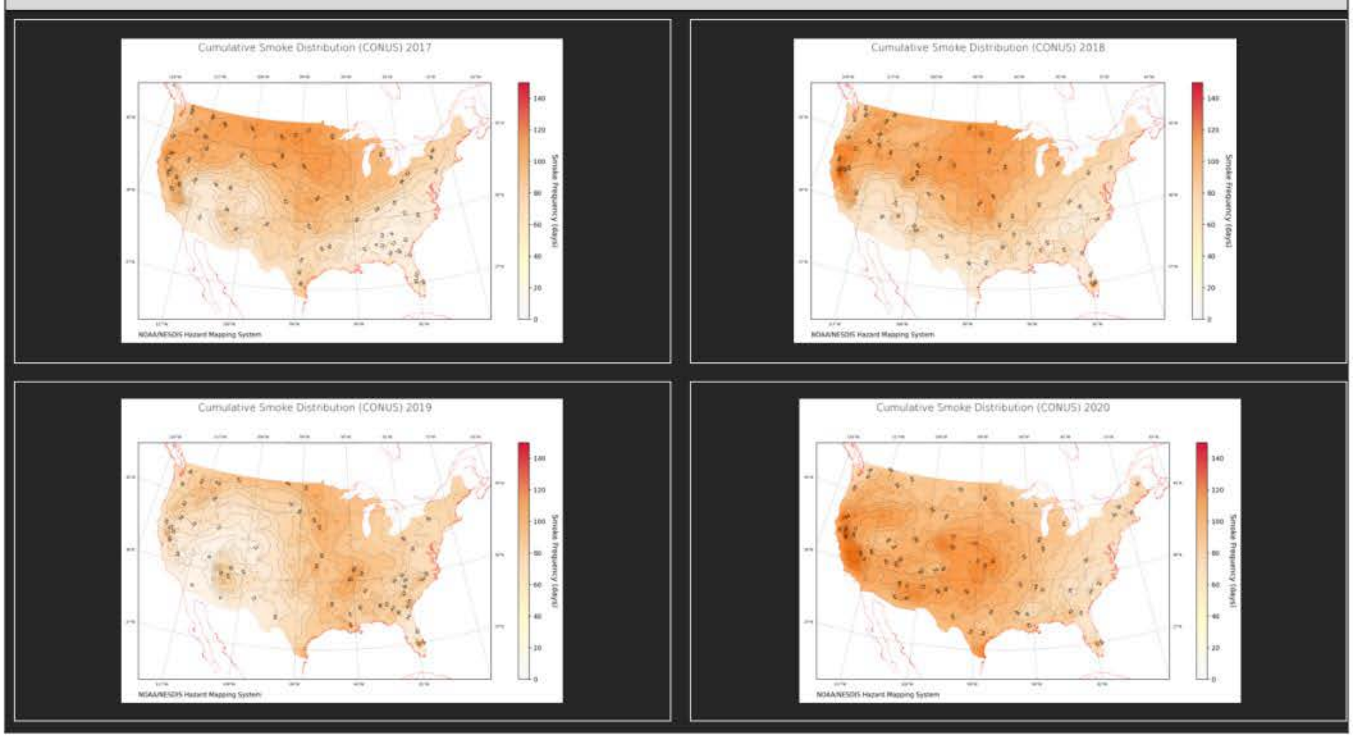
the performance of continuous FEM monitors collocated with FRM monitors across 10 EPA regions in the U.S., focusing on $PM_{2.5}$ measurements collected from 276 monitoring stations. The findings of this study verify the State's concerns of the T640(X) FEM. It found: "*On average, light scatter-based FEM monitors demonstrate higher biases compared to beta attenuation monitors across all EPA regions (28% vs. 12%). Irrespective of the measurement method employed, FEM monitors demonstrate a significant positive bias (mean bias 22%) relative to FRM monitors, which could result in an overestimation of $PM_{2.5}$ design values (DVs) by 13–21% at monitoring sites designating FEMs as primary monitors for NAAQSs compliance designations. These findings emphasize the critical need to address method comparability issues, especially considering the recent tightening of NAAQS for $PM_{2.5}$ (annual) from 12 µg/m^3 to 9 µg/m^3 in the U.S.*" Figure 13 displays their bias results categorized by equipment manufacturer and model type, comparing biases against the ±10% range, a data quality criterion recommended by the EPA for comparing $PM_{2.5}$ concentrations from collocated FEM and FRM monitors.

Figure 13. FEM/FRM bias by the equipment manufacturer.



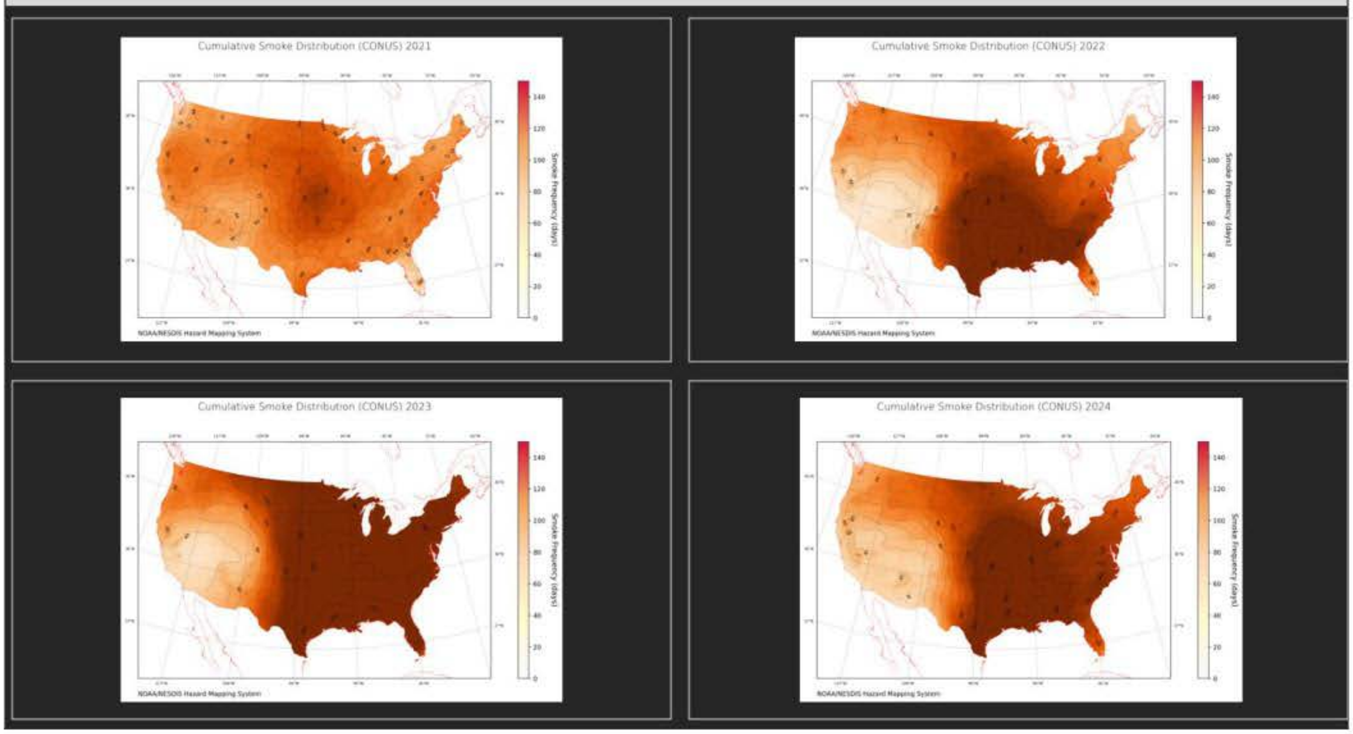
Kansas is an agricultural state where prescribed fire is used extensively. Prescribed fire or prescribed burning season in Kansas begins late February and continues through mid-April. Kansas is a fire adapted landscape. Prescribed fire, at a frequency of 3 to 5 years, plays a critical role in maintaining our grassland's health and reducing wildfire risk. Prescribed fire reduces fuel loading, controls unwanted trees and brush, increases forage value, and rejuvenates our grasslands. It is tool landowners and land managers use to ensure our valuable grasslands remain intact. As one might expect, Kansas' airshed is exposed to many days of smoke that might impact air quality monitors across the state. In fact, whether from prescribed fires or the dramatic recent increase in wildfires, especially in Canada, the number of days that Kansas may have impacts from smoke have increased dramatically in the last four years. Figure 14 shows images from the Hazard Mapping System Fire and Smoke Product, produced by the National Oceanic and Atmospheric Administration's Office of Satellite and Product Operations. Cumulative smoke data annual statistics for 2017–2020 are derived by aggregating daily Hazard Mapping System (HMS) smoke polygons into a 0.05° grid and counting the number of days when individual cells were covered by either light, medium or heavy smoke during the year. Examining these

Figure 14. Cumulative Smoke Data Statistics - CONUS (2017-2020)



images, Kansas was covered in some degree of smoke on an average of 40–60 days per year from 2017 to 2019. In 2020, that annual average increased to between 50–70 days of smoke coverage across the state. Figure 15 displays images of HMS cumulative smoke data annual statistics for 2021–2024. As is very apparent, the number of days that smoke was analyzed over the State of Kansas increased dramatically over this four-year period. In 2021, Kansas averaged between 120–130 days of smoke coverage, or about double the number of days seen in the prior four years. In the years 2021 to 2024, that number of days increased to between 160–200 days per year of some level of intensity of smoke in the atmosphere of the state.

Figure 15. Cumulative Smoke Data Statistics - CONUS (2021-2024)



With all these smoke days, the State is very concerned that areas of the state are going to be potentially deemed in violation of the new annual $PM_{2.5}$ standard based on an instrument that is continuing to run higher than FRM monitors, and was not properly adjusted for its high smoke bias. Recall that EPA and others have noted this high bias of the T640(X) monitor from burning of biomass since its deployment across the country.[8,9]

As mentioned earlier, the only Kansas site that has both a T640X and FRM monitor located together is the JFK location in Kansas City, KS. The State chose a particular wildfire smoke impacted episode in Kansas City to examine the smoke bias in the T640X. The 2023 Canadian wildfires were well documented[10] and impacted much of the geography of North America, including much of the United States and Kansas. Wildland fire experts have described Canada's 2023 fire season as record-breaking and shocking.[11] Over the course of a fire season that started very early[12] and ended late, blazes burned an estimated 18.4 million hectares[13] (71,043 square miles). For perspective, the size of the State of

[8] Long, R.; Urbanski, S.; Lincoln, E.; Colón, M.; Kaushik, S.; Krug, J.; Vanderpool R.; Landis, M.: Summary of PM2.5 measurement artifacts associated with the Teledyne T640 PM Mass Monitor under controlled chamber experimental conditions using polydisperse ammonium sulfate aerosols and biomass smoke, Journal of the Air & Waste Management Association, 73(4), 295-312, 2023.

[9] https://www.4cleanair.org/wp-content/uploads/Iowa_Wildfire_Smoke_Episode.pdf

[10] https://ciffc.net/situation/archive/

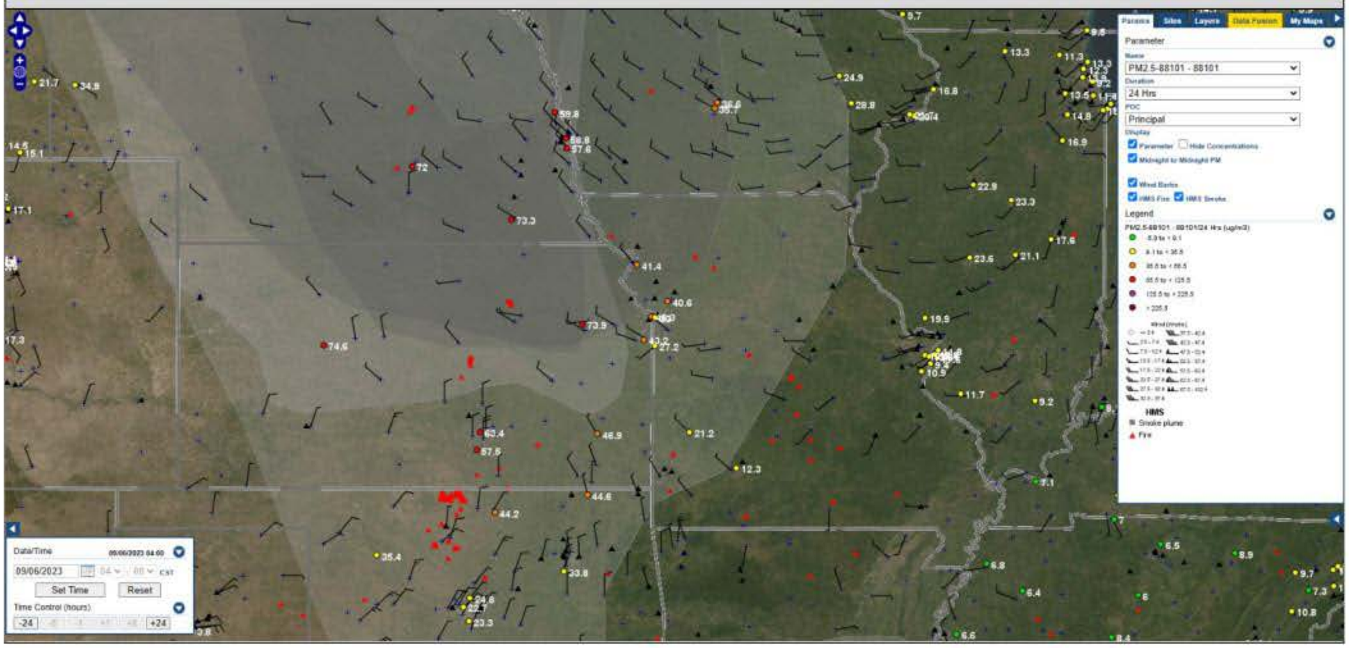
[11] https://natural-resources.canada.ca/simply-science/canadas-record-breaking-wildfires-2023-fiery-wake-call/25303

[12] https://www.cnn.com/2023/06/10/us/canada-wildfire-season-us-impact-climate/index.html

[13] https://earthobservatory.nasa.gov/images/151985/tracking-canadas-extreme-2023-fire-season

Kansas is 82,278 square miles. On average, just 2.5 million hectares[13] (9,653 square miles) burn in Canada annually. The total area that burned in 2023 amounted to 2½ times the previous record set in 1995 and more than six times the average over the past 10 years.[14] The episode chosen occurred from September 6–8, 2023, across the Kansas City metropolitan area as moderate to heavy smoke from wildfires in Canada was transported into the area on moderate northwest winds.[15] Figures 16–17 show a regional view of the Midwest and a close up of the Kansas City metropolitan area from EPA's AirNow-Tech with 24-hour $PM_{2.5}$ concentrations, wind barbs, and analyzed smoke plumes across the region from September 6, 2023. AirNow-Tech is a password-protected website for air quality data management analysis and decision support. AirNow-Tech is primarily used by the federal, State, Tribal, and local air quality organizations that provide data and forecasts to the AirNow system, as well as researchers and other air data users. On September 6, moderate to heavy wildfire smoke was pushing across north

Figure 16. AirNow-Tech September 6, 2023 $PM_{2.5}$ Data



central and northeast Kansas toward the Kansas City metropolitan area. In the zoomed view (Figure 17), the T640X monitor in Topeka, KS recorded a 24-Hour $PM_{2.5}$ concentration of 73.9 $\mu g/m^3$ (in heavy smoke); the T640X at Heritage Park (Johnson County, KS) had a value of 43.2 $\mu g/m^3$; and the JFK (Kansas City, KS) T640X recorded a 24-hour value of 46.3 $\mu g/m^3$. In contrast, the Troost TEOM FEM approximately 3.6 miles across the state line in Missouri recorded a 24-hour value of 33 µg/m3—13.3 $\mu g/m^3$ less than the T640X in similar smoke conditions. Figures 18–19 show a regional view of the Midwest and a close-up of the Kansas City metropolitan area from EPA's AirNow-Tech with 24-hour $PM_{2.5}$ concentrations, wind barbs, and analyzed smoke plumes across the region from September 7, 2023. Heavy smoke had reached across almost all eastern Kansas and had moved into southeast Missouri. Moderate smoke was continuing to impact far eastern Kansas and western Missouri, including the Kansas City metropolitan area. In the zoomed view (Figure 19), the T640X monitor in Topeka, KS

[14] https://www.cbc.ca/news/climate/wildfire-season-2023-wrap-1.6999005

[15] https://www.kshb.com/news/local-news/hazy-conditions-smell-of-smoke-envelop-kansas-city-wednesday-afternoon#:~:text=KANSAS%20CITY%2C%20Mo.,and%20the%20Truman%20Sports%20Complex.&text=Smoke%20over%20the%20Truman%20Sports%20Complex%20on%20Sept.

Figure 17. AirNow-Tech September 6, 2023 $PM_{2.5}$ Data

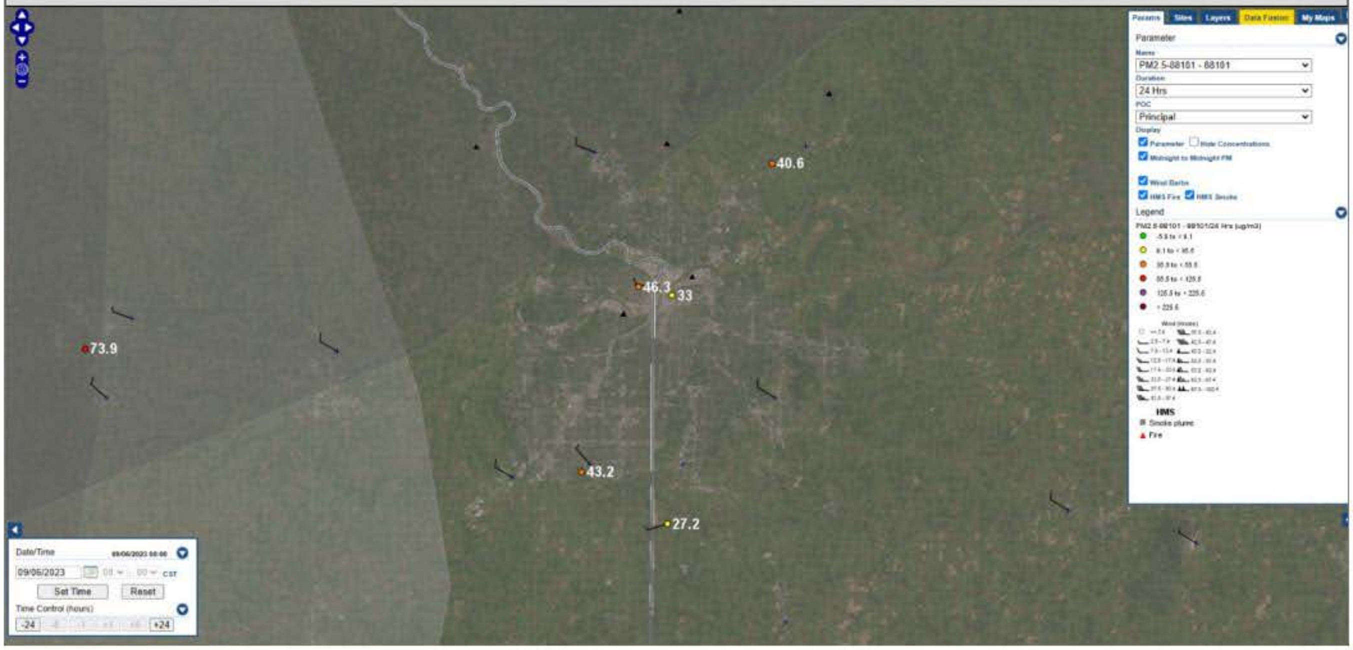
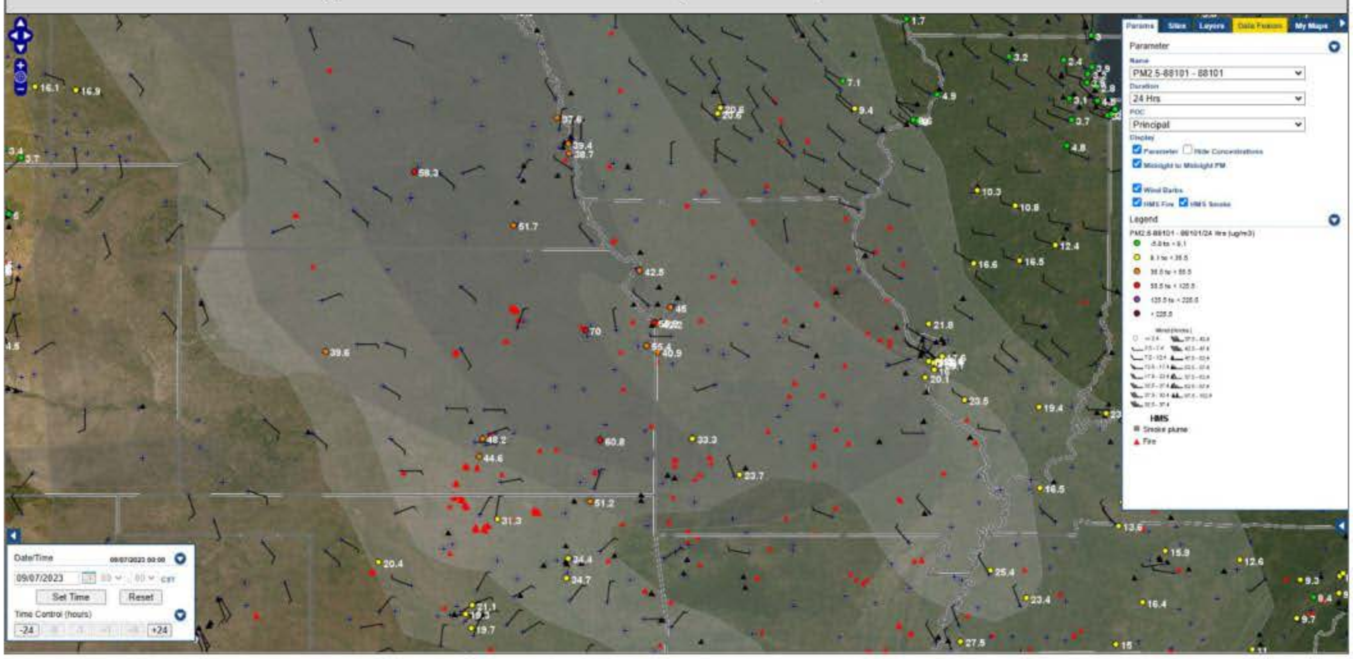


Figure 18. AirNow-Tech September 7, 2023 $PM_{2.5}$ Data



recorded a 24-Hour $PM_{2.5}$ concentration of 70 $\mu g/m^3$ (in heavy smoke), the T640X at Heritage Park (Johnson County, KS) had a value of 55.4 $\mu g/m^3$, and the JFK (Kansas City, KS) T640X recorded a 24-hour value of 55.9 $\mu g/m^3$. Once again in contrast, the Troost TEOM FEM approximately 3.6 miles across the state line in Missouri recorded a 24-hour value of 42.2 $\mu g/m^3$, 13.7 $\mu g/m^3$ less than the T640X in similar smoke conditions. Additionally, the T640X at Heritage Park (Johnson County, KS) recorded a value of 55.4 µg/m^3 while the Richards-Gebaur South TEOM FEM in Missouri recorded a value of 40.9 µg/m^3, 14.5 µg/m^3 less. This site is located approximately 10 miles southeast of the Heritage Park monitor site in Johnson County, Kansas.

Figure 19. AirNow-Tech September 7, 2023 PM$_{2.5}$ Data

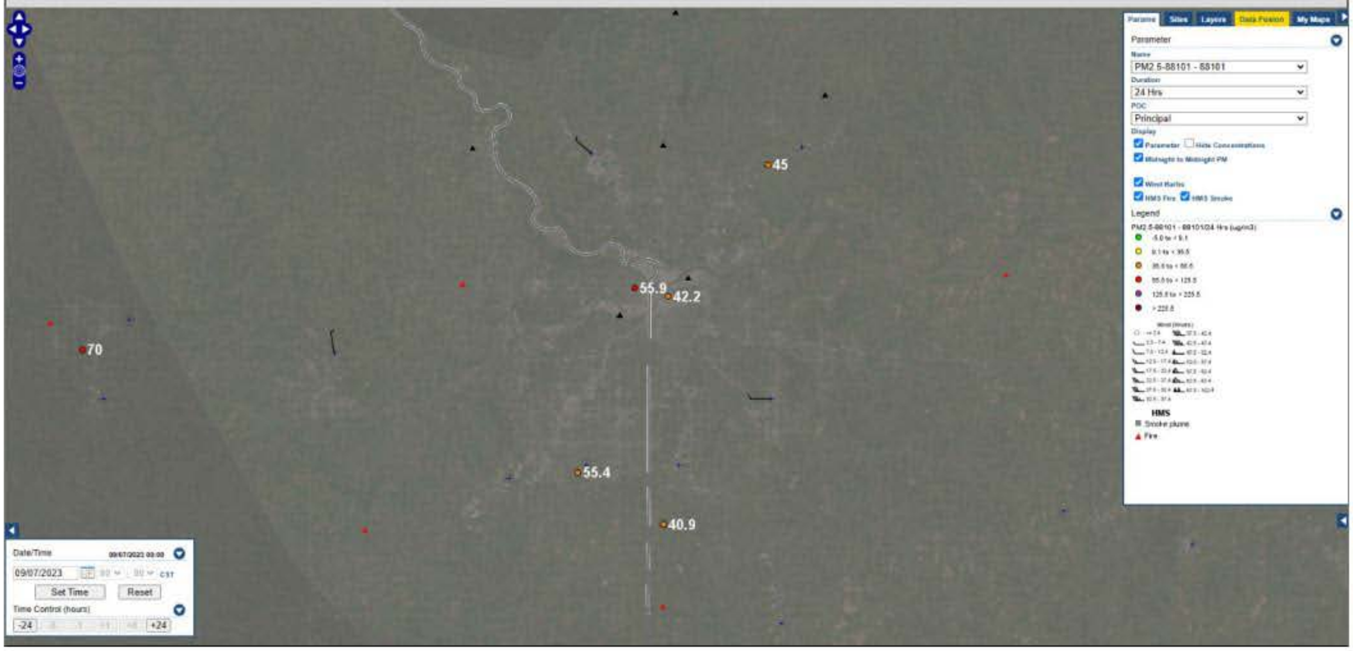
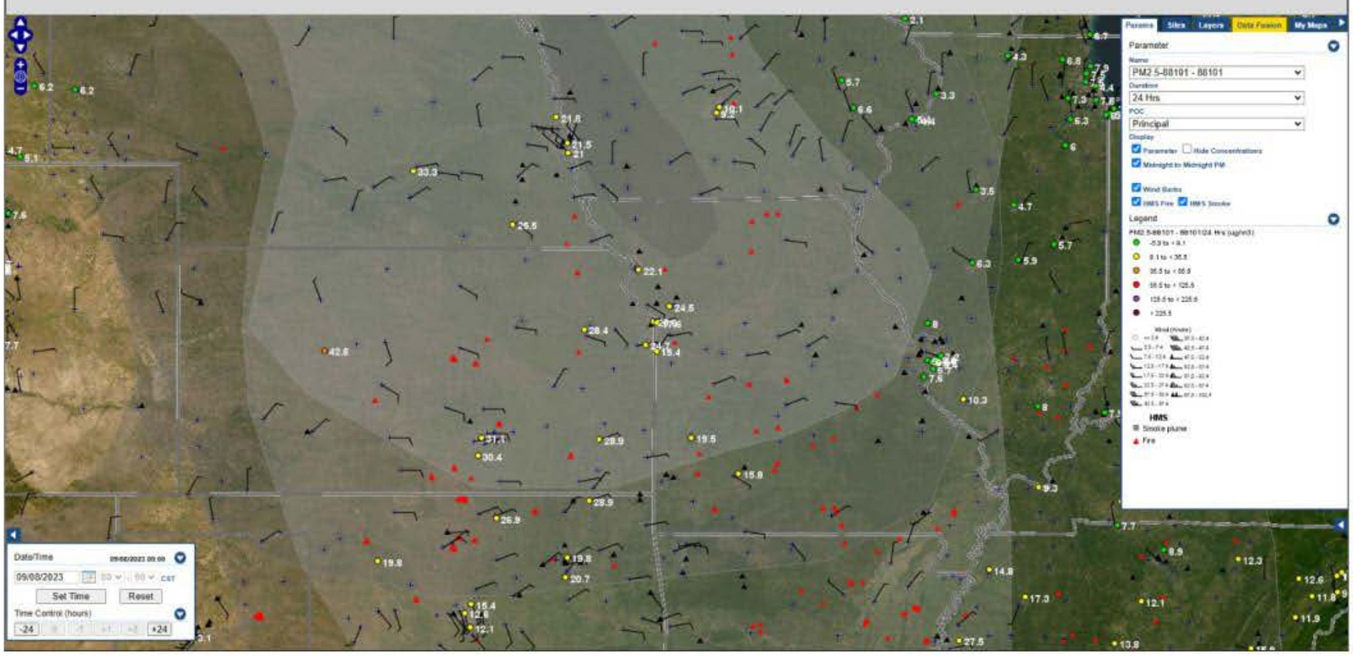
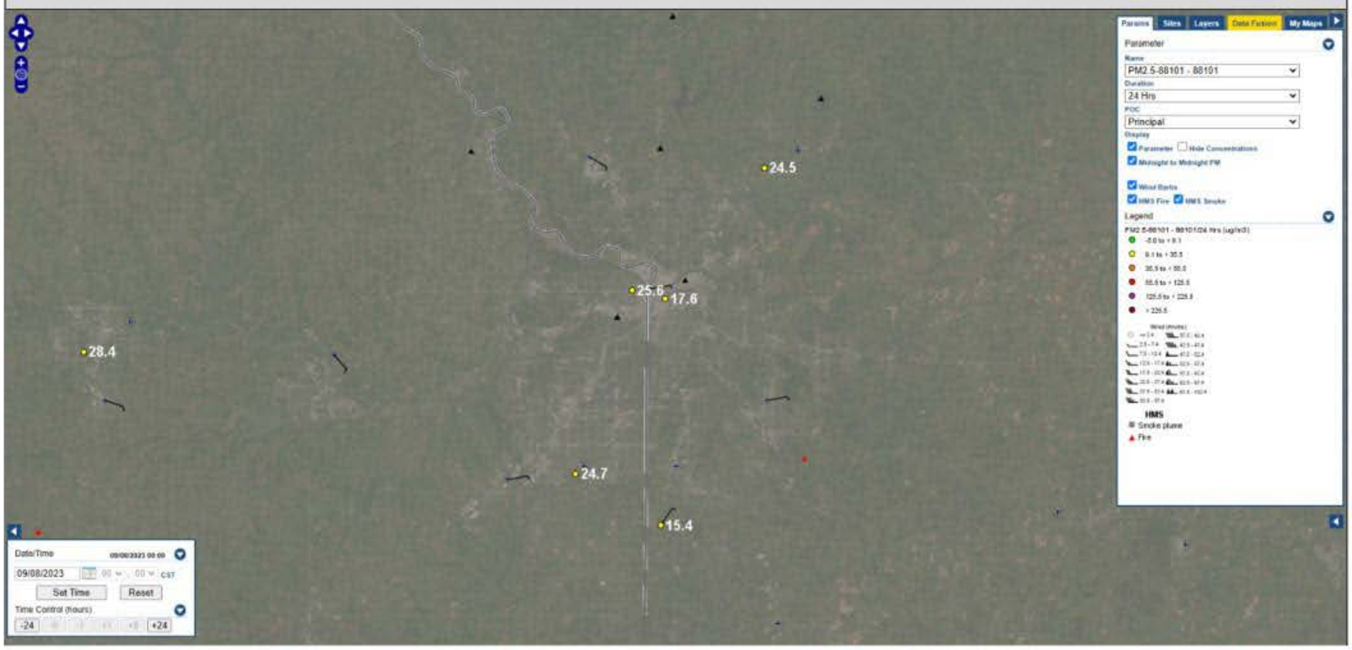


Figure 20. AirNow-Tech September 8, 2023 PM$_{2.5}$ Data



Figures 20–21 show a regional view of the Midwest and a close-up of the Kansas City metropolitan area from EPA's AirNow-Tech with 24-hour $PM_{2.5}$ concentrations, wind barbs, and analyzed smoke plumes across the region from September 8, 2023. On this day, the smoke intrusion episode had begun to lighten up across the Midwest as the heaviest smoke had retreated to western Iowa and a small section of northwest Missouri. The Kansas City metropolitan area had seen a decrease in smoke intensity from the previous two days but lighter smoke still blanketed the area. In the zoomed view (Figure 21), the T640X monitor in Topeka, KS recorded a 24-Hour $PM_{2.5}$ concentration of 28.4 µg/m^3, the T640X at Heritage Park (Johnson County, KS) had a value of 24.7 µg/m^3, and the JFK (Kansas City, KS) T640X recorded a 24-hour value of 25.6 µg/m^3. Even in lighter smoke, the Troost TEOM FEM continued to be less than the T640X at JFK. The Troost TEOM FEM recorded a value of 17.6 µg/m^3, 8 µg/m^3 less than the T640X.

Figure 21. AirNow-Tech September 8, 2023 $PM_{2.5}$ Data



The State believes that this example continues to show that the T640X is biased high in smoke events, not only in Kansas but across the country. Concentration differences in this three-day wildfire smoke event between the T640X and a TEOM FEM located 3 miles away ranged from 8 µg/m^3 to 13.7 µg/m^3.

Per Section 107 of the Clean Air Act, areas should also be designated nonattainment if they contribute to ambient air quality in a nearby area that does not meet the national ambient air quality standard. To determine if sources in Kansas contribute to violations in nearby areas outside of the state, data from $PM_{2.5}$ monitors located within 50 km of the Kansas border were also evaluated. Four monitors located in Missouri fall within the 50 km range (see Figure 23). None of these monitors have design values in violation of the 2024 Primary Annual $PM_{2.5}$ NAAQS (see Table 6); therefore, no further evaluation was conducted.

Figure 23. Nearby $PM_{2.5}$ Monitors Outside Kansas (2010 – 2012)

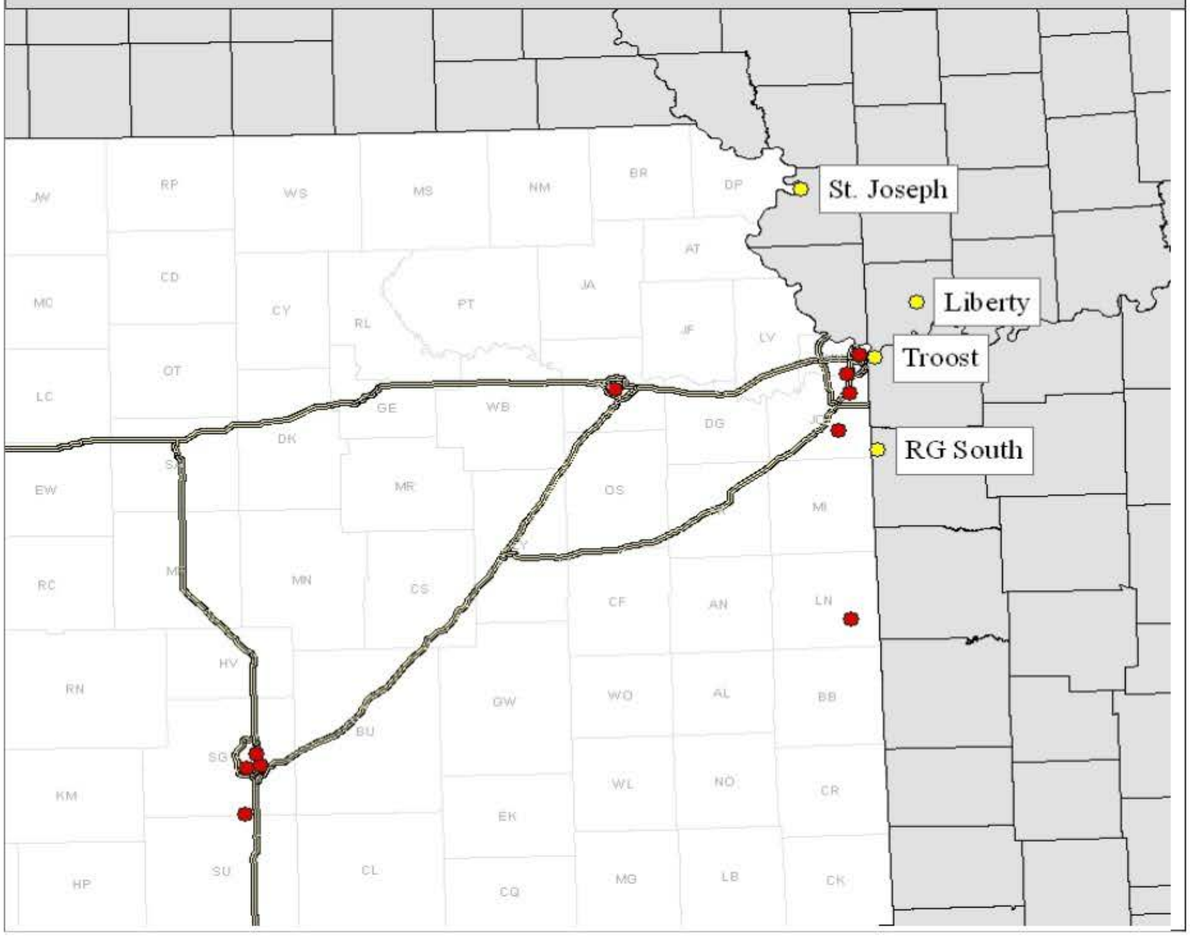


Table 6. Nearby $PM_{2.5}$ Monitor Design Values (2021 – 2023)

Site Name	AQS Site ID	County	2021 – 2023 Annual $PM_{2.5}$ Design Value ($\mu g/m^3$)
St. Joseph Pump Station	29-021-0005	Buchanan	8.6
Liberty	29-047-0005	Clay	6.0
Troost	29-095-0034	Jackson	7.6
RG-South	29-037-0003	Cass	6.3*

*- Did not meet data completeness requirements

Conclusion:

As discussed throughout this document, the State of Kansas believes that there continues to be issues with the T640(X) and its data compared to FRM data. Even though the Teledyne/EPA data algorithm improved the bias in the monitored data from the T640X, there continues to be issues with high biases as compared to both the FRMs and other FEMs. In addition, there is ample evidence from research and example used in this document, where the T640(X) clearly shows a high bias when exposed to wildfire and/or prescribed fire smoke. As far as the State can discern, no attempt was made by Teledyne or EPA to mitigate this high smoke bias in this instrument when the data was corrected or implemented in the firmware update provided by Teledyne. Many other states continue to voice their concerns about the use of the T640(X) FEM data to determine meeting or not meeting the new annual $PM_{2.5}$ standard. North Dakota voiced their concerns in their draft 2023 Canadian Wildfire Exceptional Event document located here: https://deq.nd.gov/AQ/Notices/EE/2023CanadianWildfireEEDemonstration_DRAFT.pdf.

"While the alignment algorithm resulted in an improvement in the T460/T640X FEM monitor bias compared to FRM monitors, it still does not adequately reduce the bias in the PM2.5 concentrations. In fact, the bias is so significant that, for the new 2024 $PM_{2.5}$ Annual NAAQS the ongoing bias could lead to an area being improperly designated nonattainment based on T640/T640X FEM monitored data while the area would have been designated attainment based on FRM monitored concentrations."

In addition, on December 20th, the Association of Air Pollution Control Agencies (AAPCA)[16] sent a letter to the EPA Administrator and Teledyne's Chief Executive Officer voicing their continued concerns over the use of the T640(X) in NAAQS determinations:

"AAPCA's state and local air agency members are concerned that the Teledyne T640/X FEM instruments have a significantly high bias compared to FRM instruments. AAPCA appreciates Teledyne Technologies and U.S. EPA's efforts to correct the bias in the Teledyne T640/X FEM. However, the bias adjustment algorithm that was developed by Teledyne, approved by U.S. EPA, and applied to AQS data does not adequately reduce the bias in the Teledyne T640/X $PM_{2.5}$ concentrations, resulting in annual $PM_{2.5}$ concentrations that are significantly higher compared to annual $PM_{2.5}$ concentrations measured with FRM monitors. This can lead to areas being designated nonattainment based on measured Teledyne T640/X $PM_{2.5}$ concentrations, when the area would have been designated attainment based on measured FRM $PM_{2.5}$ concentrations. As a result, many state and local air monitoring programs are in the process of invalidating the Teledyne T640/X measurements and moving away from the Teledyne T640/X instruments."

The State of Kansas recommends that the three monitors (T640Xs) located in Neosho County (Chanute), Sedgwick County (Wichita HD) and Wyandotte County (JFK) that currently do not meet the new primary annual standard of 9.0 $\mu g/m^3$ be designated "Unclassifiable" for the new standard, based on the continued concerns by many states over the data being produced by the T640(X) and the analysis provided in this document. It would be improper to penalize a state, its citizens and businesses based on a flawed monitor. The State would also propose that it is currently moving forward with purchasing two

[16] AAPCA is a national, non-profit, consensus-driven organization focused on assisting state and local air quality agencies and personnel with implementation and technical issues associated with the federal Clean Air Act. Created in 2012, AAPCA represents 53 state and local air pollution control agencies, and senior officials from 21 state environmental agencies currently sit on the AAPCA Board of Directors. AAPCA is housed in Lexington, Kentucky as an affiliate of The Council of State Governments. More about AAPCA is at: www.cleanairact.org.

additional FRM monitors to install at the Chanute and Wichita HD monitor sites to collocate next to the existing T640X monitors. These installations will allow the State to run these monitors side by side to determine what the proper design value is for each location, and work to develop what a data alignment algorithm for the State of Kansas should be for the T640X.

600 Broadway, Suite 200
Kansas City, Missouri 64105-1659

816-474-4240
816-421-7758 FAX
marcinfo@marc.org
www.marc.org

MARC
MID-AMERICA REGIONAL COUNCIL

January 28, 2025

Kansas Department of Health and Environment
Bureau of Air
1000 S.W. Jackson, Suite 310
Topeka, Kansas 66612-13666

Re: Kansas PM2.5 NAAQS Designation Recommendations

Dear Mr. Doug Watson:

The Mid-America Regional Council (MARC) Air Quality Forum (AQF), created in accordance with Section 174 of the Clean Air Act to coordinate the development and implementation of air quality policy in the bi-state Kansas City region, offers the following comments on the KDHE's proposed recommendation for PM2.5 NAAQS Designations:

KDHE utilizes the Federal Equivalent Monitor (FEM) Teledyne T640X monitor rather than the filter based Federal Reference Monitors (FRM). It has been documented and recognized that this monitor has a pronounced high bias, and the EPA has retroactively applied Network Data Alignment equations to adjust the T640x data using temperature and concentration. KDHE has concluded however that this procedure is insufficient to account for the high bias, particularly when PM2.5 is related to smoke from wildfires and/or controlled burns. Monitor data and design values from 2021-2023 indicate that three Kansas counties, including Wyandotte County, have design values that exceed the annual PM2.5 National Ambient Air Quality Standards (NAAQS). However, until the remaining T640x high bias has been resolved, KDHE feels making an attainment designation should not be based on existing data from these monitors.

In their more detailed analysis of the monitor in Wyandotte County, KDHE presented a comparison with data collected at the Troost Air Quality Monitoring Site in Missouri (3.4 mile south-southeast). Data demonstrated that the T640x in Wyandotte County had significantly higher readings than the TEOM FEM at Troost, even after applying the Network Data Alignment to the T640x. A collocated secondary T640 FEM monitor at Troost also showed high bias compared to the site's main TEOM FEM and was instead similar to the data from Wyandotte County.

The Missouri Department of Natural Resources looked at speciation data to rule out the possibility that the Wyandotte County T640x FEM was higher due to hyperlocal sources of particulate matter originating in Missouri. MDNR concluded that the higher design value in Wyandotte County is not due to hyperlocal sources and that the most likely cause is ongoing unexplained positive bias of the Teledyne T640X and T640 monitors.

The AQF agrees with KDHE's recommendation to designate Wyandotte County as 'Unclassifiable.' The AQF has reviewed KDHE's analysis of the bias issue that led to their conclusion and shares their concern. The Forum further recognizes that the bias associated with the T640X monitors is a continued concern among many air pollution control agencies and the Association of Air Pollution Control Agencies.

Wyandotte County's design value for PM2.5 (2021-2023) at 9.6 µg /m^3 is very close to the 9.0 µg /m^3 federal standard. Considering the increase in smoke days due to sources outside the region over the last few years and the uncorrected high bias associated specifically with smoke, the Forum similarly concludes that increased attention to the apparent bias of the T640X FEMs is required and the remaining bias should be remedied prior to any attainment designation for Wyandotte County. Additionally, the AQF agrees with KDHE's recommendation that the agency purchase and install FRMs at the Chanute and Wichita monitor sites and work to develop a data alignment algorithm for the State of Kansas' T640X.

The MARC Board of Directors, which consists of 33 local elected officials from the Kansas City region, has endorsed the Air Quality Forum's position on the proposed PM2.5 NAAQS designation recommendation. Thank you for this opportunity to comment. Please contact Karen Clawson, MARC Air Quality Program Manager at 816-701-8255 or kclawson@marc.org if you have any questions.

Sincerely,

A. Savastino

Andy Savastino, City of Kansas City, Mo.
Office of Environmental Quality
Co-Chair, Air Quality Forum

Rollin Sachs

Rollin Sachs, Johnson County, Ks.
Department of Health and Environment
Co-Chair, Air Quality Forum

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

February 7, 2025

Ms. Jeaneanne Gettle
Acting Regional Administrator
U.S. EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303

RE: Submission of initial area designation recommendations for the revised $PM_{2.5}$ primary annual standard

Dear Ms. Gettle:

On February 7, 2024, the U.S. Environmental Protection Agency (EPA) promulgated a revised National Ambient Air Quality Standard (NAAQS) for the primary annual particulate matter standard for fine particles ($PM_{2.5}$) by lowering the level from 12.0 $\mu g/m^3$ to 9.0 $\mu g/m^3$. This action was officially published in the Federal Register on March 6, 2024.[1] Pursuant to Section 107(d)(1)(A) of the Clean Air Act (CAA), states are required to submit initial area designation recommendations to the EPA no later than one year after promulgation of the new or revised NAAQS. Thus, states must submit initial area designation recommendations for the revised primary annual $PM_{2.5}$ standard by February 7, 2025.

Using certified air quality data that meets the applicable regulatory requirements, the 2021-2023 design values of all $PM_{2.5}$ monitors in Kentucky are provided in Attachment 1. The use of this data corresponds to the $PM_{2.5}$ initial area designation memorandum issued by EPA that encouraged states to submit recommendations based on 2021-2023 monitoring data.[2] However, Kentucky relies on 2024 monitoring data[3] and 2022-2024 design values for Bell and Jefferson Counties in Kentucky for its initial area designation recommendations. This is appropriate because EPA's final area designations are to be based on 2022-2024 monitoring data. As demonstrated in Attachment 1, the most current design values at all monitors are below the standard of 9.0 $\mu g/m^3$. Therefore, the Energy and Environment Cabinet (Cabinet) recommends Bell and Jefferson Counties be designated as attainment for the revised $PM_{2.5}$ standard. The Cabinet also recommends the remainder of the state be designated as attainment/unclassifiable. The complete list of all

[1] 89 Fed. Reg. 16,202
[2] U.S. Environmental Protection Agency. *Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard*, February 7, 2024. https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf
[3] Due to issues with Air Quality System (AQS), early certification for Jefferson and Bell Counties has not yet been completed, however, the recommendation for designation is still based on the 2024 values for these counties.

counties in the Commonwealth and their respective designation recommendations are submitted and specified in the table included as Attachment 2.

Your prompt attention to this letter is greatly appreciated. If you have any questions or comments concerning this matter, please contact Michael Kennedy, Division for Air Quality Director, at (502) 782-6997 or michael.kennedy@ky.gov.

Sincerely,

Rebecca W. Goodman

Rebecca W. Goodman, Secretary
Energy and Environment Cabinet

cc:

Denisse Diaz
Lynorae Benjamin

Attachment 1
Attachment 2

Attachment 1: Kentucky Design Values

County	Monitor I.D.	2021-2023 Design Value	2022-2024 Design Value*
Bell	21-13-0002	9.1	8.6
Boyd	21-19-0017	7.5	7.1
Campbell	21-37-3002	7.6	7.3
Carter	21-43-0500	6.3	6.0
Christian	21-47-0006	8.6	7.9
Daviess**	21-59-0005	8.8	Invalid
Fayette	21-67-0012	7.8	7.1
Hardin	21-93-0006	7.8	7.2
Jefferson	21-111-0051	9.3	8.8
	21-111-0067	8.4	7.8
	21-111-0075	9.5	8.8
	21-111-0080	8.8	8.2
	21-111-1041	8.8	8.4
McCracken	21-145-1024	8.8	8.6
	21-145-1027	8.5	7.7
Perry	21-193-0003	8.0	7.8
Pike	21-195-0002	6.8	6.4
Pulaski	21-199-0003	7.5	7.1
Warren	21-227-0009	7.4	6.9

*2022-2024 design values are based upon preliminary monitoring data that has not been certified; 2022-2024 design values will be certified for Bell and Jefferson Counties once the Air Quality System (AQS) issues are rectified.

**The Daviess County monitor was offline for a portion of 2024, making its 2022-2024 design value invalid.

Attachment 2: $PM_{2.5}$ Initial Area Designation Recommendations

County	Recommended Designation	County	Recommended Designation
Adair	Attainment/Unclassifiable	Elliot	Attainment/Unclassifiable
Allen	Attainment/Unclassifiable	Estill	Attainment/Unclassifiable
Anderson	Attainment/Unclassifiable	Fayette	Attainment
Ballard	Attainment/Unclassifiable	Fleming	Attainment/Unclassifiable
Barren	Attainment/Unclassifiable	Floyd	Attainment/Unclassifiable
Bath	Attainment/Unclassifiable	Franklin	Attainment/Unclassifiable
Bell	Attainment	Fulton	Attainment/Unclassifiable
Boone	Attainment/Unclassifiable	Gallatin	Attainment/Unclassifiable
Bourbon	Attainment/Unclassifiable	Garrard	Attainment/Unclassifiable
Boyd	Attainment	Grant	Attainment/Unclassifiable
Boyle	Attainment/Unclassifiable	Graves	Attainment/Unclassifiable
Bracken	Attainment/Unclassifiable	Grayson	Attainment/Unclassifiable
Breathitt	Attainment/Unclassifiable	Green	Attainment/Unclassifiable
Breckinridge	Attainment/Unclassifiable	Greenup	Attainment/Unclassifiable
Bullitt	Attainment/Unclassifiable	Hancock	Attainment/Unclassifiable
Butler	Attainment/Unclassifiable	Hardin	Attainment
Caldwell	Attainment/Unclassifiable	Harlan	Attainment/Unclassifiable
Calloway	Attainment/Unclassifiable	Harrison	Attainment/Unclassifiable
Campbell	Attainment	Hart	Attainment/Unclassifiable
Carlisle	Attainment/Unclassifiable	Henderson	Attainment/Unclassifiable
Carroll	Attainment/Unclassifiable	Henry	Attainment/Unclassifiable
Carter	Attainment	Hickman	Attainment/Unclassifiable
Casey	Attainment/Unclassifiable	Hopkins	Attainment/Unclassifiable
Christian	Attainment	Jackson	Attainment/Unclassifiable
Clark	Attainment/Unclassifiable	Jefferson	Attainment
Clay	Attainment/Unclassifiable	Jessamine	Attainment/Unclassifiable
Clinton	Attainment/Unclassifiable	Johnson	Attainment/Unclassifiable
Crittenden	Attainment/Unclassifiable	Kenton	Attainment/Unclassifiable
Cumberland	Attainment/Unclassifiable	Knott	Attainment/Unclassifiable
Daviess	Attainment	Knox	Attainment/Unclassifiable
Edmonson	Attainment/Unclassifiable	LaRue	Attainment/Unclassifiable

County	Recommended Designation	County	Recommended Designation
Laurel	Attainment/Unclassifiable	Ohio	Attainment/Unclassifiable
Lawrence	Attainment/Unclassifiable	Oldham	Attainment/Unclassifiable
Lee	Attainment/Unclassifiable	Owen	Attainment/Unclassifiable
Leslie	Attainment/Unclassifiable	Owsley	Attainment/Unclassifiable
Letcher	Attainment/Unclassifiable	Pendleton	Attainment/Unclassifiable
Lewis	Attainment/Unclassifiable	Perry	Attainment
Lincoln	Attainment/Unclassifiable	Pike	Attainment
Livingston	Attainment/Unclassifiable	Powell	Attainment/Unclassifiable
Logan	Attainment/Unclassifiable	Pulaski	Attainment
Lyon	Attainment/Unclassifiable	Robertson	Attainment/Unclassifiable
McCracken	Attainment	Rockcastle	Attainment/Unclassifiable
McCreary	Attainment/Unclassifiable	Rowan	Attainment/Unclassifiable
McLean	Attainment/Unclassifiable	Russell	Attainment/Unclassifiable
Madison	Attainment/Unclassifiable	Scott	Attainment/Unclassifiable
Magoffin	Attainment/Unclassifiable	Shelby	Attainment/Unclassifiable
Marion	Attainment/Unclassifiable	Simpson	Attainment/Unclassifiable
Marshall	Attainment/Unclassifiable	Spencer	Attainment/Unclassifiable
Martin	Attainment/Unclassifiable	Taylor	Attainment/Unclassifiable
Mason	Attainment/Unclassifiable	Todd	Attainment/Unclassifiable
Meade	Attainment/Unclassifiable	Trigg	Attainment/Unclassifiable
Menifee	Attainment/Unclassifiable	Trimble	Attainment/Unclassifiable
Mercer	Attainment/Unclassifiable	Union	Attainment/Unclassifiable
Metcalfe	Attainment/Unclassifiable	Warren	Attainment
Monroe	Attainment/Unclassifiable	Washington	Attainment/Unclassifiable
Montgomery	Attainment/Unclassifiable	Wayne	Attainment/Unclassifiable
Morgan	Attainment/Unclassifiable	Webster	Attainment/Unclassifiable
Muhlenberg	Attainment/Unclassifiable	Whitley	Attainment/Unclassifiable
Nelson	Attainment/Unclassifiable	Wolfe	Attainment/Unclassifiable
Nicholas	Attainment/Unclassifiable	Woodford	Attainment/Unclassifiable

JEFF LANDRY
GOVERNOR

AURELIA S. GIACOMETTO
SECRETARY

STATE OF LOUISIANA

DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL ASSESSMENT

February 4, 2025

Scott Mason IV, Regional Administrator
US EPA Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270

RE: State of Louisiana
Recommendations for Area Designations
2024 Particulate Matter 2.5 National Ambient Air Quality Standards (NAAQS)

Dear Administrator Mason:

In accordance with Section 107(d) of the Clean Air Act Amendments of 1990, LDEQ submits designation recommendations for the 2024 Particulate Matter 2.5 ($PM_{2.5}$) NAAQS, published on February 7, 2024 (89 FR 16202). These designation recommendations are based on a review of the quality-assured $PM_{2.5}$ monitoring data for the period 2021-2023.

The recommended designations are outlined in the attached document. Of particular note are the recommendations for Caddo and West Baton Rouge Parishes. Further explanation is provided below.

In Caddo Parish, both Louisiana Department of Environmental Quality (LDEQ) and Environmental Protection Agency (EPA) Region 6 staff expressed concerns about the location of the Shreveport/Calumet Ambient Air Monitoring Site. These issues were discussed during site visits with EPA Region 6 staff in coordination with the 2014 and 2023 Technical System Audits[1]. The site is located directly adjacent to a gravel parking lot that was established a number of years after monitoring commenced. The parking lot was used as a parking area for the industrial facility located adjacent to the property, further increasing particulate matter generation with the large number of vehicles entering and exiting the lot during shift changes. To compound issues, in recent years, the site had issues with encroaching vegetation that was no longer being maintained by the city and beyond LDEQ's control.

LDEQ believes the monitoring data at the Shreveport Calumet site was influenced by both the parking lot and vegetation and that the data is not representative of the area. In LDEQ's 2024 Annual Ambient Monitoring Network Plan, LDEQ proposed to relocate the site to a more

[1] Note: Due to COVID travel restrictions in place at the time, site visits were not conducted in coordination with the TSA performed in 2020.

suitable location. After nearly one year of evaluating proposed sites, LDEQ signed a lease with the City of Shreveport and relocated the monitoring equipment from the Shreveport/Calumet site to Ingleside Park. Sampling commenced at the relocated site, identified as the Shreveport Claiborne site in the Air Quality System (AQS), on September 27, 2024, which does not allow for the collection of the requisite minimum of three (3) years of data. Considering the issues with data influences at the Shreveport/Calumet site and the lack of a valid design value at the Shreveport Claiborne site, LDEQ is recommending a designation of unclassifiable for Caddo Parish at this time.

In West Baton Rouge Parish, LDEQ submitted two exceptional event demonstrations (EEDs), dated December 18, 2024, requesting EPA's concurrence with excluding data suspected to be influenced by exceptional events from design value calculations. The first demonstration described a Saharan Dust Outbreak that occurred during the period of June 12th through June 16th of 2022. This demonstration alone decreases the design value for the Port Allen monitoring site from $9.1 \mu g/m^3$ to $8.9 \mu g/m^3$. LDEQ believes this demonstration will be approved in its entirety. However, due to deadlines associated with submitting EEDs for initial area designations, in the event a portion of this demonstration is not approved, or if 2024 monitoring data again show an exceedance of the standard, LDEQ submitted a second EED for a Canadian Wildfire Event that occurred October 4th through 5th of 2023. Considering EPA's concurrence with these exceptional event analyses, LDEQ is recommending a designation of attainment for West Baton Rouge Parish.

We look forward to working closely with your staff over the next year on EPA's issuance of the final 2024 $PM_{2.5}$ NAAQS designations. If you have any questions, please contact Mr. Jason Meyers, Administrator of the Air Planning and Assessment Division at 225-219-3408, or by email at jason.meyers@la.gov.

Sincerely,

Aurelia S. Giacometto
Secretary

c: Guy Donaldson, EPA Region 6

Attachment

State of Louisiana
2024 $PM_{2.5}$ Designation Recommendations

Designated Area (Parish)	Recommended Designation
Acadia Parish	Unclassifiable
Allen Parish	Unclassifiable
Ascension Parish	Attainment
Assumption Parish	Unclassifiable
Avoyelles Parish	Unclassifiable
Beauregard Parish	Unclassifiable
Bienville Parish	Unclassifiable
Bossier Parish	Unclassifiable
Caddo Parish	Unclassifiable[1]
Calcasieu Parish	Attainment
Caldwell Parish	Unclassifiable
Cameron Parish	Unclassifiable
Catahoula Parish	Unclassifiable
Claiborne Parish	Unclassifiable
Concordia Parish	Unclassifiable
DeSoto Parish	Unclassifiable
East Baton Rouge Parish	Attainment
East Carroll Parish	Unclassifiable
East Feliciana Parish	Unclassifiable
Evangeline Parish	Unclassifiable
Franklin Parish	Unclassifiable
Grant Parish	Unclassifiable
Iberia Parish	Unclassifiable
Iberville Parish	Unclassifiable
Jackson Parish	Unclassifiable
Jefferson Davis Parish	Unclassifiable
Jefferson Parish	Attainment
La Salle Parish	Unclassifiable
Lafayette Parish	Attainment
Lafourche Parish	Attainment
Lincoln Parish	Unclassifiable
Livingston Parish	Attainment
Madison Parish	Unclassifiable
Natchitoches Parish	Unclassifiable
Orleans Parish	Attainment
Ouachita Parish	Attainment
Plaquemines Parish	Unclassifiable

[1] Caddo Parish recommended unclassifiable due to data influences at the Shreveport/Calumet site and lack of requisite minimum of three (3) years data at the Shreveport Claiborne site. See cover letter for details.

State of Louisiana
2024 $PM_{2.5}$ Designation Recommendations

Designated Area (Parish)	Recommended Designation
Pointe Coupée Parish	Unclassifiable
Rapides Parish	Attainment
Red River Parish	Unclassifiable
Richland Parish	Unclassifiable
Sabine Parish	Unclassifiable
St. Bernard Parish	Attainment
St. Charles Parish	Unclassifiable
St. Helena Parish	Unclassifiable
St. James Parish	Unclassifiable
St. John the Baptist Parish	Unclassifiable
St. Landry Parish	Unclassifiable
St. Martin Parish	Unclassifiable
St. Mary Parish	Unclassifiable
St. Tammany Parish	Attainment
Tangipahoa Parish	Attainment
Tensas Parish	Unclassifiable
Terrebonne Parish	Attainment
Union Parish	Unclassifiable
Vermilion Parish	Unclassifiable
Vernon Parish	Unclassifiable
Washington Parish	Unclassifiable
Webster Parish	Unclassifiable
West Baton Rouge Parish	Attainment[2]
West Carroll Parish	Unclassifiable
West Feliciana Parish	Unclassifiable
Winn Parish	Unclassifiable

[2] West Baton Rouge Parish recommended attainment based on two exceptional event demonstrations (EEDs), June 12 – 16, 2022 Saharan Dust Outbreak and October 4-5, 2023 Canadian Wildfire Event. See cover letter for details.

OFFICE OF THE GOVERNOR
COMMONWEALTH OF MASSACHUSETTS
STATE HOUSE • BOSTON, MA 02133
(617) 725-4000

MAURA T. HEALEY
GOVERNOR

KIMBERLEY DRISCOLL
LIEUTENANT GOVERNOR

January 6, 2025

David W. Cash
Regional Administrator
U.S. Environmental Protection Agency, Region 1
EPA New England Headquarters
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Dear Administrator Cash:

I am writing to recommend that the U.S. Environmental Protection Agency (EPA) designate the entire state of Massachusetts as "attainment" for the 2024 primary annual National Ambient Air Quality Standard (NAAQS) for fine particulate matter ($PM_{2.5}$). This recommendation is based on certified 2021–2023 air monitoring data for Massachusetts (see Attachment).

If you need additional information, please contact Massachusetts Department of Environmental Protection Commissioner Bonnie Heiple at 617-292-5500. An electronic copy of this recommendation also is being provided to your staff.

I look forward to continuing to work with you to improve air quality in Massachusetts.

Sincerely,

Maura T. Healey
Governor

Attachment

Massachusetts Monitored Annual $PM_{2.5}$ Design Values

The table below shows annual $PM_{2.5}$ design values for monitors in Massachusetts based on certified 2021-2023 $PM_{2.5}$ monitoring data. No design value exceeds the primary annual $PM_{2.5}$ NAAQS of 9 microgram per cubic meter.

Monitor Site	AQS Code	Design Value 2021-2023	Recommendation
Pittsfield	250030008	7.0[1]	Attainment
North Adams	250036001	6.6	Attainment
Greenfield	250112005	7.2	Attainment
Chicopee	250130008	5.8	Attainment
Springfield	250130018	8.7[1]	Attainment
Ware	250154002	6.0	Attainment
Worcester	250270023	8.2	Attainment
Lynn	250092006	5.5[1]	Attainment
Haverhill	250095006	7.2	Attainment
Chelmsford	250170010	5.8	Attainment
Boston-Kenmore	250250002	6.2	Attainment
Boston-Roxbury	250250042	5.8	Attainment
Boston-Von Hillern	250250044	7.1	Attainment
Boston-Chinatown	250250045	7.5[2]	Attainment
Chelsea	250251004	6.5[1]	Attainment
Fall River	250051004	5.9	Attainment
Weymouth	250212005	5.8	Attainment
Brockton	250230005	7.9	Attainment

Design values in micrograms per cubic meter ($\mu g/m^3$) retrieved from EPA 2023 Design Value Report.

[1] Monitors with less than 75% data capture for one or more quarters.

[2] Value is based on 2023 Q2-Q4 data only. Boston-Chinatown $PM_{2.5}$ monitoring began in 2023 and therefore a 3-year design value cannot be calculated.

Friday, January 17, 2025

Adam Ortiz
Regional Administrator
U.S. Environmental Protection Agency
Region 3
1600 John F. Kennedy Boulevard
Philadelphia, PA 19103

RE: Submission of initial designations for the revised PM2.5 primary annual standard

Dear Administrator Ortiz,

On February 7, 2024, the U.S. Environmental Protection Agency (EPA) proposed more stringent National Ambient Air Quality Standards (NAAQS) for annual Fine Particulate Matter (PM2.5), and on March 6, 2024, that ruling went into effect. The primary annual PM2.5 standard was lowered from 12.0 μg/m3 to 9.0 μg/m3. All other PM standards (24-hour PM2.5 standard, 24-hour PM10 standard, and suite of secondary PM standards) were retained. After the promulgation of a new standard, Section 107(d) of the Clean Air Act (CAA) requires that EPA and states follow a standard procedure in order to designate every area within the country in relation to the new standard. After EPA's promulgation of a NAAQS, states are required to submit their recommendations of designations in their state no later than 1 year after the ruling.

Attachment 1 provides historical and current design values for every county in Maryland, using certified air quality data that meet the applicable regulatory requirements. Initial designations will be based on 2023 design values, which are made up of air quality data from 2021, 2022, and 2023. As demonstrated in the attachment, there are no counties in Maryland that violate the 2024 PM2.5 standard. All monitors with certified data in the state have 2021-2023 design values well below the standard of 9.0 µg/m3, even when including monitoring data from days affected by wildfires in 2023. Based on these monitoring data, Maryland is recommending that the entire state be designated “attainment”/“unclassifiable.” Attachment 2 contains Maryland’s recommended designations for each county with respect to the 2024 annual PM2.5 standard.

Thank you for your attention to this request. If you have any questions or comments concerning this matter, please contact Secretary of the Environment Serena McIlwain, at (410) 537-3893 or MDE.Secretary@maryland.gov.

Sincerely,

Wes Moore
Governor of Maryland

Enclosures

cc: Serena C. McIlwain, Secretary, Maryland Department of the Environment
Chris Hoagland, Air and Radiation Administration Director

Attachment 1: County 2021 - 2023 Design Values[1]

		Annual Average Design Value (µg/m³)		
County	**Monitor Name**	**2019 – 2021**	**2020 – 2022**	**2021 – 2023**
Allegany	N/A			
Anne Arundel	N/A			
Baltimore	Padonia	7.9	7.7	7.8
	Essex	7.6	7.1	8.3
Baltimore City	Lake Montebello		6.8*	7.5*
Calvert	N/A			
Caroline	N/A			
Carroll	N/A			
Cecil	Fair Hill	6.7	6.8	7.4
Charles	N/A			
Dorchester	Horn Point	5.6	5.9	6.9
Frederick	N/A			
Garrett	Piney Run	5.3	5.2	5.6
Harford	Edgewood	6.9	6.7	7.3
Howard	HCNR	7.1	6.9	7.4
Kent	Millington	5.4	5.5	6.0
Montgomery	Rockville	6.4	6.8	7.1
Prince George's	HU-Beltsville	6.4	5.9	6.5
Queen Anne's	N/A			
Saint Mary's	N/A			
Somerset	N/A			
Talbot	N/A			
Washington	Hagerstown	7.2	6.8	7.0
Wicomico	N/A			
Worcester	N/A			

*Lake Montebello commenced operations in 2022. The first valid design value will be calculated using 2023-2025 data.

[1] https://www.epa.gov/air-trends/air-quality-design-values#report

Attachment 2: PM2.5 Recommendations

County	Recommended Designation
Allegany	Attainment/Unclassifiable
Anne Arundel	Attainment/Unclassifiable
Baltimore	Attainment
Baltimore City	Attainment
Calvert	Attainment/Unclassifiable
Caroline	Attainment/Unclassifiable
Carroll	Attainment/Unclassifiable
Cecil	Attainment/Unclassifiable
Charles	Attainment/Unclassifiable
Dorchester	Attainment
Frederick	Attainment/Unclassifiable
Garrett	Attainment
Harford	Attainment
Howard	Attainment
Kent	Attainment
Montgomery	Attainment
Prince George's	Attainment
Queen Anne's	Attainment/Unclassifiable
Saint Mary's	Attainment/Unclassifiable
Somerset	Attainment/Unclassifiable
Talbot	Attainment/Unclassifiable
Washington	Attainment
Wicomico	Attainment/Unclassifiable
Worcester	Attainment/Unclassifiable

Janet T. Mills
GOVERNOR

STATE OF MAINE
OFFICE OF THE GOVERNOR
1 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0001

February 7, 2025

Karen McGuire
Acting Regional Administrator
USEPA Region I New England
5 Post Office Square
Mail Code: OSA01-4
Boston, MA 02109-3912

RE: Maine's Area Designation Recommendation for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard

Dear Ms. McGuire,

I am pleased to submit Maine's recommended designation for the 2024 revised primary annual fine particulate matter ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS). Section 107(d)(1)(A) of the Clean Air Act (CAA) provides up to one year after adoption of new or revised NAAQS for states to submit recommendations identifying areas that violate or contribute to nearby violations of the revised NAAQS.

Maine's Department of Environmental Protection (MEDEP) has monitored $PM_{2.5}$ as prescribed by 40 CFR Part 58. Monitored data demonstrates compliance and is summarized in the Technical Support Document for Maine's Recommendation for the 9.0 $\mu g/m^3$ annual $PM_{2.5}$ NAAQS.

Consistent with Section 107(d)(1)(A) of the CAA and EPA guidance, Maine recommends that the entire state of Maine be designated as "attainment" for the annual $PM_{2.5}$ NAAQS.

Thank you for your consideration of this recommendation. I have asked Jeff Crawford, Director of the Bureau of Air Quality, to be available (207) 242-3414 to answer any questions you may have regarding the recommended designation and $PM_{2.5}$ monitoring strategy.

Sincerely,

Janet T. Mills,
Governor

cc: Congressional Delegation
Lynne, Hamjian, U.S. EPA Region 1
Melanie, Loyzim, Maine DEP
Jeff Crawford, Maine DEP

TECHNICAL SUPPORT DOCUMENT

State of Maine's Recommendations for the Primary Annual $PM_{2.5}$ NAAQS Attainment Designations

1. INTRODUCTION

The State of Maine recommends the entire state be designated as 'attainment' for the Primary Annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS). This document summarizes the technical analysis used to formulate this decision. The recommendations contained in this document meet requirements of Section 107(d) of the Clean Air Act (CAA).

2. RATIONALE FOR ATTAINMENT CLASSIFICATION

The National Ambient Air Quality Standards for Particulate Matter final rule, as published in the Federal Register on March 6, 2024, requires quality assured monitored data. The State of Maine is recommending that the entire state be designated attainment based on an analysis of certified, quality assured data from 2021 to 2023, which was downloaded from AQS on November 6, 2024. Data analysis met all applicable handling conventions as prescribed in sections 3 and 4 of Appendix N to 40 CFR Part 50 "Interpretation of the NAAQS for $PM_{2.5}$."

Table 1 summarizes $PM_{2.5}$ quality assured monitoring data from locations in Maine (see Figure 1). The Lewiston monitor is located in the parking lot of the Country Kitchen bakery on Canal Street. Presque Isle has two monitoring sites: one on Riverside Drive in a downtown Presque Isle parking lot, and the Regional Office site at the Maine Department of Environmental Protection's Northern Maine Regional Office on Central Drive. Portland is Maine's largest city and also has two monitoring sites: one at Tukey's Bridge and the other at Deering Oaks Park. The McFarland Hill site is located in Acadia National Park. In Augusta, the site is on the roof of the Lincoln Street School. In Rumford, the monitor is located in a paper mill employee parking lot off Rumford Avenue. Bangor's monitor is located on the roof of the Mary Snow School. These sites are all operated by the Maine Department of Environmental Protection.

3. RECOMMENDED ATTAINMENT AREAS IN MAINE

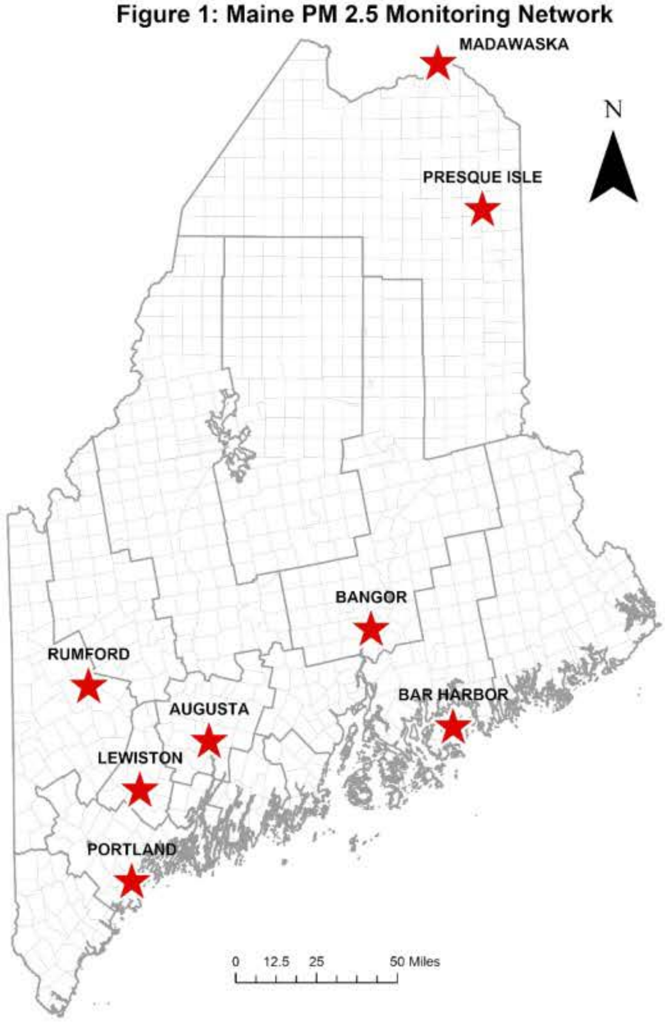
Maine's $PM_{2.5}$ monitoring data demonstrates compliance with the Primary Annual $PM_{2.5}$ NAAQS. Therefore, the State of Maine respectfully recommends that the entire state be designated Attainment for the Primary Annual $PM_{2.5}$ NAAQS.

Table 1: Valid Annual Design Value for $PM_{2.5}$

Site Name	2019-2021 Annual DESIGN VALUE	2020-2022 Annual DESIGN VALUE	2021-2023 Annual DESIGN VALUE
Lewiston	5.5	5.3	5.3
Madawaska	5.6	n/a*	5.5
Presque Isle - Regional Office	4.0	4.0	3.9
Presque Isle - Riverside Drive	4.4	4.4	4.9
Portland - Tukey's Bridge	6.8	6.5	7.0
Portland - Deering Oaks	7.1	5.8	5.3
McFarland Hill	3.2	3.2	3.7
Augusta	n/a*	5.6	5.8
Rumford	5.1	5.1	5.3
Bangor	4.4	4.5	4.8
Statewide Maximum	**7.1**	**6.5**	**7.0**

*n/a indicates the monitor wasn't operating long enough during that design value period to generate a design value

Figure 1: Maine PM 2.5 Monitoring Network



STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
EXECUTIVE OFFICE

GRETCHEN WHITMER
GOVERNOR

EGLE

PHILLIP D. ROOS
DIRECTOR

February 6, 2025

VIA ELECTRONIC SUBMISSION

Cheryl L. Newton, Acting Regional Administrator
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (R-19J)
Chicago, Illinois 60604-3507

Dear Acting Regional Administrator Newton:

SUBJECT: Michigan's Recommended Area Designations for the 2024 Annual $PM_{2.5}$ National Ambient Air Quality Standard

By way of this letter, the Michigan Department of Environment, Great Lakes, and Energy (EGLE), herein referred to as Michigan, submits the enclosed recommendation entitled, "Michigan's Recommended Area Designations for the 2024 Annual $PM_{2.5}$ National Ambient Air Quality Standard," as allowed under Section 107(d)(1)(A) of the federal Clean Air Act.

The designation recommendations are based on the most current $PM_{2.5}$ monitoring data, including ambient $PM_{2.5}$ data for the period 2021-2023 from all monitoring stations within Michigan, and preliminary 2024 ambient data in the case of Missaukee and Washtenaw Counties (see below).

To determine the attainment status of areas within Michigan based on the revised standard, Michigan consulted the United States Environmental Protection Agency's (USEPA) guidance, "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard" (February 7, 2024). This guidance states that the USEPA will make final designations based on a five-factor analysis, taking into consideration the Core Based Statistical Area (CBSA), Combined Statistical Area (CSA), which includes two or more adjacent CBSAs, and adjacent counties to the CBSA or CSA that have the potential to contribute to the violating monitor(s). Under this guidance, these areas would serve as the starting point or "presumptive" boundary for evaluating each nonattainment area. Michigan has used this approach in developing its recommendations. The enclosed documentation, including emissions and air quality data, population density and degree of urbanization, traffic and commuting patterns, and wind rose and HYSPLIT analyses, supports the recommended designation for each particular area.

For Missaukee and Washtenaw Counties, Michigan evaluated nonattainment status based on quality-assured 2021-2023 ambient monitoring data, as well as preliminary 2024 ambient data for the exceeding monitors. The 2024 data utilized for this document were complete through quarter 3, whereas preliminary data were utilized for quarter 4. Michigan believes the data predictions laid out in this document will closely align with the final certified 2024 ambient data and will not change significantly enough to affect Michigan's recommendations. However, if final certified data indicates those areas exceed the new standard, Michigan will expeditiously prepare and submit an exceptional events demonstration for the USEPA's consideration prior to the announcement of its proposed final designations.

Several counties within and adjacent to previous nonattainment boundaries were evaluated to determine what, if any, adjustments need to be made to the recommendations. Below are the Area of Analysis counties Michigan evaluated in this document, the historical nonattainment areas for $PM_{2.5}$, and the specific counties which Michigan believes should be included in the area designations under this newly revised $PM_{2.5}$ standard:

County of Violating Monitors	Counties in the Area of Analysis	Historical Nonattainment Counties	Recommended Nonattainment County
Kalamazoo	Allegan, Barry, Branch, Calhoun, Cass, Kalamazoo, and Van Buren	None	Kalamazoo
Kent	N/A (see exceptional events demonstration)	None	None
Missaukee	Missaukee	None	None
Washtenaw	Washtenaw	1997 and 2006 standards: Detroit-Ann Arbor, MI (Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne)	None
Wayne	Lapeer, St. Clair, Macomb, Monroe, Oakland, Livingston, Washtenaw, and Wayne	1997 and 2006 standards: Detroit-Ann Arbor, MI (Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne)	Wayne

Michigan appreciates the opportunity to provide these initial recommendations and will work cooperatively with USEPA Region 5 staff to review new ambient data. Michigan looks forward to commenting on the USEPA's own proposed designations, which, if different from Michigan's, are expected 120 days prior to promulgation of the final designations.

An electronic version of the submittal, in PDF format, has been submitted to the USEPA's Region 5 office using the State Planning Electronic Collaboration System.

Questions on this submittal may be directed to Robert Irvine, Supervisor, SIP Development Unit, Air Quality Division, at 517-648-7367; IrvineR@Michigan.gov; or EGLE, P.O. Box 30260, Lansing, Michigan 48909-7760; or you may contact me.

Sincerely,

Phillip D. Roos

Phillip D. Roos
Director
517-284-6700

Enclosure
cc/enc: Christos Panos, USEPA, Region 5
Elizabeth Selbst, USEPA, Region 5
Aaron B. Keatley, Chief Deputy Director, EGLE
Annette Switzer, EGLE
Dr. Eduardo P. Olaguer, EGLE
Tom Shanley, EGLE
Robert Irvine, EGLE
Marissa Vaerten, EGLE

Michigan's Recommended Area Designations for the 2024 Annual $PM_{2.5}$ National Ambient Air Quality Standard

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Prepared by:
Michigan Department of Environment, Great Lakes, and Energy
Air Quality Division
P.O. Box 30260
Lansing, Michigan 48909-7760
www.michigan.gov/air

February 2025

Table of Contents

1.0 Introduction

On February 7, 2024, the United States Environmental Protection Agency (USEPA) strengthened the 2012 primary annual National Ambient Air Quality Standard (NAAQS) for particulate matter with a diameter of 2.5 micrometer or smaller ($PM_{2.5}$) from 12.0 µg/m^3 to 9.0 µg/m^3 (89 Federal Register [FR] 16202). The USEPA also retained the existing 24-hour $PM_{2.5}$ standard of 35 µg/m^3.

Under the federal Clean Air Act Section 107(d), the USEPA is required to make $PM_{2.5}$ attainment, nonattainment, and unclassifiable designations after a state submits recommendations based on the analysis of air monitoring data. These recommendations are due to the USEPA by February 7, 2025. This document provides Michigan's designation recommendations for the 2024 annual $PM_{2.5}$ standard based on air monitoring data for 2021-2023, the three most recent years of quality-assured data currently available. It also considers the preliminary data available for 2024. Following this recommendation the USEPA will finalize designations based on the quality-assured data for the years 2022-2024, after a public comment period.

Based on the air quality data and the five-factor analysis discussed below, the Michigan Department of Environment, Great Lakes, and Energy (herein referred to as Michigan) is recommending designations of attainment, unclassifiable/attainment, and nonattainment. The remainder of this document discusses the analyses and results Michigan used to arrive at recommendations of attainment and nonattainment for the counties equipped with $PM_{2.5}$ monitoring stations. Michigan is recommending all other counties in the state be designated as unclassifiable/attainment. The USEPA has historically used the "unclassifiable/attainment" category for areas that do not have monitors and where there is no reason to believe they are in nonattainment or contributing to nearby violations.

Historical Nonattainment Areas

Prior to 1997, particulate standards had been based on total suspended particulates and then particles less than 10 micrometers in diameter (PM_{10}). In 1997, the USEPA revised the NAAQS to reflect the growing body of scientific knowledge that links serious health effects to fine particles. On July 18, 1997, the USEPA promulgated two new $PM_{2.5}$ standards – an annual average of 15 µg/m^3, and a 24-hour daily average of 65 µg/m^3 (62 FR 38652). On October 17, 2006, the USEPA published a revised 24-hour standard for $PM_{2.5}$, lowering the standard from 65 µg/m^3 to 35 µg/m^3 (71 FR 61144). The USEPA retained the annual standard for $PM_{2.5}$ of 15 µg/m^3. The USEPA also retained the daily standard for PM_{10} of 150 µg/m^3 but revoked the annual standard of 50 µg/m^3. On December 14, 2012, the USEPA strengthened the 1997 primary annual $PM_{2.5}$ standard, lowering it from 15.0 µg/m^3 to 12.0 µg/m^3, and retained the existing 2006 24-hour $PM_{2.5}$ standard of 35 µg/m^3 (78 FR 30860).

Table 1 below documents the historical $PM_{2.5}$ nonattainment areas (NAA) and the recommended nonattainment counties for the 2024 $PM_{2.5}$ NAAQS. Historically, Michigan had one NAA in the Detroit area for the 1997 and 2006 $PM_{2.5}$ NAAQS. Redesignation was granted for this NAA in 2013 for the 1997 and 2006 $PM_{2.5}$ NAAQS, respectively. These historical NAAs were taken into consideration during Michigan's analysis for designation recommendations.

Table 1. Historical Nonattainment Areas and Recommended Nonattainment Counties for 2024 $PM_{2.5}$ NAAQS

Core Based Statistical Area (CBSA)	Counties in the CBSA	Historical 1997 Nonattainment Counties	Historical 2006 Nonattainment Counties	Historical 2012 Nonattainment Counties	Recommended Nonattainment Counties for 2024 NAAQS
Detroit-Warren-Dearborn	Lapeer, St. Clair, Macomb, Oakland, Livingston, and Wayne	Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne	Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne	None	Wayne
Kalamazoo-Portage	Kalamazoo	None	None	None	Kalamazoo

2.0 Monitoring Data Adjustments

Following the strengthening of the $PM_{2.5}$ NAAQS, the USEPA provided an opportunity for public comment in the Federal Register on February 15, 2024, on their plan to apply the approved modification of the Federal Equivalent Method (FEM) for the Teledyne T640 particulate matter (PM) mass monitor, including the T640X. This revised all the $PM_{2.5}$ concentration data for the T640 and T640X in the USEPA's Air Quality System (AQS) that was reported prior to the monitor's firmware modification (89 FR 11832). This modification aligned the T640 and T640X monitoring data with that of the Federal Reference Method (FRM) and other FEMs in order for states and the USEPA to review the three-year design value (DV) and make designation recommendations consistently across states and various types of monitors for the 2024 $PM_{2.5}$ standard. The monitoring data utilized in this designation reflects adjustments made for the T640 and T640X monitors.

3.0 Five Factor Analysis

The USEPA's memorandum "Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard" (February 7, 2024) (herein referred to as the "Designation Guidance"), stated that each area evaluated for nonattainment should be assessed on a case-by-case basis considering the specific facts and circumstances unique to the area.[1] A NAA must include not only the area that is violating the standard but also nearby areas that contribute to the violation. This analysis began with an evaluation of the 2023 Core Based Statistical Area/Combined Statistical Area (CBSA/CSA) that contains the violating monitor(s). Michigan's CBSA/CSA areas are shown in Attachment 1. Boundary recommendations were based on an evaluation of the five factors discussed in the Designation Guidance, as well as other relevant factors or circumstances specific to particular areas.

[1] (2024, February 7). Memorandum: Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard [Review of Memorandum: Initial Area Designations for the 2024 Revised Primary Annual Fine Particle National Ambient Air Quality Standard]. USEPA. https://www.epa.gov/system/files/documents/2024-02/pm-naaqs-designations-memo_2.7.2024-_-jg-signed.pdf

The five designation factors used to analyze potential nonattainment boundaries were:

1. Air quality data;
2. Emissions and emissions-related data;
3. Meteorology;
4. Geography/topography; and
5. Jurisdictional boundaries.

The analysis methods for each factor are described below and the individual analysis for each NAA is provided in Section 4.0, "Recommendation Analysis for Areas with Exceeding Monitors."

The Designation Guidance recommended the USEPA's $PM_{2.5}$ Designation Mapping Tool to identify disadvantaged communities for outreach efforts. Additionally, Michigan reviewed environmental justice (EJ) data to provide additional information to inform this recommendation. While this data did not influence the recommendation Michigan presents in this document, it is an important consideration when addressing updated NAAQS. Information on EJ data reviewed and community outreach completed is further discussed in the following sections. Additional governmental departments, associations, and conferences where outreach was conducted that does not specifically align with specific geographic areas were Michigan Environmental Compliance Conference, ESC Spectrum Corporation, Michigan Department of Transportation (MDOT), the Air Advisory Council, Michigan Aggregates Association, and Michigan Manufactures Association.

3.1 Factor 1: Air Quality Data

The annual revised standard is 9.0 $\mu g/m^3$. Michigan operates a large network of $PM_{2.5}$ monitors that measure using three techniques: filter-based FRM, continuous methods, and chemical speciation methods (e.g., sulfate, nitrate, organic carbon, elemental carbon, and crustal or other). The $PM_{2.5}$ FRM filter-based monitors are deployed to characterize background or regional $PM_{2.5}$ transport collectively from upwind sources and population-oriented sites. These monitors are located primarily in the expected high $PM_{2.5}$ concentration areas, with additional attention given to more highly populated areas. Figure 1 shows the location of $PM_{2.5}$ monitors across Michigan and the controlling monitors' DVs based on the 3-year average for 2021-2023. Table 2 provides the 2023 DVs and CBSA area classifications for each $PM_{2.5}$ monitor in Michigan.

Figure 1. Michigan PM2.5 Monitor Locations and 2023 Design Values

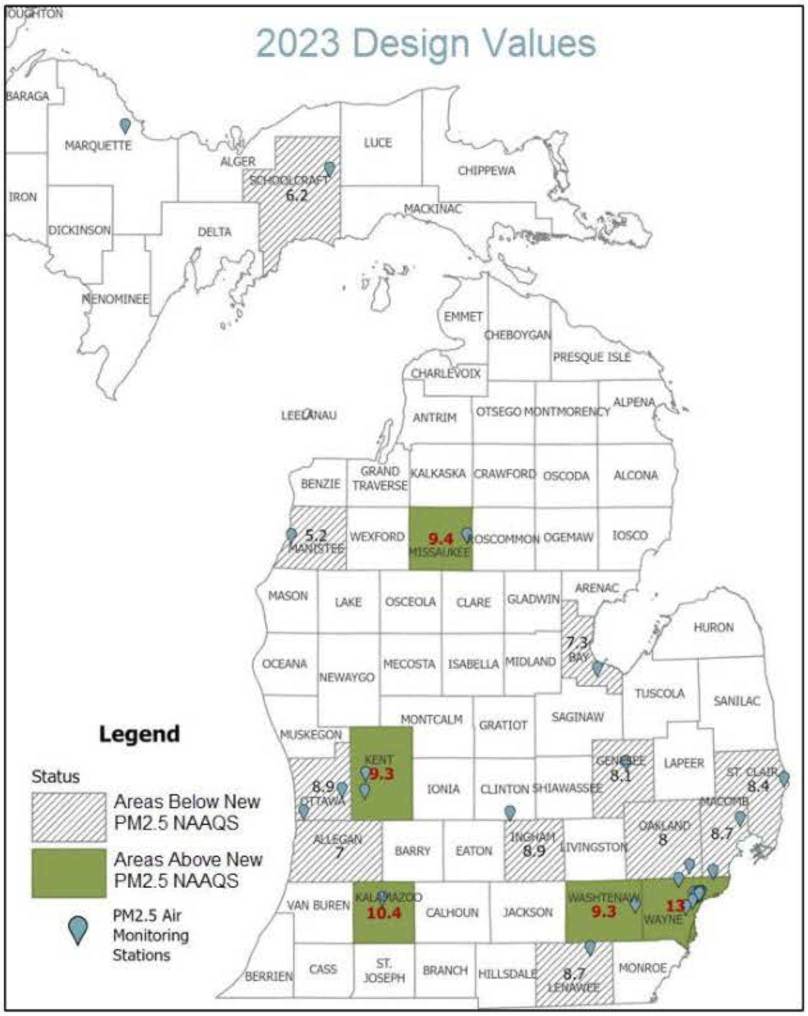


Table 2. Michigan Air Quality Monitors and 2023 Design Values.

County	Monitoring Site (AQS ID)	USEPA Final 2021-2023 Design Value ($\mu g/m^3$)	CSBA Name
Lenawee	Tecumseh (260910007)	8.7[1]	Adrian, MI
Macomb	New Haven (260990009)	8.7	Detroit-Warren-Dearborn, MI
Oakland	Oak Park (261250001)	8.0[1]	Detroit-Warren-Dearborn, MI
St. Clair	Port Huron – Dove St. (261470005)	8.4	Detroit-Warren-Dearborn, MI
Washtenaw	Ypsilanti (261610008)	9.3	Ann Arbor, MI
Wayne	Allen Park (261630001)	9.1	Detroit-Warren-Dearborn, MI
Wayne	Detroit - E7 Mile (261630019)	8.0	Detroit-Warren-Dearborn, MI
Wayne	Detroit - SW (261630015)	10.4	Detroit-Warren-Dearborn, MI
Wayne	Dearborn (261630033)	10.6	Detroit-Warren-Dearborn, MI
Wayne	Eliza Howell Near Road (261630093)	11.6	Detroit-Warren-Dearborn, MI
Wayne	NMH 48217 (261630097)	10.1[1]	Detroit-Warren-Dearborn, MI
Wayne	DP4th (261630098)	10.8	Detroit-Warren-Dearborn, MI
Wayne	Trinity (261630099)	12.1	Detroit-Warren-Dearborn, MI
Wayne	Military Park (261630100)	13.0	Detroit-Warren-Dearborn, MI
Genesee	Flint (260490021)	8.1	Flint, MI
Ottawa	Jenison (261390005)	8.9[1]	Grand Rapids – Wyoming – Kentwood, MI
Kent	Grand Rapids – Monroe St. (260810020)	9.3	Grand Rapids – Wyoming – Kentwood, MI
Allegan	Holland (260050003)	7.0[1]	Holland, MI
Kalamazoo	Kalamazoo (260770008)	10.4	Kalamazoo-Portage Area
Ingham	Lansing / Filley Street (260650018)	8.9	Lansing-East Lansing, MI
Bay	Bay City (260170014)	7.3	Bay City, MI
Missaukee	Houghton Lake (261130001)	9.4	Cadillac, MI
Manistee	Manistee (261010922)	5.2[1]	None
Schoolcraft	Seney (261530001)	6.2[1]	None

[1] Invalid 2021-2023 Design Value due to incomplete quarter(s).

The air quality monitoring sites identified in Table 2 as Tecumseh, New Haven, Oak Park, Port Huron – Dove Street, Detroit – E7 Mile, Flint, Jenison, Holland, Lansing/Filley Street, Bay City, Manistee, and Seney are all below the 2024 $PM_{2.5}$ NAAQS.

Air quality in the Grand Rapids-Wyoming CBSA was impacted in June and July 2023 by smoke entering the region from wildfires in Canada. Due to this influence, Michigan's Air Quality Division (AQD) anticipates submitting an Exceptional Events Demonstration for the Grand Rapids-Wyoming CBSA by the submittal deadline of February 7, 2025. The days included in the Exceptional Event Demonstration are Tier 1 category days according to the USEPA's $PM_{2.5}$ Tiering Tool. If the USEPA grants the exclusion of the days from the Grand Rapids monitor, $PM_{2.5}$ DV calculations for the Grand Rapids 2021-2023 DV will be below the 2024 annual $PM_{2.5}$ NAAQS. Based on this information, Michigan has not included a detailed analysis for the Grand Rapids-Wyoming CBSA.

The air quality data analysis completed consists of a review of air quality monitoring data, including annual DVs for $PM_{2.5}$ based on the 3-year average of the annual mean concentrations from the 2021 to 2023 timeframe, quarterly mean concentrations from 2021 to 2023, and a 10-year historical $PM_{2.5}$ DV trends analysis. Additionally, Michigan considered the $PM_{2.5}$ speciated data by completing an urban increment analysis and review of recent scientifically peer-reviewed $PM_{2.5}$ compositional analysis for the Detroit area.

3.2 Factor 2: Emissions and Emissions-related Data

The analysis for factor 2 looks at $PM_{2.5}$-related emissions from areas near an exceeding monitor to determine their contribution. Emissions data was derived from the USEPA 2022v1 emissions modeling platform (EMP) and the 2022 Michigan State and Local Emissions Inventory System (SLEIS) data. Emissions reductions that may occur and affect these inventories that are due to permanent and enforceable emissions controls and that will be in place in the attainment timeframe were also evaluated and are covered later in this document.

This portion of the analysis looks at sources and source categories, based on data from direct $PM_{2.5}$ emissions, $PM_{2.5}$ precursor emissions (nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOCs), and ammonia (NH3)), and speciated components of direct $PM_{2.5}$ (organic carbon, elemental carbon, crustal material). These emissions were also analyzed for any potential seasonal fluctuations. Analyzing the magnitude and extent of emissions can further inform the urban/rural air monitoring analysis, as described below. Considering meteorological data additionally informs the contributions from nearby areas versus regional contributions.

In addition to emissions data from point sources, analyses were completed reviewing mobile source emissions from the 2022v1 EMP in tandem with current and historic population, population density, degree of urbanization, and traffic and commuting patterns for areas surrounding violating monitors. Local trends in population growth and commuting patterns may indicate the probable location and magnitude of emissions sources that contribute to nonattainment. Traffic and commuting pattern data can help assess the influence of mobile source emissions in a given area.

Lastly, as stated in the USEPA's *Final Regulatory Impact Analysis for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter,* released in January 2024, nationally it has been found that among the $PM_{2.5}$ precursors, the largest emission reductions have occurred for SO_2 and NOx, (84% and 60%, respectively) from 2002 to 2017.[2] These reductions have been attributed to emission reductions at stationary sources such as electrical generating units (EGUs) for SO_2 and reduced emissions from mobile sources and EGUs for NO_x in the eastern United States. These large SO_2 and NO_x reductions in recent decades have been found to reduce regional background concentrations and increase the importance of urban influences for $PM_{2.5}$ emissions. Furthermore, the USEPA's 2032 projections show additional large reductions in SO_2 and NO_x emissions, which further support the need

[2] Final Regulatory Impact Analysis for the Reconsideration of the National Ambient Air Quality Standards for Particulate Matter. (n.d.). https://www.epa.gov/system/files/documents/2024-02/naaqs_pm_reconsideration_ria_final.pdf

for control of local primary $PM_{2.5}$ sources to address the highest $PM_{2.5}$ concentrations in urban areas. Michigan has taken this into consideration when assessing and recommending nonattainment boundaries. Further discussion in relation to local SO_2 and NO_x emission reductions are discussed in the sections below to relate this national finding to the State of Michigan.

3.3 Factor 3: Meteorology

The meteorological analysis looks at the transport of emissions contributing to $PM_{2.5}$, which helps to identify areas contributing to elevated $PM_{2.5}$ concentrations. This analysis includes the creation and review of wind and pollution roses, as well as Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) modeling. Wind roses depict the wind speed and direction at a singular location. Wind roses in this report were generated by Michigan staff using meteorological data from $PM_{2.5}$ air quality monitors and nearby airports. The generated wind roses for monitoring locations and airports were then added to the USEPA $PM_{2.5}$ Designation Mapping Tool. Michigan staff compared the wind roses generated by the USEPA and determined they were comparable to the wind roses generated by Michigan staff. The main difference between the USEPA wind roses and AQS wind roses was the number of quadrants (the USEPA having more quadrants than Michigan) and the USEPA documenting wind speed in meters per second (m/s) while Michigan documented wind speed in miles per hour (mph). Pollution roses depict concentrations of $PM_{2.5}$ and wind direction. Pollution roses included in this report were generated by Michigan staff using pollutant concentrations and wind direction data from $PM_{2.5}$ air quality monitors. Daily HYSPLIT data for 2021-2023 for each violating monitor were produced by the USEPA as outlined in the Designation Guidance and analyzed by Michigan. This modeling analysis produces trajectories illustrating how air masses likely traveled to reach the exceeding monitor locations for days that were representative of high concentrations of $PM_{2.5}$.

3.4 Factor 4: Geography and Topography

The geography and topography analysis looks at physical features that might have an effect on the distribution of particulate matter within an area. Michigan does not have significant topographic features that substantially influence the regional transport and formation of $PM_{2.5}$.

3.5 Factor 5: Jurisdictional Boundaries

The analysis of jurisdictional boundaries looks at the planning and organizational structure of an area to determine if the implementation of controls in a potential NAA can be carried out in a cohesive manner. This analysis considered data from the counties with exceeding monitors as well as respective CBSA and adjacent counties. The CSA for Kalamazoo was also considered.

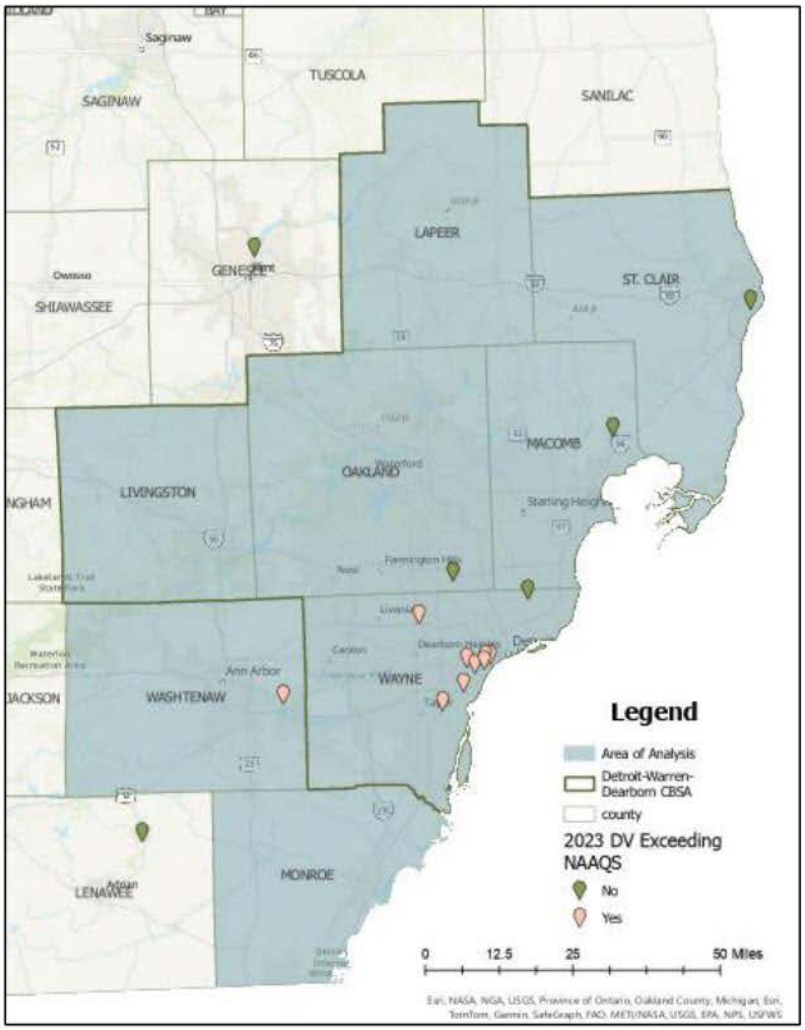
4.0 Recommendation Analysis for Areas with Exceeding Monitors

The areas discussed in Section 4.0 are areas Michigan evaluated because they have a monitor exceeding the 2024 $PM_{2.5}$ NAAQS. Michigan made determinations of attainment and nonattainment based on these analyses. In general, areas that were evaluated had air monitor sites with 2021-2023 DVs violating the 2024 $PM_{2.5}$ NAAQS. For additional information on Michigan's analysis, refer to the sections below.

4.1.0 Wayne County Area of Analysis

The Wayne County Area of Analysis (AoA) was evaluated because several air monitoring sites in this area exceed the 2021-2023 DV. Refer to Section 4.1.1 Wayne County AoA – Air Quality Data for additional information. Michigan analyzed the CBSA identified as the Detroit-Warren-Dearborn, Michigan Area as well as adjoining Washtenaw and Monroe counties in evaluating the Detroit area. The Detroit-Warren-Dearborn CBSA includes Lapeer, Livingston, Macomb, Oakland, St. Clair, and Wayne counties. Included as Figure 2 is the Wayne County AoA for the Detroit-Warren-Dearborn, Michigan Area. The red markers depicted in Figure 2 are air quality monitor locations with 2021-2023 DV above the revised $PM_{2.5}$ NAAQS; the green markers depict air quality monitor locations with 2021-2023 DV below the revised $PM_{2.5}$ NAAQS. Historical $PM_{2.5}$ NAA for the Wayne County AoA is discussed earlier in Section 1.0. The sections included below summarize the analyses Michigan completed for this area.

Figure 2. Area of Analysis for the Detroit-Warren-Dearborn, Michigan Area



4.1.1 Wayne County AoA - Air Quality Data

Air Quality Data

The Wayne County AoA consists of 13 Michigan monitoring sites. These sites are identified in Table 2 and are depicted in Figure 2 as red and green markers. Of the 13 monitoring sites, 9 are exceeding the NAAQS. As documented in Table 3 below, 8 of the monitoring sites are in Wayne County and one site is in eastern Washtenaw County.

Table 3. Detroit Area Violating Michigan Air Quality Monitors and 2023 Design Values

County	Monitoring Site (AQS ID)	USEPA Final 2021-2023 Design Value (μg/m^3)
Washtenaw	Ypsilanti (261610008)	9.3
Wayne	Allen Park (261630001)	9.1
Wayne	Detroit - SW (261630015)	10.4
Wayne	Dearborn (261630033)	10.6
Wayne	Eliza Howell Near Road (261630093)	11.6
Wayne	NMH 48217 (261630097)	10.1[1]
Wayne	DP4th (261630098)	10.8
Wayne	Trinity (261630099)	12.1
Wayne	Military Park (261630100)	13.0

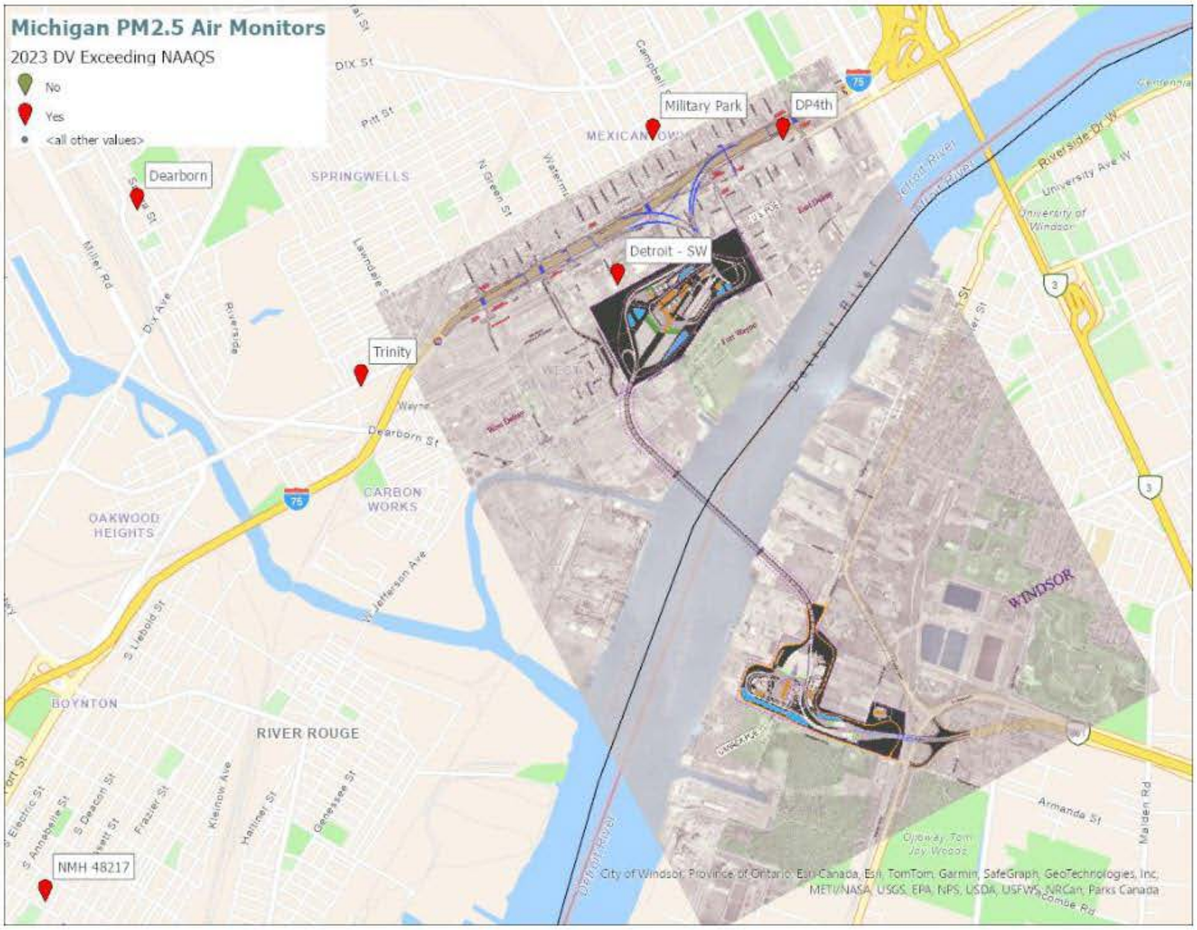
[1] Invalid 2021-2023 Design Value due to incomplete quarter(s).

Michigan considers it important to acknowledge the construction of the Gordie Howe International Bridge (GHIB) in Wayne County when evaluating the 2021-2023 DV period. The GHIB commenced in 2018, and several air quality monitors were placed near this construction project. The GHIB is a $6.4 billion dollar project, adding a 6-lane and 1.5-mile cable-stayed design bridge, 167-acre U.S. Port of Entry, and updates to the Michigan interchange. These interchange improvements include: four new road bridges, five new pedestrian bridges, widening of roads at key intersections, connecting ramps to and from the US Port of Entry by adding four bridges crossing the railways and connecting Interstate 75 (I-75) to the US Port of Entry, and reconfiguration of the I-75 interchange ramps and service drives.[3] Michigan has monitored the air quality near the GHIB with the Detroit-SW, DP4th, Trinity, and Military Park monitoring sites. Michigan added DP4th, Trinity, and Military Park monitoring sites in 2017 and 2018. The three new sites were added to monitor air pollutants before, during, and after construction of the bridge. In addition, a continuous $PM_{2.5}$ monitor was added to the existing Detroit-SW monitoring site for this project. Construction is still ongoing near these sites with an expected opening date of the bridge in early fall of 2025. Figure 3 shows a map of the GHIB project overlaying the Michigan $PM_{2.5}$ air quality monitoring sites.[4]

[3] Project Overview | Gordie Howe International Bridge. (n.d.). www.gordiehoweinternationalbridge.com. https://www.gordiehoweinternationalbridge.com/en/project-overview

[4] Gallery. Gordie Howe International Bridge. (n.d.). https://www.gordiehoweinternationalbridge.com/en/gallery#!nav-maps

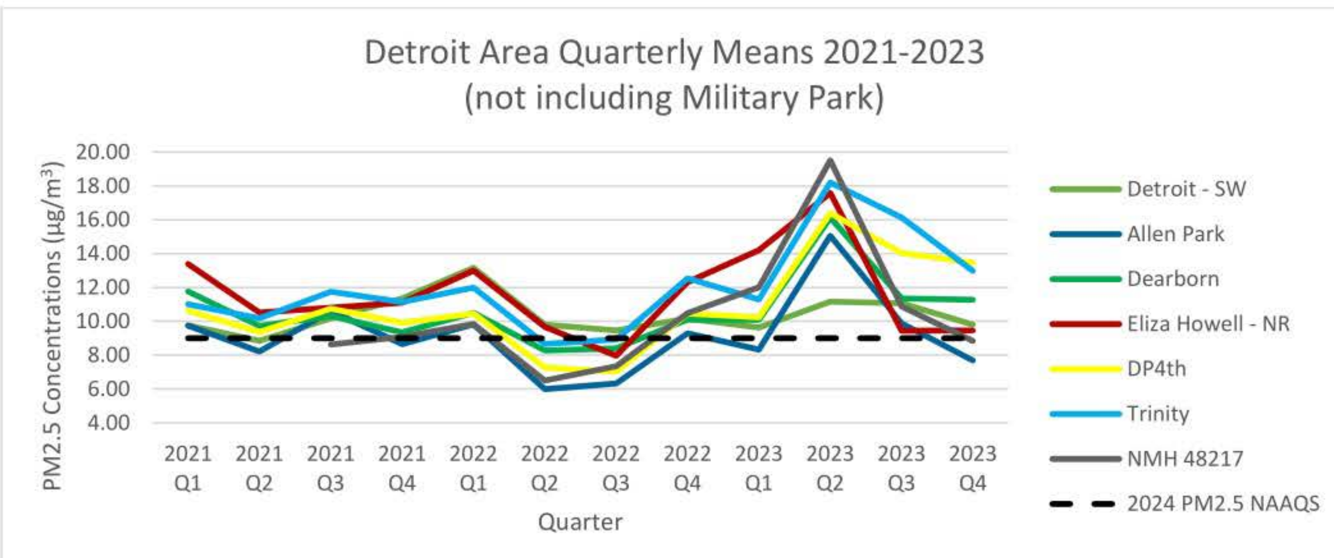
Figure 3. GHIB Project and Location of Michigan $PM_{2.5}$ Air Quality Monitoring Sites.



As mentioned in Section 3.1 Factor 1, a trends analysis was completed by looking at quarterly mean concentrations of $PM_{2.5}$ from 2021 to 2023. Figures 4 and 5 show the trend of the quarterly mean concentrations from 2021-2023. A high quarter can increase the mean for a year, and therefore can increase the DV. Review of the quarterly means at exceeding monitors in the Wayne County AoA shows a slight uptick in $PM_{2.5}$ concentrations in the first quarters of 2021 and 2022, and the fourth quarter of 2022, associated with the fall and winter months when $PM_{2.5}$ concentrations are generally higher. Additionally, a large peak of $PM_{2.5}$ concentrations in the second quarter of 2023 shown in these figures may be associated with the Canadian wildfires that occurred during that period. This high $PM_{2.5}$ concentration in the second quarter of 2023, and in some cases also the third quarter of 2023 (DP4th and Trinity monitors), increased the overall DV for 2021-2023. Additionally, the Military Park monitor experienced a higher percentage of invalidated clean data during this quarter which, when coupled with the wildfire smoke, showed an increased second quarter $PM_{2.5}$ mean concentration.

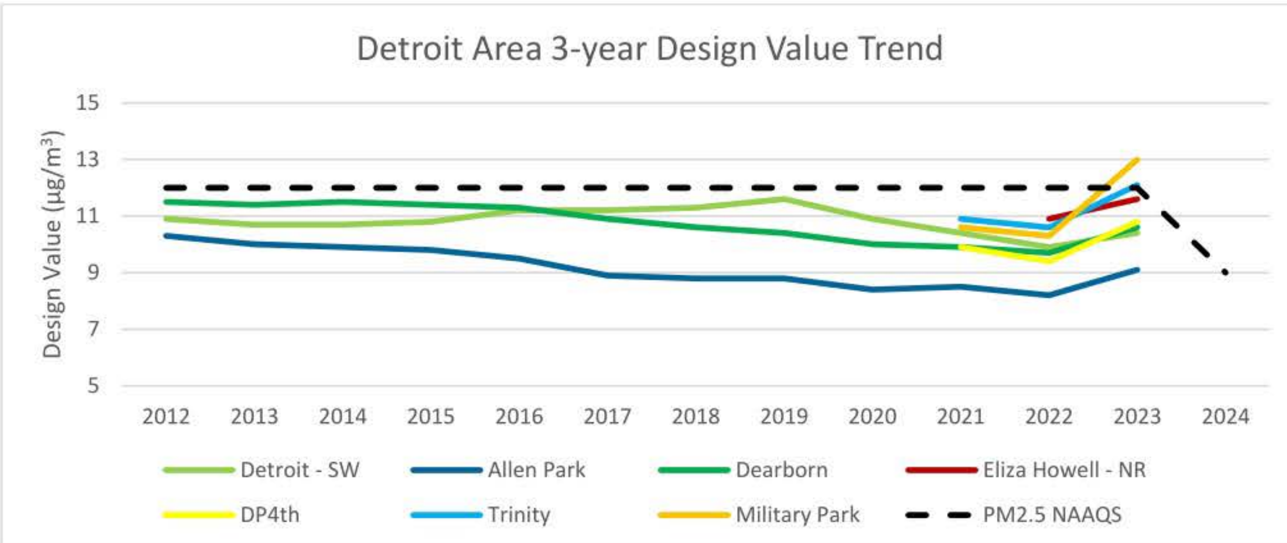
Figure 4. Area of Analysis for the Detroit-Warren-Dearborn, Michigan Area

Figure 5. Area of Analysis for the Detroit-Warren-Dearborn, Michigan Area – not including Military Park



Michigan compiled 10 years of $PM_{2.5}$ DVs for a historical analysis, which is included below as Figure 6. Review of this figure indicates the Allen Park and Dearborn monitoring sites were trending down from 2012 to 2022; however, from 2022 to 2023 both locations show an upward peak. The Detroit-SW monitoring site shows a slight decrease from 2012 to 2013, then remains relatively consistent from 2013 to 2014, and then begins to trend upward from 2014 to 2019. From 2019 to 2022 the monitoring site trends back downward and then begins trending upward again from 2022 to 2023. The remaining monitoring sites included in the figure show a slight downward trend (except Eliza Howell-NR) from 2021 to 2022 and then begin an upward trend from 2022 to 2023. It is likely that the upward trend in 2023 for all monitoring sites depicted on Figure 6 is associated with the Canadian wildfire impact seen earlier in the second and third quarters of 2023. It is notable that even with the substantial wildfire smoke the upper Midwest experienced in the summer of 2023, the annual average and DVs still remain well below values observed at the monitoring locations in the mid to late 2010s.

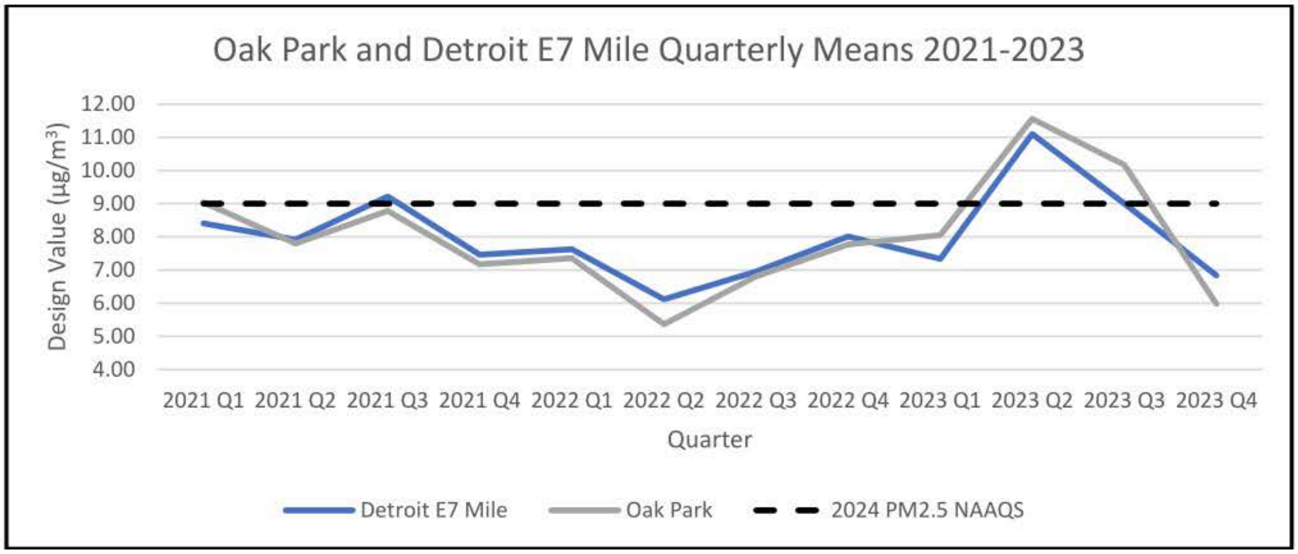
Figure 6. Detroit Area 3-year Design Value Trend



Lastly, Michigan compiled data from $PM_{2.5}$ air monitors along the northern boundary of Wayne County and the southern boundaries of Oakland and Macomb counties to analyze $PM_{2.5}$ trends further from the controlling monitor (Military Park). A trends analysis was completed by looking at quarterly mean concentrations of $PM_{2.5}$ from 2021 to 2023 for the Oak Park and Detroit E7 Mile $PM_{2.5}$ air monitors. Figure 7 shows the trend of the quarterly mean concentrations from 2021-2023 for Oak Park and Detroit E7 Mile. Review of the quarterly means data for both monitors shows a slight uptick in $PM_{2.5}$ concentrations in the first quarters of 2021 and 2022, the fourth quarter of 2022, and the first quarter of 2023 (Oak Park only), associated with the fall and winter months when $PM_{2.5}$ concentrations are generally higher. A slight uptick in $PM_{2.5}$ concentrations was also seen in the third quarters of 2021 and 2022. Additionally, a large peak of $PM_{2.5}$ concentrations in the second quarter of 2023 is shown in the figure, which is associated with the Canadian wildfires that occurred during that period.

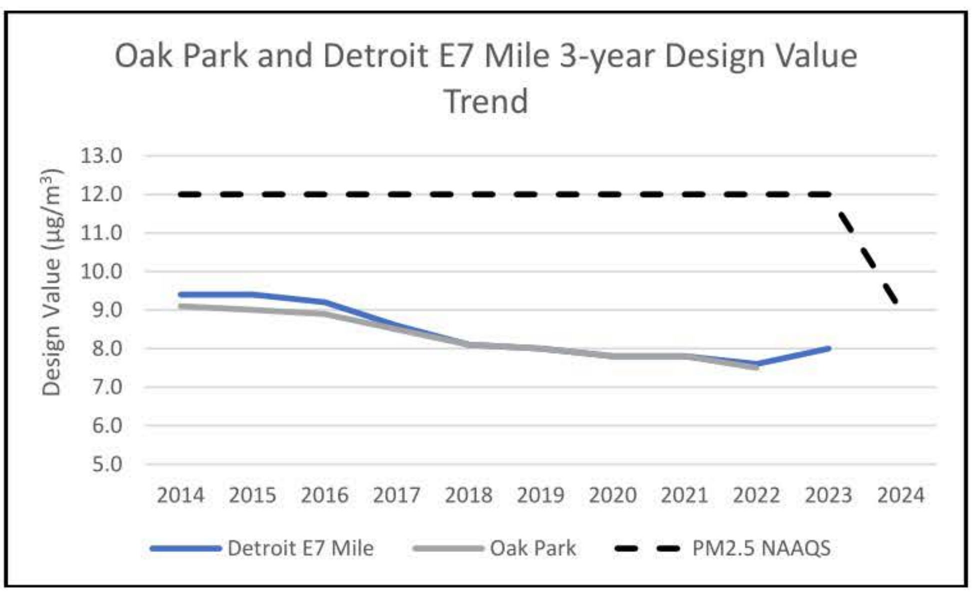
It should be noted that the third and fourth quarters of 2023 for Oak Park are considered by the USEPA to be invalid. The third and fourth quarters were only 65% and 50% complete, respectively. Although there were more than 11 creditable sample counts, because the DV was calculated to be below the 2024 $PM_{2.5}$ NAAQS, the DV is considered invalid per Title 40 of the Code of Federal Regulations, Appendix N to Part-50 4.04.1(c). The quarterly means data shown in Figure 7 below depict Oak Park and Detroit E7 Mile as generally mirroring each other. Although two quarters of Oak Park's data were invalid, Figure 7 shows that for both monitors those two quarters appeared to be trending downward. For the most part, the quarterly means data was below the 2024 NAAQS with the exception of the third quarter in 2021 (Detroit E7 Mile, 9.21 µg/m³) and the second and third quarters of 2023, which were impacted by wildfire smoke.

Figure 7. Area of Analysis for the Oak Park and Detroit E7 Mile $PM_{2.5}$ Monitors



Michigan compiled 10 years of $PM_{2.5}$ DVs for the Oak Park and Detroit E7 Mile monitors for a historical analysis, which is included as Figure 8. Review of this figure indicates the Oak Park and Detroit E7 Mile monitors have been trending downward from 2012 to 2022; however, from 2022 to 2023 they show an upward peak. It is likely that the upward trend in 2023 depicted on Figure 8 is associated with the Canadian wildfire impact seen earlier in the second and third quarters of 2023. Although an upward peak is observed from 2022 to 2023, it should be noted that the DV has been below the 2024 $PM_{2.5}$ NAAQS since 2017 for the Detroit E7 Mile monitor. The Oak Park monitor DV has been at or below the 2024 $PM_{2.5}$ NAAQS since 2015. While not depicted in Figure 8, it should be noted that Oak Park's invalid DV for 2023 is 8.0 as documented in Table 2.

Figure 8. Oak Park and Detroit E7 Mile 3-year Design Value Trend



$PM_{2.5}$ Compositional Analysis

Michigan was not able to conduct a $PM_{2.5}$ Compositional Analysis; however, recent related work has been performed by the University of Michigan in an open access article titled "Apportionment of $PM_{2.5}$ Sources across Sites and Time Periods: An Application and Update for Detroit, Michigan."[5] Michigan finds this study relevant for the purposes of understanding the $PM_{2.5}$ composition for the Wayne County AoA and making a designation recommendation. This study retrieved data from the three Chemical Speciation Network (CSN) monitors in Wayne County: Allen Park, AQS ID: 26-163-0001; Dearborn, AQS ID: 26-163-0033; and Southwestern High School – now referred to as Detroit Southwest (Detroit-SW), AQS ID: 26-163-0015. Data was reviewed for the years of 2016-2021. $PM_{2.5}$ at all three sites was apportioned using positive matrix factorization (PMF). The USEPA Designation Guidance recommends this type of analysis be done to better understand contributing influences on air quality. The University of Michigan utilized two approaches with this PMF modeling. The first approach developed separate PMF model source profiles for each site over the 6-year period; and the second approach consolidated all three sites and developed one single PMF model source profile over the 6-year period. Further methodology parameters can be found within the publication.

Results of this study found several pollutants had strong seasonal variation with both winter and summer peaks, especially at Detroit-SW, which had the highest $PM_{2.5}$, ammonia, nitrate, sulfate, sulfur, elemental carbon, and organic carbon (NH_4^+, NO_3^-, SO_4^{2-}, S, EC, and OC) concentrations, potentially reflecting industry, fugitive dust, and construction activity. Additionally, this study found that mobile sources (onroad and nonroad) were the largest single contributor to $PM_{2.5}$ levels at each site, accounting for 34-42% of $PM_{2.5}$ depending on the site and PMF approach. It is noted that mobile source contributions at the Detroit-SW site may be influenced by the large GHIB construction site and associated nonroad sources (see Figure 3). This is further supported by seasonal trends showing the highest contributions occurring in summer and fall which are typical construction seasons. Other significant emissions were found to have come from ferrous (steel and coke) metals, soils/dust (construction, paved road, unpaved road), and other sources.

Urban Increment Analysis

To better understand and differentiate the influence of more distant emissions sources from the influence of closer emissions sources, Michigan conducted an urban increment analysis. For this analysis Michigan utilized two different methodologies. The first method compared speciation data from the closest CSN monitors in urban areas with that of Interagency Monitoring of Protected Visual Environments (IMPROVE)[6] sites within 150 miles of the exceeding monitoring site. The IMPROVE sites are meant to represent rural background $PM_{2.5}$ concentrations. The second methodology utilized satellite-derived global and regional $PM_{2.5}$ data for 2022 developed by the Atmospheric Composition and Analysis Group at Washington University[7]. Urban and suburban census tract areas were then removed to determine rural and urban mean concentrations. A complete description of the process used for these methodologies can be found in Attachments 3 and 4. The findings of both methodologies for the Wayne County AoA are discussed below.

---

[5] Yang, Z., Islam, M. K., Xia, T., & Batterman, S. (2023). Apportionment of PM2.5 Sources across Sites and Time Periods: An Application and Update for Detroit, Michigan. Atmosphere, 14(3), 592. https://doi.org/10.3390/atmos14030592

[6] Improve – Interagency Monitoring of Protected Visual Environments

[7] Satellite-derived PM2.5. Atmospheric Composition Analysis Group. (n.d.). https://sites.wustl.edu/acag/datasets/surface-pm2-5/

USEPA Urban Increment Methodology

As described in the Designations Guidance, “the basic approach for the urban increment analysis is to calculate the difference between the ambient $PM_{2.5}$ speciation levels at an urban area monitoring site and the ambient $PM_{2.5}$ speciation levels at a nearby rural monitoring site(s).” To calculate the rural background, the USEPA recommends averaging the data from all IMPROVE monitors located within 150 miles of the violating AQS site, and if no IMPROVE monitors are within 150 miles, then data from the next closest IMPROVE site should be used. Based on this methodology, Michigan used annual/quarterly $PM_{2.5}$ speciation data from the St. John’s Road – Quaker City, Ohio IMPROVE monitor located in southeast Ohio to represent the $PM_{2.5}$ rural background concentration for Wayne County since no other IMPROVE monitors were within the 150-mile radius from the Wayne County monitoring sites. Table 4 shows which CSN and IMPROVE sites were utilized as part of this analysis, and the respective distances from the IMPROVE monitor for each exceeding $PM_{2.5}$ monitoring site in Wayne County.

Table 4. Violating Detroit Area AQS Monitors – CSN/IMPROVE Monitor Pairing for Urban Increment

County Name	AQS Site ID	Local Site Name	Valid 2021-2023 Annual Design Value (µg/m³)	Nearest CSN Site Name	Nearest IMPROVE Site Name	Nearest IMPROVE Site Distance (mi) from AQS Site
Wayne	261630100	Military Park (GHIB)	13	Detroit-Southwest (DET-SW)	ST JOHNS ROAD QUAKER CITY, OH	188
Wayne	261630099	Trinity St Marks – (GHIB)	12.1	Property Owned by Dearborn Public Schools	ST JOHNS ROAD QUAKER CITY, OH	188
Wayne	261630093	Eliza-NR	11.6	Property Owned by Dearborn Public Schools	ST JOHNS ROAD QUAKER CITY, OH	197
Wayne	261630098	DP4th - Detroit Police 4th Precinct (GHIB)	10.8	Detroit-Southwest (DET-SW)	ST JOHNS ROAD QUAKER CITY, OH	188
Wayne	261630033	Property Owned by Dearborn Public Schools	10.6	Property Owned by Dearborn Public Schools	ST JOHNS ROAD QUAKER CITY, OH	189
Wayne	261630015	Detroit-Southwest (DET-SW)	10.4	Detroit-Southwest (DET-SW)	ST JOHNS ROAD QUAKER CITY, OH	187
Wayne	261630001	Allen Park	9.1	Allen Park	ST JOHNS ROAD QUAKER CITY, OH	186

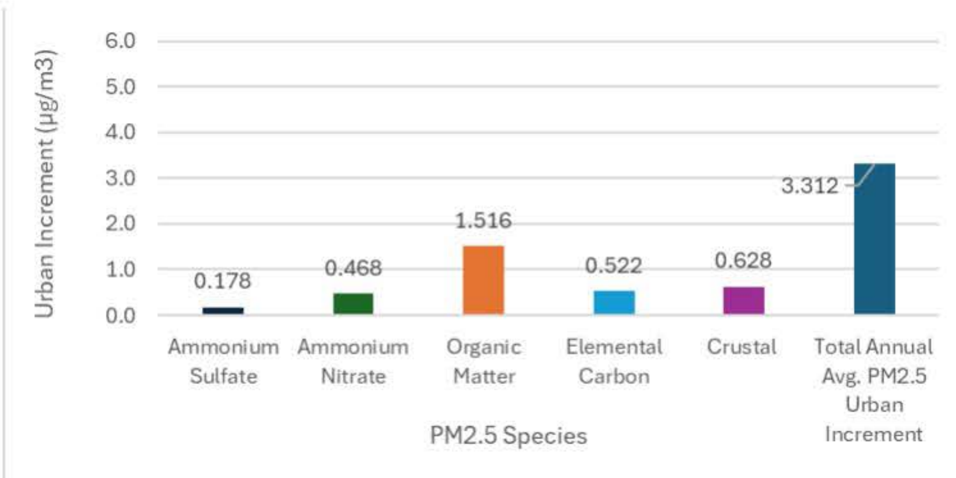
Michigan continued to adhere to the USEPA’s recommendations for conducting an urban increment analysis, as outlined in the *Designations Guidance* Memorandum – and calculated three-year average (2021-2023) quarterly and annual urban increments for each of the different measured components of the $PM_{2.5}$ mass (ammonium sulfate, ammonium nitrate, organic matter, elemental carbon, and crustal). Similarly, Michigan calculated three-year average quarterly and annual urban increments for total $PM_{2.5}$ (which combines all five components of the $PM_{2.5}$ mass). Michigan accessed the speciated urban and rural background concentrations from the $PM_{2.5}$ Speciation Network (2021-2023) layer within the USEPA’s $PM_{2.5}$ Designations Mapping Tool. These calculations are shown below in Tables 5 through 7 and Figures 9 through 11.

In Table 5, Michigan depicts the results of its computations for the speciated and total annual average $PM_{2.5}$ urban increments for Michigan’s Military Park, DP4th, and Detroit-SW monitors using quarterly speciated $PM_{2.5}$ concentration data from the Detroit-SW CSN monitor and the St. John’s Road – Quaker City, Ohio IMPROVE monitor. The quarterly speciated data that was used to produce these calculations can be found in Attachment 3 - Urban Increment USEPA Methodology. As shown in Table 5 and Figure 9, the $PM_{2.5}$ component that contributed the most to the total $PM_{2.5}$ urban increment on an average annual basis is the organic matter portion of $PM_{2.5}$ (1.516 µg/m^3).

Table 5. Military Park, DP4th, and DET-SW Monitors – 2021-2023 Annual Average Urban Increment by $PM_{2.5}$ Species

Local Site Name [Site ID]	Annual Avg. Ammonium Sulfate Increment	Annual Avg. Ammonium Nitrate Increment	Annual Avg. OM Increment	Annual Avg. EC Increment	Annual Avg. Crustal Increment	Total Annual Avg. $PM_{2.5}$ Urban Increment	Units
Military Park [261630100], DP4th [261630098], DET-SW [261630015]	0.178	0.468	1.516	0.522	0.628	3.312	µg/m^3

Figure 9. Military Park, DP4th, and DET-SW Monitors – 2021-2023 Annual Average Urban Increment by $PM_{2.5}$ Species

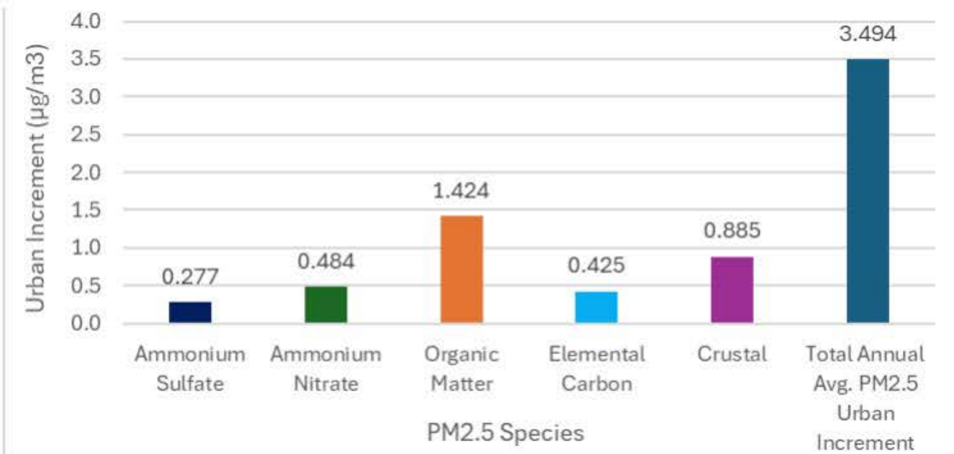


In Table 6, below, Michigan depicts the results of its computations for the speciated and total annual average $PM_{2.5}$ urban increments for Michigan's Trinity St. Marks, Eliza-NR, and Dearborn Public Schools monitors using quarterly speciated $PM_{2.5}$ concentration data from the Dearborn Public Schools CSN monitor and the St. John's Road – Quaker City, Ohio IMPROVE monitor. The quarterly speciated data that was used to produce these calculations can be found in Attachment 3. As shown in Table 6 and Figure 10, the $PM_{2.5}$ component that contributed the most to the total $PM_{2.5}$ urban increment on an average annual basis is the organic matter portion of $PM_{2.5}$ (1.424 µg/m^3).

Table 6. Trinity St. Marks, Eliza-NR, and Dearborn Public Schools Monitors – 2021-2023 Annual Average Urban Increment by $PM_{2.5}$ Species

Local Site Name [Site ID]	Annual Avg. Ammonium Sulfate Increment	Annual Avg. Ammonium Nitrate Increment	Annual Avg. OM Increment	Annual Avg. EC Increment	Annual Avg. Crustal Increment	Total Annual Avg. $PM_{2.5}$ Urban Increment	Units
Trinity St. Marks [261630099], Eliza-NR [261630093], Dearborn Public Schools [261630033]	0.277	0.484	1.424	0.425	0.885	3.494	µg/m³

Figure 10. Trinity St. Marks, Eliza-NR, and Dearborn Public Schools Monitors – 2021-2023 Annual Average Urban Increment by $PM_{2.5}$ Species

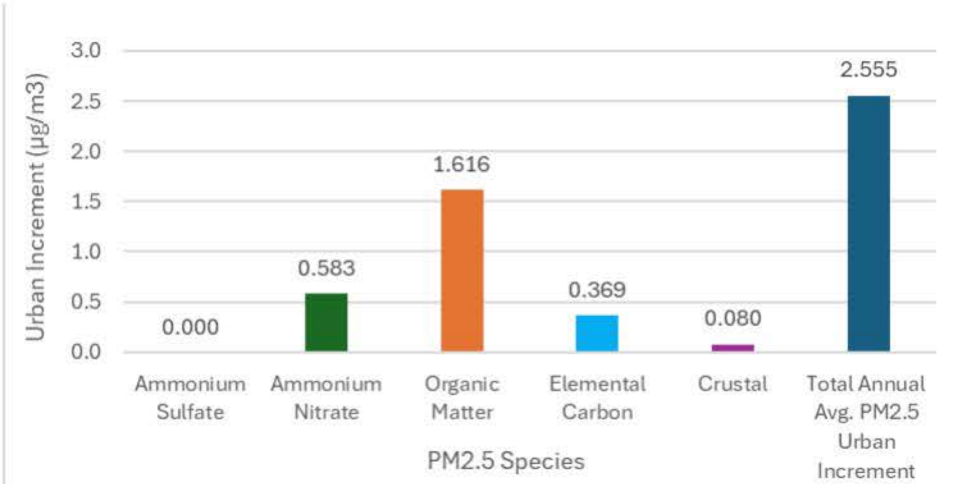


In Table 7, Michigan depicts the results of its computations for the speciated and total annual average $PM_{2.5}$ urban increments for Michigan's Allen Park monitor using quarterly speciated $PM_{2.5}$ concentration data from the Allen Park CSN monitor and the St. John's Road – Quaker City, Ohio IMPROVE monitor. The quarterly speciated data that was used to produce these calculations can be found in Attachment 3, Urban Increment USEPA Methodology. As shown within Table 7 and Figure 11, the $PM_{2.5}$ component that contributed the most to the total $PM_{2.5}$ urban increment on an average annual basis is the organic matter portion of $PM_{2.5}$ (1.616 (µg/m³)).

Table 7. Allen Park Monitor – 2021-2023 Annual Average Urban Increment by $PM_{2.5}$ Species

Local Site Name [Site ID]	Annual Avg. Ammonium Sulfate Increment	Annual Avg. Ammonium Nitrate Increment	Annual Avg. OM Increment	Annual Avg. EC Increment	Annual Avg. Crustal Increment	Total Annual Avg. $PM_{2.5}$ Urban Increment	Units
Allen Park [261630001]	0.000	0.583	1.616	0.369	0.080	2.555	µg/m³

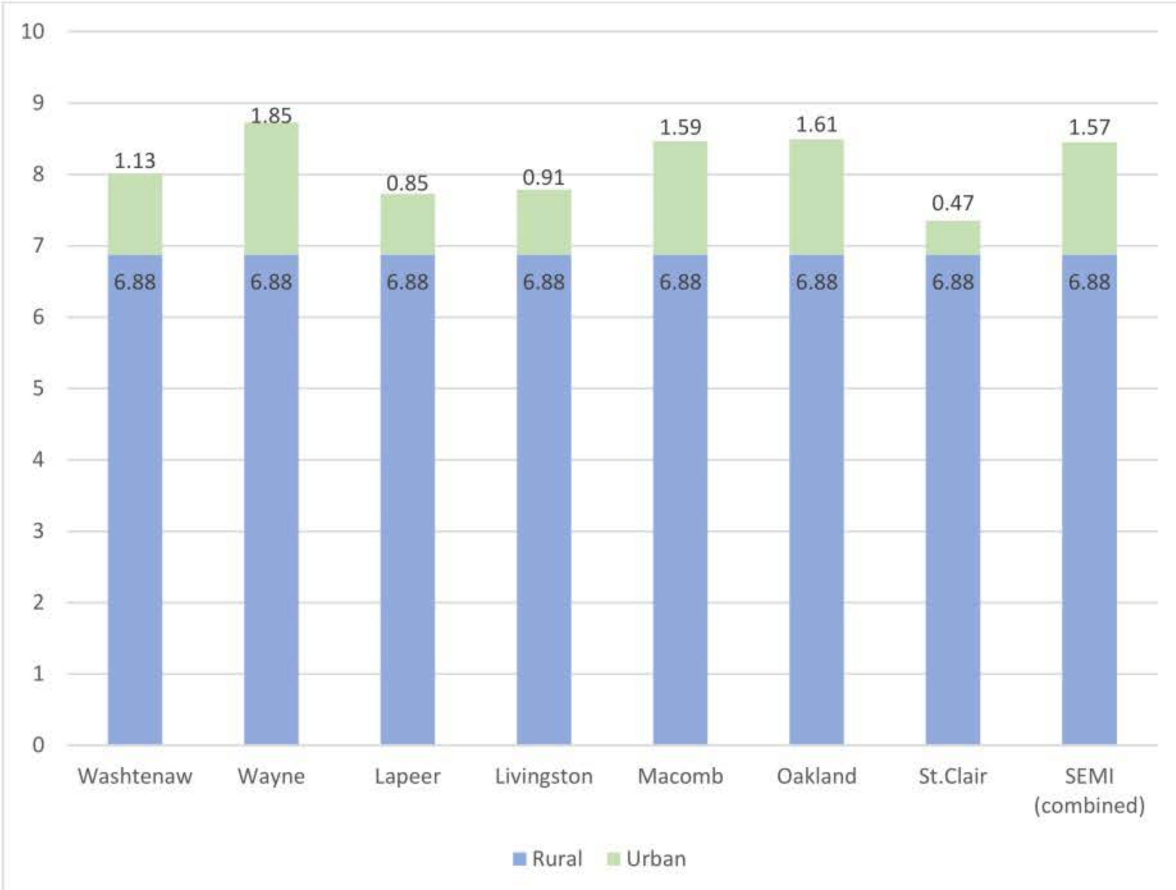
Figure 11. Allen Park Monitor – 2021-2023 Annual Average Urban Increment by $PM_{2.5}$ Species



Satellite-derived Urban Increment Methodology

As previously stated, Michigan conducted a secondary approach to calculating the urban increment, this approach is outlined in Attachment 4. The findings of this satellite-derived urban increment analysis for the Wayne County AoA are shown in Figure 12. This analysis showed a rural background of 6.88 µg/m^3 for the southern portion of Michigan and urban increments ranging from 1.85 µg/m^3 to 0.47 µg/m^3. The highest urban increments were found to be in Wayne County (1.85 µg/m^3) followed by Oakland (1.61 µg/m^3) and Macomb (1.59 µg/m^3) counties.

Figure 12. Satellite-derived Urban Increments for Wayne County AoA.



There are some differences and limitations between the two methodologies. With the USEPA Designations Guidance methodology Michigan is able to better understand the speciated breakdown across the entire three-year period (2021-2023), while the satellite data the analysis is limited to 2022 $PM_{2.5}$ data. Conversely, the USEPA approach looks only at exceeding monitoring sites, and not surrounding areas or attaining monitors and is limited by the use of CSN monitors that are located within one area in Wayne County. The satellite-derived approach is able to show potential urban increments for the surrounding counties in the AoA. With both approaches the totals found at each monitor or county do not align directly with the formal monitoring DVs. This is again due to the constraints of these methodologies relying on CSN monitors and IMPROVE monitors. The Wayne County DV is based on the controlling monitor, Military Park, which is not a CSN monitor. Wayne County has three CSN monitors at the Allen Park, SW Detroit, and Dearborn monitoring sites. CSN monitors are a component of national $PM_{2.5}$ monitoring, and their purpose is not to establish if the NAAQS are being attained. Instead, they are intended to provide expanded gravimetric $PM_{2.5}$ measurements to support assessment of trends, development of effective State Implementation Plans (SIP) and determination of regulatory compliance, development of control strategies, interpretation of health studies on effects of $PM_{2.5}$ constituents, characterization of annual and seasonal spatial variation of aerosols, and comparison to the IMPROVE network.

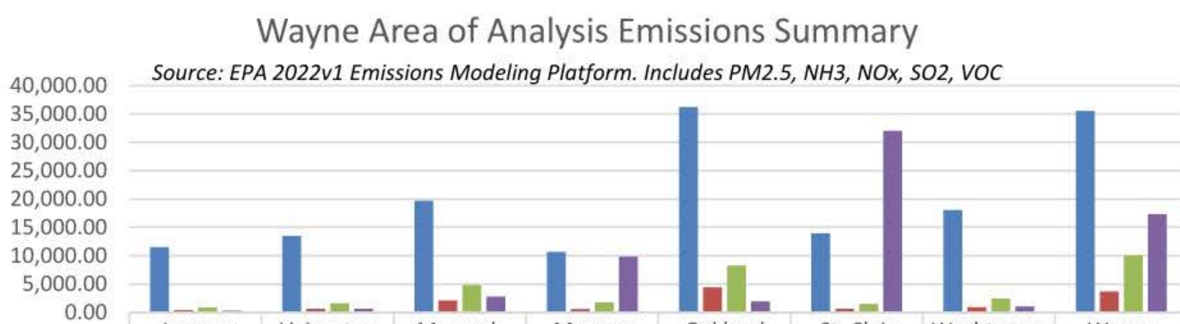
Michigan has factored in these limitations for determining influence of the final nonattainment boundaries. Due to the constraints of this analysis, Michigan did not heavily weigh the findings but rather utilized the broad conclusions to help better understand the overall analysis of the Wayne County AoA. From this analysis, main conclusions were drawn from the overall trends shown through these two methodologies. Michigan concludes that organic matter, followed by crustal matter, and to a lesser extent ammonium nitrate and elemental carbon are contributing most to the $PM_{2.5}$ urban increments. The overall urban increments from the USEPA method attribute almost 3.5 µg/m^3 to urban influence, whereas the satellite-derived approach results in less than 2 µg/m^3 in counties through the AoA, with the most in Wayne County.

4.1.2 Wayne County AoA - Emissions Data

Emissions Trends

Figure 13 presents $PM_{2.5}$, NO_x, SO_x, VOC, and NH_3 ($PM_{2.5}$ and precursors) emissions data for the Wayne County AoA[8]. The most significant emissions in the Wayne County AoA are from nonpoint (59%) followed by point (24%), onroad (12%), and lastly nonroad (5%). To assist in determining potential influence of adjacent county emissions on the exceeding monitors within Wayne County, Michigan additionally reviewed emissions trends from a subset of the AoA, which included Wayne, Oakland, and Macomb (WOM subset). When looking at the WOM subset the distribution of sector contributions shifts. Nonpoint is still the dominant contributor at 62%, but point is lowered to 15% and onroad is higher at 16% (Figure 14). Below, the sector and county contributions are discussed further.

Figure 13. $PM_{2.5}$ and Precursor Emissions Data for the Wayne County AoA.



	Lapeer	Livingston	Macomb	Monroe	Oakland	St. Clair	Washtenaw	Wayne
Nonpoint	11,498.43	13,511.13	19,710.54	10,705.12	36,212.20	13,949.57	18,047.26	35,535.77
Nonroad	440.50	628.97	2,095.01	610.40	4,401.43	640.38	954.51	3,669.10
Onroad	897.37	1,581.74	4,803.15	1,765.61	8,264.77	1,508.11	2,473.22	10,046.75
Point	290.89	647.00	2,794.56	9,818.80	1,955.07	32,017.03	1,041.09	17,353.73

Nonpoint Nonroad Onroad Point

[8] USEPA 2022v1 EMP https://www.epa.gov/particle-pollution-designations/particle-pollution-designations-memorandum-and-data-2024-revised#C

Figure 14. $PM_{2.5}$ and Precursor Emissions Distribution for Wayne County AoA and WOM Subset.

The top 10 $PM_{2.5}$ nonpoint sector categories are listed in Table 8 for the Wayne County AoA and Table 9 for the WOM subset. Since many of the nonpoint source sectors are correlated with population, it is reasonable to expect more nonpoint emissions are originating from areas with higher population densities. Later in this section there is a discussion of the population density within the Wayne County AoA (see Figure 17). Michigan took into consideration population density when assessing the nonpoint source county level inventory. Fuel combustion from residential wood is highest for both areas, followed by commercial cooking. The Wayne County AoA has higher overall emissions coming from dust for both paved and unpaved roads, waste disposal and fuel combustion (from industrial boilers, internal combustion engines – biomass) than that of the WOM subset. For the WOM subset fuel combustion (from industrial boilers, internal combustion engines – biomass) is higher, followed by dust from paved and unpaved roads, and then dust from construction.

Table 8. Top 10 Nonpoint Sector Categories for the Wayne County AoA in tons per year (tpy) for Combined $PM_{2.5}$.

Nonpoint Sector Category	**$PM_{2.5}$ (tpy)**	**Overall Percentage**
Fuel Comb - Residential - Wood	6,490.13	33.7
Commercial Cooking	2,850.35	14.8
Dust - Unpaved Road Dust	1,874.59	9.7
Dust - Paved Road Dust	1,669.57	8.7
Waste Disposal	1,661.34	8.6
Fuel Comb - Industrial Boilers, ICEs – Biomass	1,553.49	8.1
Dust - Construction Dust	946.83	4.9
Agriculture - Crops & Livestock Dust	764.43	4.0
Fuel Comb - Comm/Institutional – Biomass	604.57	3.1
Industrial Processes - Mining	355.39	1.8

Table 9. Top 10 Nonpoint Sector Categories for the WOM Subset in tons per year for Combined $PM_{2.5}$.

Nonpoint Sector Category	$PM_{2.5}$ (tpy)	Overall Percentage
Fuel Comb - Residential - Wood	4,034.27	32.2
Commercial Cooking	2,370.52	18.9
Fuel Comb - Industrial Boilers, ICEs - Biomass	1,273.28	10.2
Dust - Paved Road Dust	1,212.14	9.7
Dust - Unpaved Road Dust	880.34	7.0
Dust - Construction Dust	837.90	6.7
Waste Disposal	745.07	5.9
Fuel Comb - Comm/Institutional - Biomass	514.79	4.1
Industrial Processes - Mining	258.41	2.1
Miscellaneous Non-Industrial Not Elsewhere Classified	175.90	1.4

For the $PM_{2.5}$ and precursor point source contributions based on Figure 13, St. Clair County has the highest point contribution, followed by Wayne County. Michigan also looked at individual pollutant contributions based on the data provided by the USEPA for 2022 County and Facility level[9] (see Table 10). Wayne County is highest for Total $PM_{2.5}$ primary, NH3, and VOC. St. Clair County is highest for NO_x and SO_2. Additionally, Table 11a through 11e show the top 20 facilities with highest emissions for each pollutant, what county they reside in, and their NAICS code and description.

Table 10. Wayne County AoA County-level $PM_{2.5}$ and Precursor Point Source Emissions Breakdown in tpy (see Footnote 8).

County	$PM_{2.5}$ Primary	NH_3	NO_x	SO_2	VOC
Lapeer	3.60	0.40	17.90	188.30	80.60
Livingston	9.10	0.20	495.00	1.50	141.10
Macomb	214.30	16.60	847.40	96.00	1,620.20
Monroe	117.00	1.30	5,680.40	3,808.40	211.60
Oakland	144.50	13.30	928.60	118.70	749.90
St. Clair	139.80	18.40	10,020.20	26,892.70	1,186.80
Washtenaw	81.70	11.80	590.80	127.60	229.20
Wayne	1,414.00	46.20	7,271.80	7,967.50	3,602.00

[9] USEPA 2022 County and Facility Emissions for PM2.5 Designations spreadsheet, https://www.epa.gov/particle-pollution-designations/particle-pollution-designations-memorandum-and-data-2024-revised#C

Table 11a. Top 20 Facility Level $PM_{2.5}$ Emissions for the Wayne County AoA (see Footnote 8).

County	Facility Name	NAICS Code	NAICS Description	$PM_{2.5}$ (tpy)
Wayne	EES Coke Battery LLC	324199	All Other Petroleum and Coal Products Manufacturing	172.95
Wayne	Cleveland-Cliffs Steel Corporation Dearborn Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	154.51
Wayne	Z Technologies Corp.	325510	Paint and Coating Manufacturing	75.15
Wayne	Marathon Petroleum Company LP	324110	Petroleum Refineries	52.86
Monroe	DTE Electric Company - Monroe Power Plant	221112	Fossil Fuel Electric Power Generation	40.87
Macomb	Pine Tree Acres, Inc.	562212	Solid Waste Landfill	34.89
Wayne	Dearborn Industrial Generation	221112	Fossil Fuel Electric Power Generation	31.80
St. Clair	Cargill Salt - St. Clair	311942	Spice and Extract Manufacturing	31.53
Wayne	Carmeuse Lime Inc., River Rouge Operation	327410	Lime Manufacturing	27.46
St. Clair	St. Clair / Belle River Power Plant	221112	Fossil Fuel Electric Power Generation	23.95
Washtenaw	Arbor Hills Landfill, Inc.	562212	Solid Waste Landfill	21.85
Wayne	Crown Group, Lynch Road Plant	332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	17.57
Monroe	Gerdau MacSteel Monroe Mill	331110	Iron and Steel Mills and Ferroalloy Manufacturing	16.44
Wayne	Ford Motor Co./ Livonia Transmission	336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	16.01
Wayne	GLWA Water Resource Recovery Facility	221320	Sewage Treatment Facilities	15.12
Wayne	FCA US LLC - Jefferson North Assembly Plant	336110	Automobile and Light-duty Motor Vehicle Manufacturing	13.91
Wayne	Ajax Materials Corporation	324121	Asphalt Paving Mixture and Block Manufacturing	13.44
Wayne	Woodland Meadows RDF	562212	Solid Waste Landfill	12.91
Wayne	Ford Motor Co. Rouge Complex	336110	Automobile and Light-duty Motor Vehicle Manufacturing	12.54
Wayne	St Marys Cement	327310	Cement Manufacturing	11.65

Table 11b. Top 20 Facility Level NH_3 Emissions for the Wayne County AoA (see Footnote 8).

County	Facility Name	NAICS Code	NAICS Description	NH_3 (tpy)
Wayne	Marathon Petroleum Company LP	324110	Petroleum Refineries	14.27
Wayne	Cooper Heat Treating LLC	332811	Metal Heat Treating	12.00
Macomb	FCA US LLC Sterling Heights Assembly plant	336110	Automobile and Light-duty Motor Vehicle Manufacturing	9.76
Oakland	Engineered Heat Treat, Inc.	332811	Metal Heat Treating	9.25
Wayne	EES Coke Battery LLC	324199	All Other Petroleum and Coal Products Manufacturing	8.22
Washtenaw	University of Michigan	611310	Colleges, Universities, and Professional Schools	6.06
St. Clair	DTE Electric Company - Greenwood Energy Center	221112	Fossil Fuel Electric Power Generation	5.50
St. Clair	St. Clair / Belle River Power Plant	221112	Fossil Fuel Electric Power Generation	4.92
Washtenaw	DAPCO Industries	332911	Industrial Valve Manufacturing	3.72
Wayne	U S Steel Great Lakes Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	2.71
St. Clair	Marysville Ethanol, LLC	325193	Ethyl Alcohol Manufacturing	2.47
St. Clair	Cargill Salt - St. Clair	311942	Spice and Extract Manufacturing	2.05
Macomb	Consumers Energy - Ray Compressor Station	486210	Pipeline Transportation of Natural Gas	1.61
Macomb	Specialty Steel Treating Inc.	332811	Metal Heat Treating	1.56
Macomb	GM Technical Center	541380	Testing Laboratories and Services	1.31
Wayne	Cleveland-Cliffs Steel Corporation Dearborn Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	1.22
Oakland	FCA US LLC - Chrysler Technology Center	336110	Automobile and Light-duty Motor Vehicle Manufacturing	1.17
St. Clair	Consumers Energy - St. Clair Compressor Station	486210	Pipeline Transportation of Natural Gas	1.06
Wayne	BASF Corporation - Chemical Plants	325199	All Other Basic Organic Chemical Manufacturing	0.92
Wayne	Ford Motor Co. Elm Street Boilerhouse	221330	Steam and Air-Conditioning Supply	0.89

Table 11c. Top 20 Facility Level NO_x Emissions for the Wayne County AoA (see Footnote 8).

County	Facility Name	NAICS Code	NAICS Description	NO_x (tpy)
St. Clair	St. Clair/Belle River Power Plant	221112	Fossil Fuel Electric Power Generation	9,224.04
Monroe	DTE Electric Company - Monroe Power Plant	221112	Fossil Fuel Electric Power Generation	4,969.71
Wayne	EES Coke Battery LLC	324199	All Other Petroleum and Coal Products Manufacturing	1,542.05
Wayne	Detroit Metropolitan Wayne County	48811	Airport OperationsT	1,203.07
Wayne	Dearborn Industrial Generation	221112	Fossil Fuel Electric Power Generation	598.89
Wayne	Carmeuse Lime Inc., River Rouge Operation	327410	Lime Manufacturing	521.20
Wayne	DTE Electric Company - Trenton Channel Power Plant	221112	Fossil Fuel Electric Power Generation	509.43
Monroe	Guardian Industries-Carleton	327211	Flat Glass Manufacturing	488.15
Livingston	Howell Compressor Station	486210	Pipeline Transportation of Natural Gas	471.91
Wayne	Marathon Petroleum Company LP	324110	Petroleum Refineries	360.16
Washtenaw	University of Michigan	611310	Colleges, Universities, and Professional Schools	295.64
Wayne	Cleveland-Cliffs Steel Corporation Dearborn Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	280.19
St. Clair	DTE Electric Company - Greenwood Energy Center	221112	Fossil Fuel Electric Power Generation	243.64
St. Clair	DTE Gas Co. - Belle River Mills Compressor Station	221210	Natural Gas Distribution	231.62
Macomb	Selfridge ANGB	48811	Airport OperationsT	207.70
Wayne	GLWA Water Resource Recovery Facility	221320	Sewage Treatment Facilities	191.09
Wayne	Detroit Thermal Beacon Heating Plant	221330	Steam and Air-Conditioning Supply	177.42
Wayne	Oakwood	488210	Support Activities for Rail Transportation	169.36
Wayne	Consumers Energy - Northville Compressor Station	486210	Pipeline Transportation of Natural Gas	154.50
Wayne	U S Steel Great Lakes Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	147.97

Table 11d. Top 20 Facility Level SO_2 Emissions for the Wayne County AoA (see Footnote 8).

County	Facility Name	NAICS Code	NAICS Description	SO_2 (tpy)
St. Clair	St. Clair/Belle River Power Plant	221112	Fossil Fuel Electric Power Generation	26,862.73
Monroe	DTE Electric Company - Monroe Power Plant	221112	Fossil Fuel Electric Power Generation	3,583.73
Wayne	EES Coke Battery LLC	324199	All Other Petroleum and Coal Products Manufacturing	2,957.98
Wayne	DTE Electric Company - Trenton Channel Power Plant	221112	Fossil Fuel Electric Power Generation	2,428.52
Wayne	Dearborn Industrial Generation	221112	Fossil Fuel Electric Power Generation	914.23
Wayne	Cleveland-Cliffs Steel Corporation Dearborn Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	481.19
Wayne	U S Steel Great Lakes Works	331110	Iron and Steel Mills and Ferroalloy Manufacturing	389.52
Wayne	Carmeuse Lime Inc., River Rouge Operation	327410	Lime Manufacturing	233.90
Lapeer	Tuscola Energy - Richfield Gas Plant	211130	Natural Gas Extraction	187.90
Wayne	Marathon Petroleum Company LP	324110	Petroleum Refineries	169.25
Wayne	Detroit Metropolitan Wayne County	48811	Airport OperationsT	128.51
Washtenaw	Arbor Hills Landfill, Inc.	562212	Solid Waste Landfill	120.88
Monroe	Gerdau MacSteel Monroe Mill	331110	Iron and Steel Mills and Ferroalloy Manufacturing	113.81
Wayne	Carleton Farms Landfill	562212	Solid Waste Landfill	112.09
Monroe	Guardian Industries-Carleton	327211	Flat Glass Manufacturing	104.48
Macomb	Pine Tree Acres, Inc.	562212	Solid Waste Landfill	68.08
Oakland	Oakland Heights Development, Inc.	562212	Solid Waste Landfill	39.17
Oakland	Eagle Valley Landfill	562212	Solid Waste Landfill	38.98
Wayne	Ameresco Woodland Meadows Romulus LLC	486990	All Other Pipeline Transportation	37.67
Wayne	Riverview Land Preserve	562212	Solid Waste Landfill	30.30

Table 11e. Top 20 Facility Level VOC Emissions for the Wayne County AoA (see Footnote 8).

County	Facility Name	NAICS Code	NAICS Description	VOC (tpy)
Macomb	FCA US LLC Sterling Heights Assembly plant	336110	Automobile and Light-duty Motor Vehicle Manufacturing	665.35
Wayne	Ford Motor Co. Rouge Complex	336110	Automobile and Light-duty Motor Vehicle Manufacturing	626.52
Wayne	FCA US LLC - Jefferson North Assembly Plant	336110	Automobile and Light-duty Motor Vehicle Manufacturing	626.34
St. Clair	St. Clair / Belle River Power Plant	221112	Fossil Fuel Electric Power Generation	399.25
St. Clair	Intertape Polymer Group	322220	Paper Bag and Coated and Treated Paper Manufacturing	350.59
Wayne	Marathon Petroleum Company LP	324110	Petroleum Refineries	300.19
Wayne	EES Coke Battery LLC	324199	All Other Petroleum and Coal Products Manufacturing	267.64
Wayne	Ford Motor Co./ Wayne Complex	336110	Automobile and Light-duty Motor Vehicle Manufacturing	227.80
Macomb	FCA US LLC Warren Truck Assembly Plant	336110	Automobile and Light-duty Motor Vehicle Manufacturing	178.36
Macomb	Pine Tree Acres, Inc.	562212	Solid Waste Landfill	159.36
Wayne	Detroit Metropolitan Wayne County	48811	Airport OperationsT	155.14
St. Clair	Pregis	326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	138.20
Wayne	Ford Motor Company - Flat Rock Assembly	336110	Automobile and Light-duty Motor Vehicle Manufacturing	118.87
Macomb	Selfridge ANGB	48811	Airport OperationsT	101.05
Livingston	Ventra Fowlerville LLC	336390	Other Motor Vehicle Parts Manufacturing	87.33
Macomb	Shelby Foam Systems, a Division of Magna Seating	326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	65.51
Oakland	Eagle Industries, INC.	326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	65.39
Washtenaw	Arbor Hills Landfill, Inc.	562212	Solid Waste Landfill	64.49
Wayne	Riverview Land Preserve	562212	Solid Waste Landfill	60.58
Lapeer	Albar Industries, Inc.	326199	All Other Plastics Product Manufacturing	59.43

As stated in Section 3.2, the USEPA has acknowledged that SO_2 and NO_x emissions in the last decade, as well as predicted reductions, make $PM_{2.5}$ exceedances more of a localized issue with more emphasis on direct $PM_{2.5}$ emissions than has been found in the past. The point source data provided above shows the highest $PM_{2.5}$ emissions are from within Wayne County (1,414 tpy), with the next highest county at only 15% of Wayne County's total $PM_{2.5}$ emissions, Macomb County with 214 tpy. When looking at the facility level $PM_{2.5}$ emissions the highest contributors are over 50 tpy and are in Wayne County. The surrounding counties all have facility level $PM_{2.5}$ emissions under 50 tpy. When addressing the NO_x and SO_2 emissions, the highest emissions come from two sources within the Wayne County AoA: the St. Clair / Belle River Power Plant (B2796) and the DTE Electric Company - Monroe Power Plant (B2816).

While the county level emissions for SO_2 are significantly higher in St. Clair County, as shown in Table 10, when the facility level emissions were reviewed there was one source contributing to 99.7% of the total SO_2, the St. Clair / Belle River Power Plant (B2796). Michigan reviewed the emission units at this facility based on the 2022 SLEIS reporting which showed that two coal boilers at Belle River make up over 20,000 tpy of the overall 26,862.73 tpy SO_2 emissions in the county. According to DTE Electric Company's most recent 2022 Integrated Resource Plan (IRP),[10] the Belle River plant is slated for conversion from baseload coal to a natural gas peaker plant, only operating in times of high customer demand. The conversion will occur in two phases, with the first unit conversion happening in 2025 and the second unit in 2026. Additionally, DTE has indicated it plans to retire the Belle River natural gas peaking resource by the year 2040. The St. Clair coal-fired power plant retired in May 2022. IRPs are not federally enforceable and are resubmitted and updated on a set schedule every three to five years; however, there are ongoing public and customer pressures to utilize more sustainable and cleaner forms of energy generation. This provides an incentive for utilities not to stray too much from what they've incorporated into their IRPs.

In addition, DTE Electric has another power plant located in the Wayne County AoA, the Monroe Power Plant, that is contributing to the higher point source emissions from that county, specifically for NO_x and SO_2 (see Tables 11c and 11d). Similar to the St. Clair / Belle River Power Plant, based on DTE Electric's most recent IRP (see Footnote 9) this coal-fired power plant is slated to be retired in mid-2030, with retirements of two units in 2028. The energy currently generated by the two coal units is proposed to be replaced with renewable energy and energy storage. In addition, a low or zero carbon dispatchable resource may be considered for the mid-2030s timeframe to support the final retirement of all coal units. Tables 11f and 11g represent facility level data from the USEPA 2022v1 emissions modeling platform (see Footnote 7) and model projected emissions for $PM_{2.5}$ and precursors for the DTE Electric St. Clair/Belle River and Monroe Power Plant facilities. Projected emissions show significant reductions from these two DTE facilities for both NO_x and SO_2 emissions with between 20 to 60% reductions by 2026, and 98%+ reductions by 2032 from their 2022 base levels.

Due to the retirement of the St. Clair coal-fired power plant, proposed conversions at the Belle River power plant, and planned retirements of coal units at the Monroe power plant, Michigan expects the NO_x and SO_2 contributions will be reduced significantly over the next few years. Thus, in combination with other emission data and factors addressed in this recommendation, Michigan does not view the NO_x and SO_2 emissions coming from St. Clair or Monroe counties to be contributing to the $PM_{2.5}$ exceedances in Wayne County.

[10] Case U-21193. Michigan LARA. (2022, February 7). https://mi-psc.my.site.com/s/case/5008y000002yQhVAAU/in-the-matter-of-the-application-of-dte-electric-company-for-approval-of-power-purchase-agreements-and-other-relief

Table 11f. NO_x and SO_2 Emissions Projections for DTE Electric St. Clair/Belle River.

Pollutant (tpy)	NOx	SO_2
2022	9,224.04	26,862.73
2026	5,291.95	8,849.35
2032	219.46	0.08

Table 11g. NO_x and SO_2 Emissions Projections for DTE Electric Monroe Power Plant.

Pollutant (tpy)	NO_x	SO_2
2022	4,969.71	3,583.73
2026	3,897.77	2,839.56
2032	71.49	3.62

Lastly, to better understand the overall distribution of $PM_{2.5}$ and precursors at point sources in the Wayne County AoA, Michigan utilized the $PM_{2.5}$ facility level data from the 2022v1 EMP provided by the USEPA and completed a weighted overlay analysis to determine where there were areas of high $PM_{2.5}$ and precursor emissions and high facility count at a city/township level. This helped better refine the county level data discussed earlier. To complete this analysis the data from the 2022v1 EMP were converted to a raster and totals for total $PM_{2.5}$ and precursor emissions and facility count were summarized for each city and township area. This data was then rasterized and scored on a scale from 0 to 1. Both layers, the emissions and count layers, were then multiplied against each other with equal weight (i.e., 50% each). The final output, Figure 15, shows areas with high emissions ($PM_{2.5}$ and precursors) and facility count in red, and areas with fewer emissions and fewer facilities in progressively darker green. This same process was completed just for $PM_{2.5}$ emissions and facility count, with the results shown in Figure 16.

Figure 15. Wayne County AoA Point Distribution Weighted Overlay Analysis for $PM_{2.5}$ and Precursor Emissions.

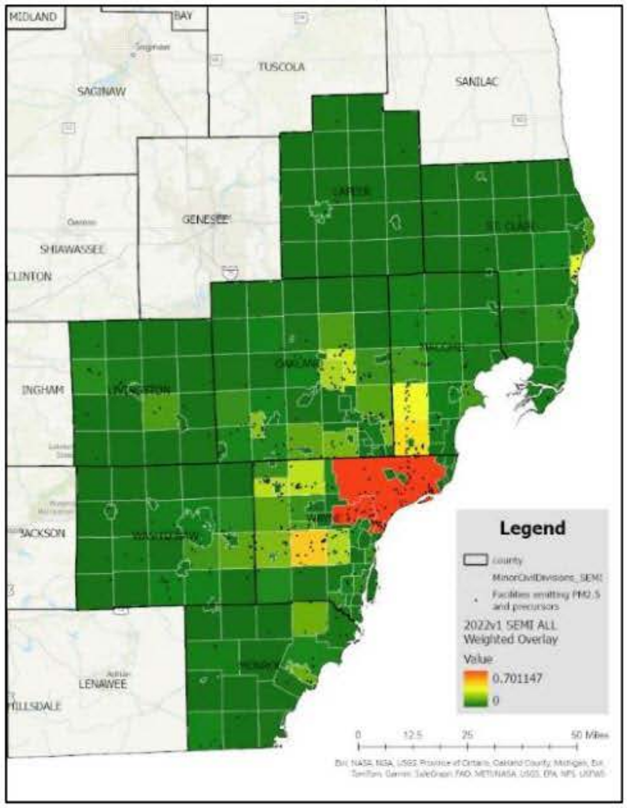
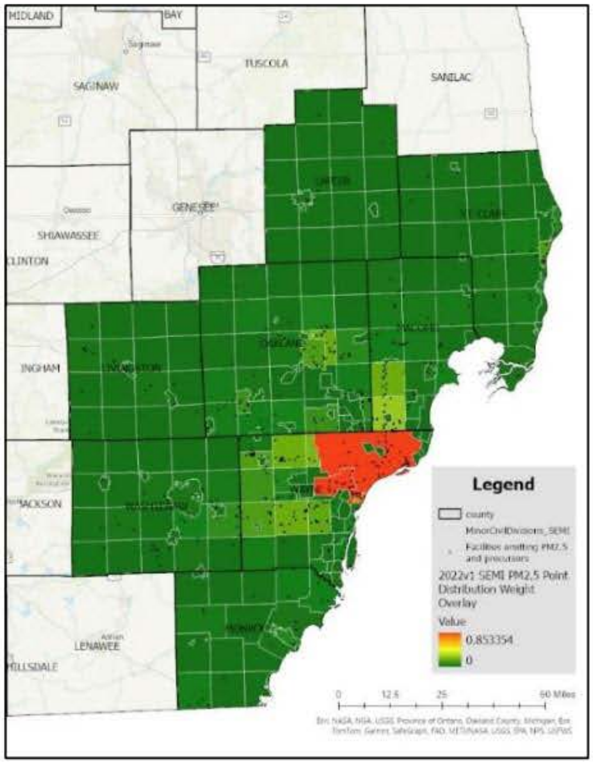


Figure 16. Wayne County AoA Point Distribution Weighted Overlay Analysis for $PM_{2.5}$ Emissions.



The results of this analysis show a large $PM_{2.5}$ (and precursor) facility and emissions distribution in the northeastern region of Wayne County, and some higher precursor contributions in mid-Wayne County and the southern portions of Oakland and Macomb counties. When reviewing the facility level data correlated with the higher values shown in Figure 15 in the southern portions of Oakland and Macomb counties, we see that there are many facilities within each township; however, they have low overall emissions. The majority of larger facility level $PM_{2.5}$ emissions come from Wayne County facilities, with large SO_2 and NO_x facility level emissions from the St. Clair and Monroe power plants, which are anticipated to drastically reduce emissions in the coming years.

Population Density

Michigan looked at the population density and degree of urbanization for the Wayne County AoA using the U.S. Census Bureau's 2020 Census Demographic and Housing Characteristics.[11] Review of Figure 17 shows that Wayne, Macomb, and Oakland counties have the highest population density in the Wayne County AoA and therefore the highest degree of urbanization. The areas of highest population density are in northern, central, and eastern Wayne County; southern and central Macomb County; and southern and southeastern Oakland County. Michigan gathered 2023 total county-level population data for each county in the Wayne County AoA from the U.S. Census Bureau. Percentages were calculated representing the contribution of each county's total population to the total population of the Wayne County AoA, as shown in Table 12.[12] In 2023, the largest counties in the Wayne County AoA by

[11] (2024). ArcGIS.com. https://www.arcgis.com/home/item.html?id=a1926cb43e844c3f82275917d6eab47a

[12] Bureau, U. C. (2022). County Population Totals: 2020-2021. Census.gov. https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html

population were Wayne County (approximately 1.8 million), Oakland County (1.3 million), and Macomb County (0.9 million).

Figure 17. Population Density Map for the Wayne County Area of Analysis

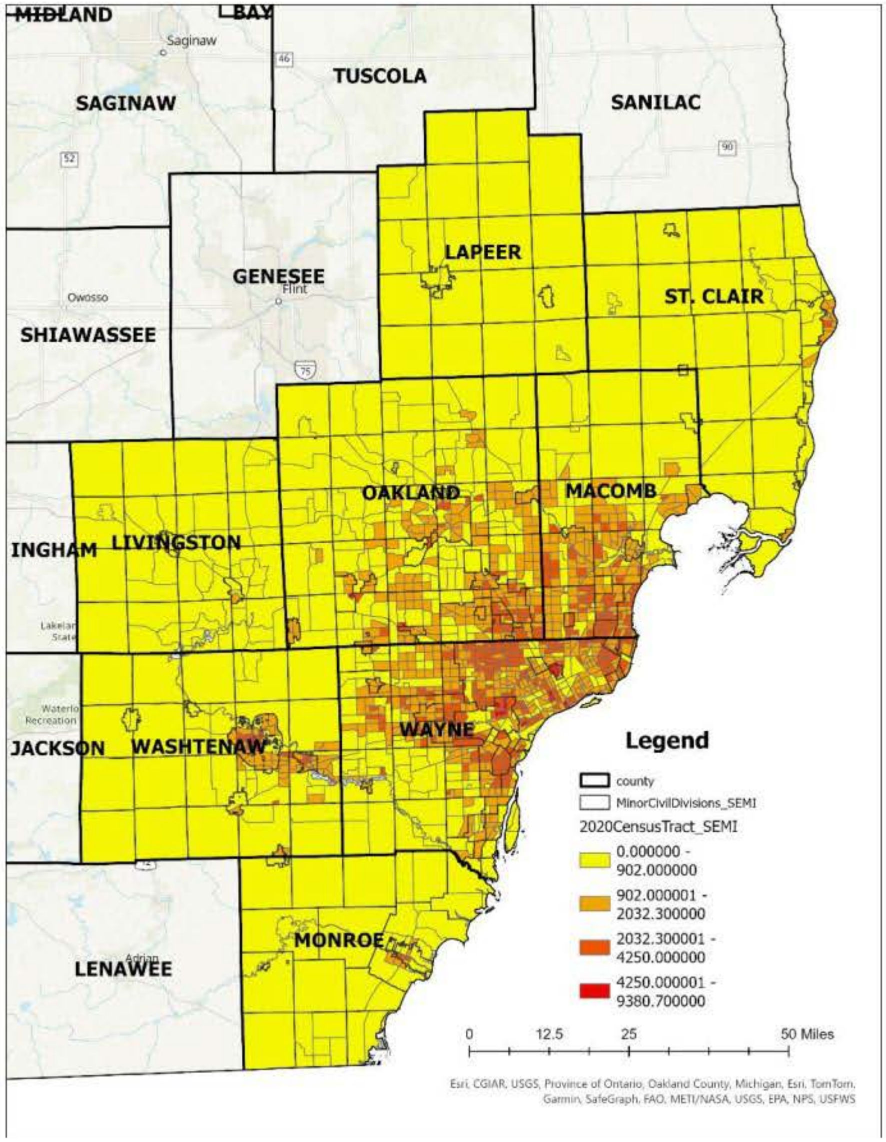


Table 12. Annual Estimate of the Resident Population for Each County in the Wayne County AoA in 2023.

County	Total County Population	Percentage of Total Wayne County AoA Population *(4,862,885 people)*
Lapeer	88,977	1.8
Livingston	196,757	4.0
Macomb	875,101	18.0
Monroe	155,045	3.2
Oakland	1,270,426	26.1
St. Clair	159,874	3.3
Washtenaw	365,536	7.5
Wayne	1,751,169	36.0

Traffic and Commuting patterns

The Designations Guidance recommends conducting analyses related to traffic and commuting patterns by examining the location of major transportation arteries, traffic volume, and commuting in and around violating monitors. Michigan conducted the following analyses to evaluate mobile patterns and emissions for the Wayne County AoA.

For the Wayne County AoA, Michigan looked at average daily person miles traveled (PMT) data from 2019-2024 at the county level for Wayne, Macomb, Oakland, Washtenaw, Livingston, Monroe, and St. Clair counties, and similarly evaluated daily expanded truck movements data from 2023, in the form of vehicle miles traveled (VMT), for the same counties. This information was accessed using the LOCUS tool developed through a partnership between the Southeast Michigan Council of Governments (SEMCOG) and LOCUS Inc. - a wholly owned subsidiary of Cambridge Systematics.[13]

In regard to average daily motorized PMT we consider both: 1) trips that originated in Wayne County and end in another county of the Wayne County AoA (excluding Lapeer County), and 2) trips that originate in one of the counties in the Wayne County AoA (excluding Lapeer County) and end in Wayne County. Wayne County represents the highest proportion, approximately 60%, of the total daily PMT for these trips across all counties in the AoA, as shown in Tables 14a and 14b. The second highest county for trips both to and from Wayne County was Oakland County at about 18%.

Considering that heavy, medium, and light-duty trucks have higher emission rates of $PM_{2.5}$ and its precursors than passenger vehicles, Michigan utilized the *2023 SEMCOG Truck Movements* dataset within the LOCUS tool to determine which counties in the Wayne County AoA (excluding Lapeer) harbor the greatest amount of trucking activity on an average daily basis. In regard to average daily extended VMT for trucking trips that originated in Wayne County and end in another county of the Wayne County AoA (excluding Lapeer County), and trips that originate in one of the counties in the Wayne County AoA (excluding Lapeer County) and end in Wayne County, Wayne County represents the highest proportion, approximately 65%, of the total average daily extended VMT for all vehicle class categories (heavy-duty, medium-duty, and light-duty) across all counties in the AoA – as shown in Tables 14c and 14d. The next

[13] (2025). LOCUS. https://locusdata.io/

highest county was Oakland County at 16.7%, which is significantly less than Wayne County. The Wayne County heavy- and light-duty vehicle class categories accounted for approximately 27% and 33% of the total average daily extended VMT across all counties, which was also higher than all other counties. Additionally, Tables 14c and 14d showed that within all counties generally the light-duty vehicles made up between 67% to 88% of county level VMT and heavy-duty vehicles made up 2% to 14% of the county level VMT. However, in Wayne County there is a significant shift in this pattern; light-duty vehicles represent 51.7% of county level VMT and heavy-duty vehicles represent 42.4%. These data show that more heavy-duty vehicle traffic occurs within Wayne County than traffic to or from Wayne County to or from other counties in the area.

In Table 14e, Michigan used the LOCUS tool data to analyze the county-level average daily expanded VMT for trucking trips to Wayne County from origin counties in the Wayne County AoA (except Lapeer County) by industry class for all truck vehicle types. It was determined that the Wayne County Retail Trade and Transportation/Warehousing industry classes represent the highest portion of the total daily VMT across all counties in the AoA, approximately 36%. Analogous results were also found for county-level average daily expanded VMT for trucking trips originating in Wayne County and ending in counties in the Wayne County AoA (excluding Lapeer) – as shown in Table 14f.

Table 14a. Average Daily PMT to Wayne (destination) County from Origin County in the Wayne County AoA (2019-2024)

Origin County	**Daily PMT**	**Percentage of Total PMT (%)**
Wayne	7,445,331	59.6
Oakland	2,297,487	18.4
Macomb	1,192,271	9.5
Washtenaw	766,967	6.1
Monroe	349,451	2.8
Livingston	292,049	2.3
St. Clair	152,928	1.2
Total PMT	*12,496,484*	*100.0*

Table 14b. Average Daily PMT from Wayne (origin) County to Destination County in the Wayne County AoA (2019-2024)

Destination County	**Daily PMT**	**Percent of Total PMT (%)**
Wayne	7,445,331	59.7
Oakland	2,310,498	18.5
Macomb	1,152,476	9.2
Washtenaw	738,587	5.9
Monroe	349,692	2.8
Livingston	308,046	2.5
St. Clair	158,013	1.3
Total PMT	*12,462,643*	*100.0*

Table 14c. Average Daily Expanded VMT to Wayne (destination) County from Origin County in Wayne County AoA by Vehicle Class (2023)

Origin County	Sum of Daily Expanded VMT	Percentage of County-wide Total VMT (%)	Percentage of Wayne County AoA VMT (%)
Livingston	**3,296**		**1.5**
Heavy-duty Trucks	74	2.2	0.0
Light-duty Trucks	2,914	88.4	1.4
Medium-duty Trucks	308	9.3	0.1
Macomb	**20,777**		**9.7**
Heavy-duty Trucks	1,170	5.6	0.5
Light-duty Trucks	17,256	83.1	8.1
Medium-duty Trucks	2,351	11.3	1.1
Monroe	**3,499**		**1.6**
Heavy-duty Trucks	489	14.0	0.2
Light-duty Trucks	2,380	68.0	1.1
Medium-duty Trucks	630	18.0	0.3
Oakland	**35,820**		**16.7**
Heavy-duty Trucks	1,715	4.8	0.8
Light-duty Trucks	29,995	83.7	14.0
Medium-duty Trucks	4,110	11.5	1.9
St. Clair	**1,310**		**0.6**
Heavy-duty Trucks	28	2.1	0.0
Light-duty Trucks	1,047	80.0	0.5
Medium-duty Trucks	235	17.9	0.1
Washtenaw	**11,213**		**5.2**
Heavy-duty Trucks	1,527	13.6	0.7
Light-duty Trucks	7,545	67.3	3.5
Medium-duty Trucks	2,141	19.1	1.0
Wayne	**138,128**		**64.5**
Heavy-duty Trucks	58,515	42.4	27.3
Light-duty Trucks	71,412	51.7	33.4
Medium-duty Trucks	8,201	5.9	3.8
Grand Total	***214,043***		***100.0***

Table 14d. Average Daily Expanded VMT from Wayne (origin) County to Destination County in Wayne County AoA by Vehicle Class (2023)

Destination County	Sum of Daily Expanded VMT	Percentage of County-wide Total VMT (%)	Percentage of Wayne County AoA VMT (%)
Livingston	**3,666**		**1.7**
Heavy-duty Trucks	265	7.2	0.1
Light-duty Trucks	3,135	85.5	1.5
Medium-duty Trucks	266	7.3	0.1
Macomb	**19,178**		**9.0**
Heavy-duty Trucks	1,828	9.5	0.9
Light-duty Trucks	15,592	81.3	7.3
Medium-duty Trucks	1,758	9.2	0.8
Monroe	**3,413**		**1.6**
Heavy-duty Trucks	516	15.1	0.2
Light-duty Trucks	2,515	73.7	1.2
Medium-duty Trucks	382	11.2	0.2
Oakland	**38,250**		**17.9**
Heavy-duty Trucks	5,432	14.2	2.5
Light-duty Trucks	29,787	77.9	13.9
Medium-duty Trucks	3,031	7.9	1.4
St. Clair	**1,228**		**0.6**
Heavy-duty Trucks	191	15.6	0.1
Light-duty Trucks	935	76.1	0.4
Medium-duty Trucks	102	8.3	0.0
Washtenaw	**10,332**		**4.8**
Heavy-duty Trucks	1,201	11.6	0.6
Light-duty Trucks	7,354	71.2	3.4
Medium-duty Trucks	1,777	17.2	0.8
Wayne	**138,128**		**64.5**
Heavy-duty Trucks	58,515	42.4	27.3
Light-duty Trucks	71,412	51.7	33.3
Medium-duty Trucks	8,201	5.9	3.8
Grand Total	***214,194***		***100.0***

Table 14e. Average Daily Expanded VMT to Wayne (destination) County from Origin County in Wayne County AoA by Industry Class for Heavy, Medium, and Light-duty Trucks (2023)

Origin County	Sum of Daily Expanded VMT	Percentage of County-wide Total VMT (%)	Percentage of Wayne County AoA VMT (%)
Livingston	**3,295**		**1.5**
Administrative and Support and Waste Management and Remediation Services	484	14.7	0.2
Construction	346	10.5	0.2
Manufacturing	519	15.8	0.2
Other Services	1,045	31.7	0.5
Retail Trade	148	4.5	0.1
Transportation and Warehousing	421	12.8	0.2
Unknown	26	0.8	0.0
Wholesale Trade	306	9.3	0.1
Macomb	**20,777**		**9.7**
Administrative and Support and Waste Management and Remediation Services	3,663	17.6	1.7
Construction	2,966	14.3	1.4
Manufacturing	2,256	10.9	1.1
Other Services	4,158	20.0	1.9
Retail Trade	1,473	7.1	0.7
Transportation and Warehousing	3,838	18.5	1.8
Unknown	237	1.1	0.1
Wholesale Trade	2,186	10.5	1.0
Monroe	**3,499**		**1.6**
Administrative and Support and Waste Management and Remediation Services	282	8.1	0.1
Construction	608	17.4	0.3
Manufacturing	299	8.5	0.1
Other Services	701	20.0	0.3
Retail Trade	283	8.1	0.1
Transportation and Warehousing	769	22.0	0.4
Unknown	81	2.3	0.0
Wholesale Trade	476	13.6	0.2
Oakland	**35,820**		**16.7**
Administrative and Support and Waste Management and Remediation Services	4,386	12.2	2.0
Construction	4,120	11.5	1.9
Manufacturing	3,003	8.4	1.4

Other Services	9,223	25.7	4.3
Retail Trade	2,307	6.4	1.1
Transportation and Warehousing	8,255	23.0	3.9
Unknown	532	1.5	0.2
Wholesale Trade	3,994	11.2	1.9
St. Clair	**1,310**		**0.6**
Administrative and Support and Waste Management and Remediation Services	150	11.4	0.1
Construction	602	46.0	0.3
Manufacturing	114	8.7	0.1
Other Services	181	13.8	0.1
Retail Trade	26	2.0	0.0
Transportation and Warehousing	119	9.1	0.1
Unknown	14	1.1	0.0
Wholesale Trade	104	8.0	0.0
Washtenaw	**11,212**		**5.2**
Administrative and Support and Waste Management and Remediation Services	1,198	10.7	0.6
Construction	909	8.1	0.4
Manufacturing	900	8.0	0.4
Other Services	1,934	17.3	0.9
Retail Trade	860	7.7	0.4
Transportation and Warehousing	3,531	31.5	1.6
Unknown	167	1.5	0.1
Wholesale Trade	1,713	15.3	0.8
Wayne	**138,128**		**64.5**
Administrative and Support and Waste Management and Remediation Services	10,141	7.3	4.7
Construction	6,481	4.7	3.0
Manufacturing	5,686	4.1	2.7
Other Services	22,363	16.2	10.4
Retail Trade	46,270	33.5	21.6
Transportation and Warehousing	31,223	22.6	14.6
Unknown	1,522	1.1	0.7
Wholesale Trade	14,442	10.5	6.7
Grand Total	***214,042***		***100.0***

Table 14f. Average Daily Expanded VMT from Wayne (origin) County to Destination County in Wayne County AoA by Industry Class for Heavy, Medium, and Light-duty Trucks (2023)

Destination County	Sum of Daily Expanded VMT	Percentage of County-wide Total VMT (%)	Percentage of Wayne County AoA VMT (%)
Livingston	**3,666**		**1.7**
Administrative and Support and Waste Management and Remediation Services	463	12.6	0.2
Construction	575	15.7	0.3
Manufacturing	424	11.6	0.2
Other Services	831	22.7	0.4
Retail Trade	746	20.4	0.3
Transportation and Warehousing	450	12.3	0.2
Unknown	74	2.0	0.0
Wholesale Trade	103	2.8	0.0
Macomb	**19,177**		**9.0**
Administrative and Support and Waste Management and Remediation Services	2,140	11.2	1.0
Construction	2,544	13.3	1.2
Manufacturing	1,924	10.0	0.9
Other Services	4,931	25.7	2.3
Retail Trade	1,100	5.7	0.5
Transportation and Warehousing	4,148	21.6	1.9
Unknown	339	1.8	0.2
Wholesale Trade	2,051	10.7	1.0
Monroe	**3,413**		**1.6**
Administrative and Support and Waste Management and Remediation Services	429	12.6	0.2
Construction	437	12.8	0.2
Manufacturing	309	9.0	0.1
Other Services	786	23.0	0.4
Retail Trade	215	6.3	0.1
Transportation and Warehousing	953	27.9	0.4
Unknown	63	1.9	0.0
Wholesale Trade	221	6.5	0.1
Oakland	**38,248**		**17.9**
Administrative and Support and Waste Management and Remediation Services	4,916	12.9	2.3
Construction	4,361	11.4	2.0
Manufacturing	2,979	7.8	1.4
Other Services	10,435	27.3	4.9

Retail Trade	2,223	5.8	1.0
Transportation and Warehousing	8,466	22.1	4.0
Unknown	594	1.6	0.3
Wholesale Trade	4,274	11.2	2.0
St. Clair	**1,227**		**0.6**
Administrative and Support and Waste Management and Remediation Services	329	26.8	0.2
Construction	86	7.0	0.0
Manufacturing	89	7.3	0.0
Other Services	97	7.9	0.0
Retail Trade	42	3.4	0.0
Transportation and Warehousing	444	36.2	0.2
Unknown	45	3.7	0.0
Wholesale Trade	95	7.8	0.0
Washtenaw	**10,333**		**4.8**
Administrative and Support and Waste Management and Remediation Services	811	7.8	0.4
Construction	861	8.3	0.4
Manufacturing	1,027	9.9	0.5
Other Services	2,501	24.2	1.2
Retail Trade	932	9.0	0.4
Transportation and Warehousing	2,416	23.4	1.1
Unknown	143	1.4	0.1
Wholesale Trade	1,642	15.9	0.8
Wayne	**138,128**		**64.5**
Administrative and Support and Waste Management and Remediation Services	10,141	7.3	4.7
Construction	6,481	4.7	3.0
Manufacturing	5,686	4.1	2.7
Other Services	22,363	16.2	10.4
Retail Trade	46,270	33.5	21.6
Transportation and Warehousing	31,223	22.6	14.6
Unknown	1,522	1.1	0.7
Wholesale Trade	14,442	10.5	6.7
Grand Total	***214,192***		***100.0***

To locate the major transportation arteries of the Wayne County AoA, Michigan utilized MDOT's Annual Average Daily Traffic (AADT) Tool to export 2023 AADT data for trunkline and non-trunkline roads within the eight-county area. The visual findings of this portion of the Traffic and Commuting Patterns analysis can be seen in Figure 23, which shows the largest cluster and concentration of trunkline and non--trunkline roads with an AADT of over 20,001 being located in the southeast portion of Oakland County, the southern portion of Macomb County, and much of Wayne County.

Figure 23. 2023 Annual average daily traffic estimates for trunkline and non-trunkline roads in the Wayne County AoA.

4.1.3 Wayne County AoA - Meteorology

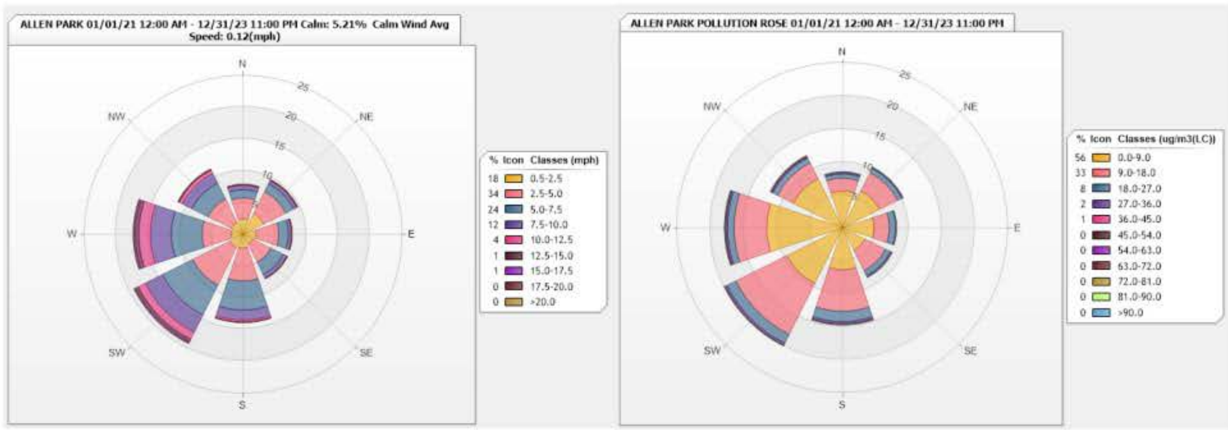
Wind Rose Analysis

As discussed in Section 3.3, Michigan generated wind and pollution roses for the monitoring sites and several airports in the Wayne County AoA prior to the USEPA's finalizing wind roses on the $PM_{2.5}$ Designations Mapping Tool. Included in Attachment 2 are the wind roses from the USEPA's $PM_{2.5}$ Designation Mapping Tool for the Detroit area where monitoring sites exceed the 2024 $PM_{2.5}$ standard. The USEPA's wind roses use units of m/s and show data from the 2021-2023 DV timeframe. Discussed further below in this section are wind and pollution roses for each violating monitor in the Wayne County AoA.

Allen Park (261630001)

Wind and pollution roses for the Allen Park monitoring site are presented in Figure 24. The wind rose for Allen Park indicates that the most common wind speed, 34% of the time, is between 2.5 and 5.0 mph. It also shows that the winds come mostly from the southwest and west at this monitoring site. Additionally, the pollution rose shows that 56% of the time $PM_{2.5}$ concentrations are between 0.0 and 9.0 µg/m^3. The pollution rose also indicates that the winds at this site are from the southwest, west, and south the majority of the time.

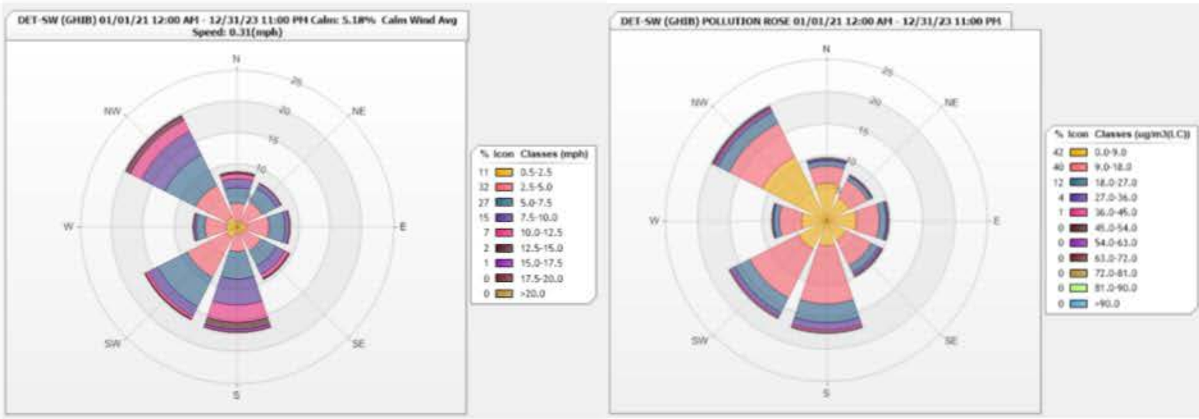
Figure 24. Allen Park Wind (left) and Pollution Roses (right) for 2021-2023 DV.



<u>Detroit-SW (261630015)</u>

Wind and pollution roses for the Detroit-SW monitoring site are presented in Figure 25. The wind rose for Detroit-SW indicates that the most common wind speed, 32% of the time, is between 2.5 and 5.0 mph. It also shows that the winds come mostly from the northwest, southwest, and south at this monitoring site. Additionally, the pollution rose shows that 42% of the time $PM_{2.5}$ concentrations are between 0.0 and 9.0 µg/m^3, and 40% of the time $PM_{2.5}$ concentrations are between 9.0 and 18.0 µg/m^3. The $PM_{2.5}$ concentrations are more likely to be lower than 9.0 µg/m^3 when the winds are from the north and northwest rather than other directions. The pollution rose also indicates that the winds at this monitoring site are from the northwest, southwest, and south the majority of the time. It should be noted that while siting criteria have been applied to the meteorological instruments at this site, it is likely that the overall prevailing wind patterns in the area are not accurately being recorded at the monitoring site due to the closeness of surrounding buildings. So, while the data is representative of near-monitor conditions, it may not be representative of winds beyond the immediate area of the monitoring site.

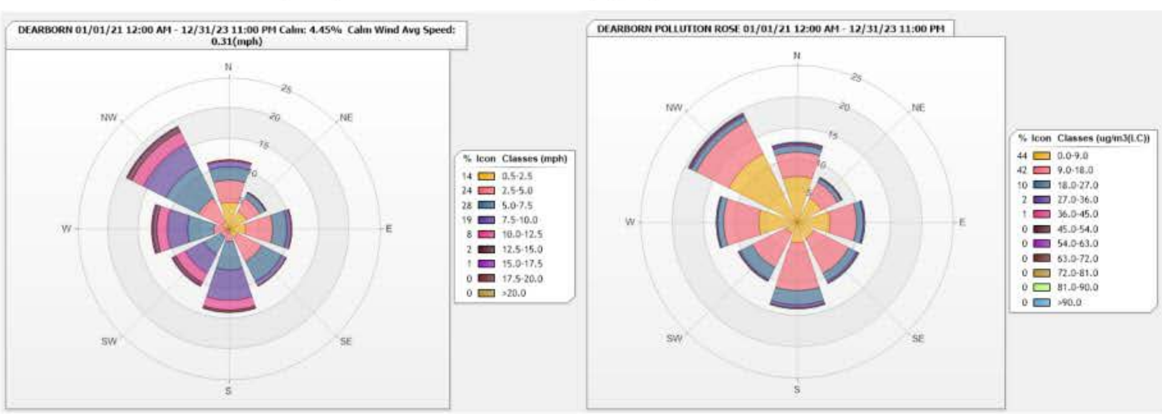
Figure 25. Detroit-SW Wind (left) and Pollution Roses (right) for 2021-2023 DV.



Dearborn (261630033)

Wind and pollution roses for the Dearborn monitoring site are presented in Figure 26. The wind rose for Dearborn indicates that the most common wind speed, 28% of the time, is between 5.0 and 7.5 mph. It also shows that the winds come mostly from the northwest at this site. The pollution rose shows that 44% of the time, $PM_{2.5}$ concentrations are between 0.0 and 9.0 μg/m^3, and 42% of the time $PM_{2.5}$ concentrations are between 9.0 and 18.0 μg/m^3. The $PM_{2.5}$ concentrations are more likely to be lower than 9.0 μg/m^3 when the winds are from the northwest rather than other directions, whle winds from the southeast are much more likely to result in concentrations greater than 9 μg/m^3.

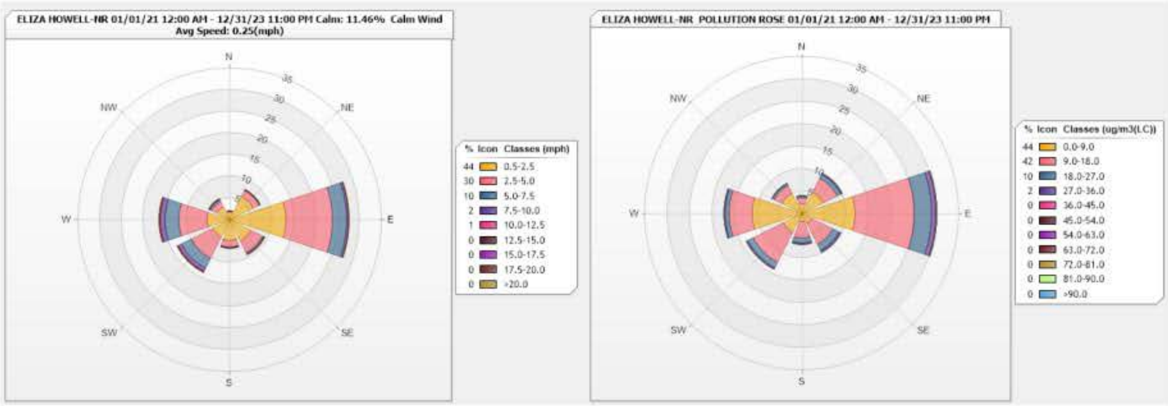
Figure 26. Dearborn Wind (left) and Pollution Roses (right) for 2021-2023 DV.



Eliza Howell Near Road (261630093)

Wind and pollution roses for the Eliza Howell monitoring site are presented in as Figure 27. The wind rose for Eliza Howell indicates that the most common wind speed, 44% of the time, is between 0.5 and 2.5 mph. It also shows that the winds come mostly from the northwest at this site. The pollution rose shows that 44% of the time, $PM_{2.5}$ concentrations are between 0.0 and 9.0 μg/m^3, and 42% of the time, $PM_{2.5}$ concentrations are between 9.0 and 18.0 μg/m^3. The pollution rose also indicates that $PM_{2.5}$ migrates to the monitoring site from the east the majority of the time. It should be noted that this site is located immediately adjacent to and north of I-96, and is likely influenced by roadway travel, so that the measurements may not be representative of regional wind patterns.

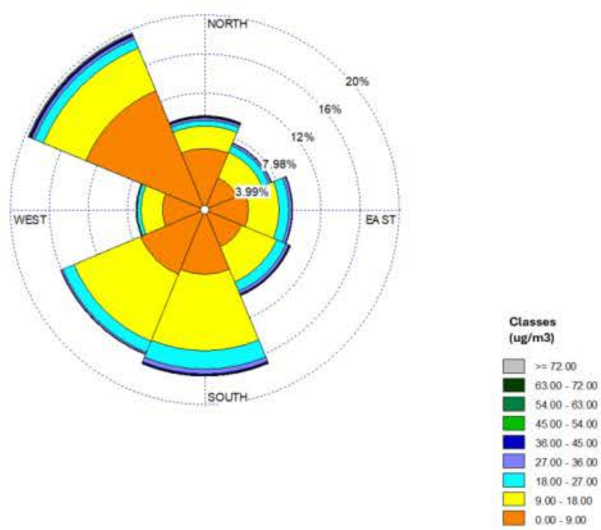
Figure 27. Eliza Howell-Near Road Wind (left) and Pollution Roses (right) for 2021-2023 DV.



NMH 48217 (261630097)

The pollution rose for the NMH 48217 monitoring site is presented in Figure 28. This monitor does not measure wind speed or direction, nor does it monitor continuous $PM_{2.5}$ data. Therefore the pollution rose was created using a different program, and the meteorology data was supplemented with wind speed and direction data from the Detroit-SW monitor. The pollution rose also indicates that $PM_{2.5}$ migrates to the monitoring site from the northwest the majority of the time. The pollution rose shows $PM_{2.5}$ concentrations out of the northwest are between 0.0 and 9.0 µg/m^3 13% of the time, between 9.0 and 18.0 µg/m^3 5% of the time, between 18.0 and 27.0 µg/m^3 1% of the time, between 27.0 and 36.0 µg/m^3 0.5% of the time, and between 36.0 and 45.0 µg/m^3 0.5% of the time. The $PM_{2.5}$ concentrations are more likely to be lower than 9.0 µg/m^3 when the winds are from the north, northwest, and west rather than other directions.

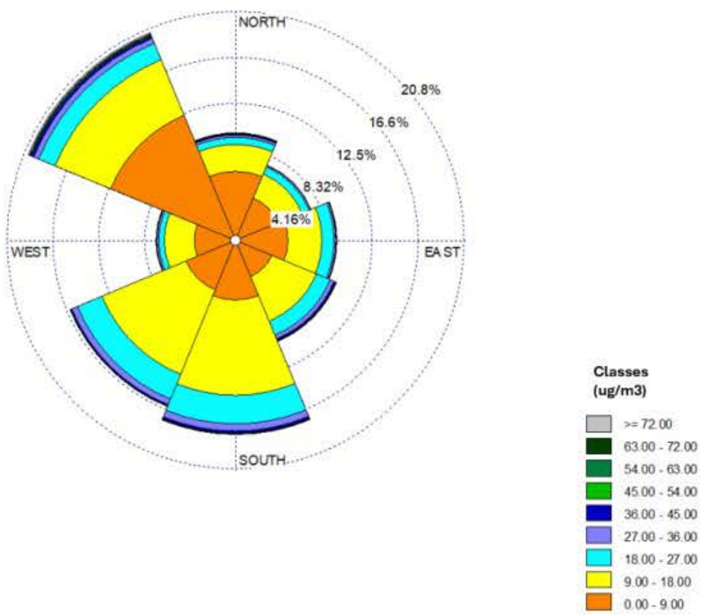
Figure 28. NMH 48217 Pollution Rose for 2021-2023 DV.



DP4th (261630098)

The pollution rose for the DP4th monitoring site is presented in Figure 29. This monitor does not measure wind speed or direction, nor does it monitor continuous $PM_{2.5}$ data. Therefore, the pollution rose was created using a different program and the meteorology data was supplemented with wind speed and direction data from the Detroit-SW monitor. The pollution rose also indicates that $PM_{2.5}$ migrates to the monitoring site from the northwest the majority of the time. The pollution rose shows $PM_{2.5}$ concentrations out of the northwest are between 0.0 and 9.0 µg/m^3 12% of the time, between 9.0 and 18.0 µg/m^3 6% of the time, between 18.0 and 27.0 µg/m^3 3% of the time, between 27.0 and 36.0 µg/m^3 1% of the time, and 36.0 and 45.0 µg/m^3 1% of the time. The $PM_{2.5}$ concentrations are more likely to be lower than 9.0 µg/m^3 when the winds are from the north and northwest rather than other directions.

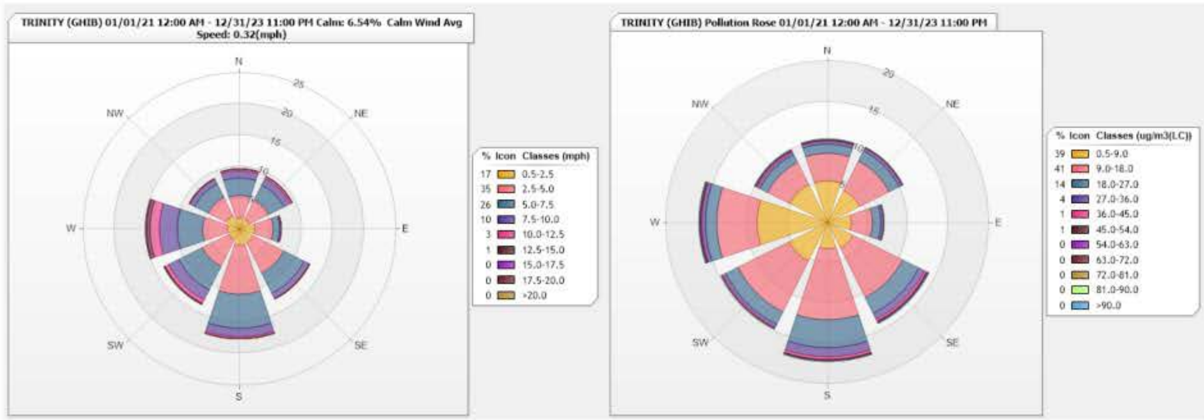
Figure 29. DP4th Pollution Rose for 2021-2023 DV.



Trinity (261630099)

Wind and pollution roses for the Trinity monitoring site are presented in Figure 30. The wind rose for Trinity indicates that the most common wind speed, 35% of the time, is between 2.5 and 5.0 mph. It also shows that the winds come mostly from the south and west at this monitoring site. Additionally, the pollution rose shows that 41% of the time $PM_{2.5}$ concentrations are between 9.0 and 18.0 µg/m^3, and 39% of the time $PM_{2.5}$ concentrations are between 0.5 and 9.0 µg/m^3. The $PM_{2.5}$ concentrations are more likely to be lower than 9.0 µg/m^3 when the winds are from the north, northwest, and west rather than other directions, while winds from the south and southeast are much more likely to result in concentrations greater than 9.0 µg/m^3.

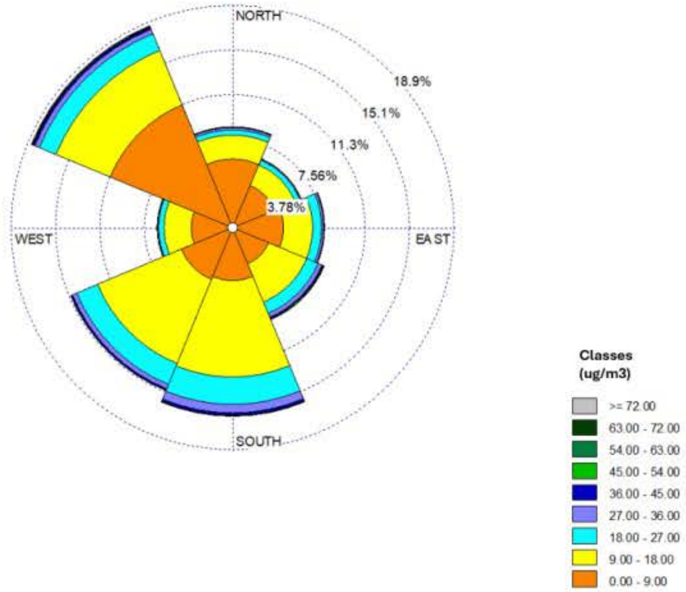
Figure 30. Trinity Wind (left) and Pollution Roses (right) for 2021-2023 DV.



<u>Military Park (261630100)</u>

The pollution roses for the Military Park monitoring site are presented in Figure 31. This monitor does not measure wind speed or direction, nor does it monitor continuous $PM_{2.5}$ data. The pollution rose was created using a different program and the meteorology data was supplemented with wind speed and direction data from the Detroit-SW monitor. The pollution rose also indicates that $PM_{2.5}$ migrates to the monitoring site from the northwest the majority of the time. The pollution rose shows $PM_{2.5}$ concentrations out of the northwest are between 0.0 and 9.0 µg/m^3 11% of the time, between 9.0 and 18.0 µg/m^3 5% of the time, between 18.0 and 27.0 µg/m^3 2% of the time, between 27.0 and 36.0 µg/m^3 1% of the time, and 36.0 and 45.0 µg/m^3 1% of the time. The $PM_{2.5}$ concentrations are more likely to be lower than 9.0 µg/m^3 when the winds have a northerly component than when winds are from other directions, while winds from the southwest and south are much more likely to result in concentrations greater than 9.0 µg/m^3.

Figure 31. Military Park Pollution Rose for 2021-2023 DV.

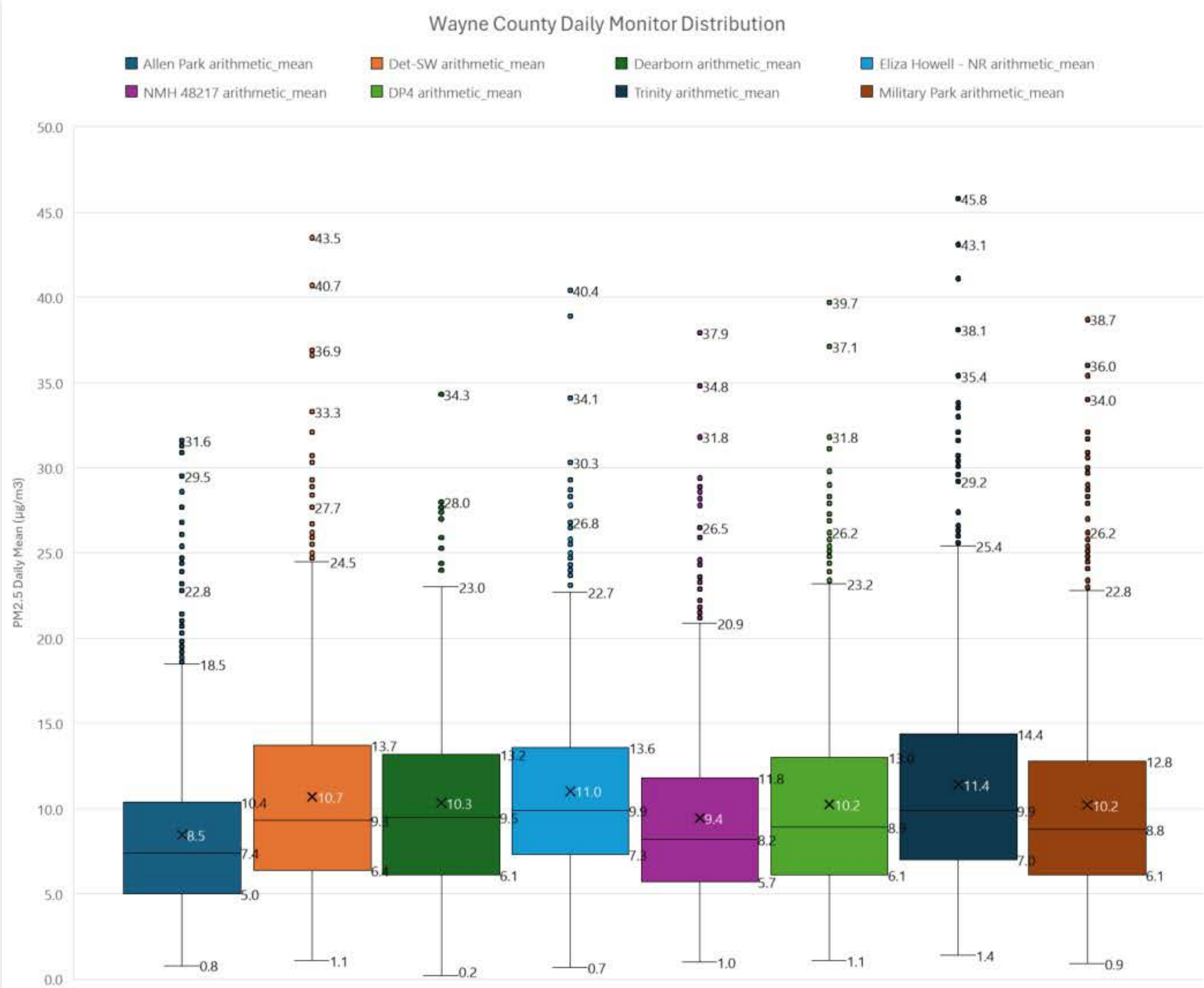


Magnitude of Exceedance Analysis

Michigan reviewed daily $PM_{2.5}$ means from 2021 through 2023 to understand the distribution and level of exceedances at the violating air monitors in Wayne County. In this magnitude of exceedance analysis Michigan removed days that were potentially influenced by wildfire events to best determine any local areas contributing to violations at the monitors that are within the regulatory authority of the state. To determine days potentially influenced by wildfires, Michigan utilized the USEPA $PM_{2.5}$ Tiering Tool for Exceptional Events Analysis[14]. The days removed for the Wayne County magnitude of exceedance study were all from June 2023 and July 25 through 29, 2023, as well as July 4 for 2021, 2022, and 2023. The remaining dates and daily $PM_{2.5}$ levels were displayed in a box plot to determine outliers which most represent the highest levels of pollution. Figure 32 shows the results of this analysis for each exceeding monitor in Wayne County.

[14] PM2.5 Tiering Tool - for Exceptional Events Analysis | USEPA. (2024, February 22). USEPA. https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis

Figure 32. Wayne County Magnitude of Exceedance Analysis.

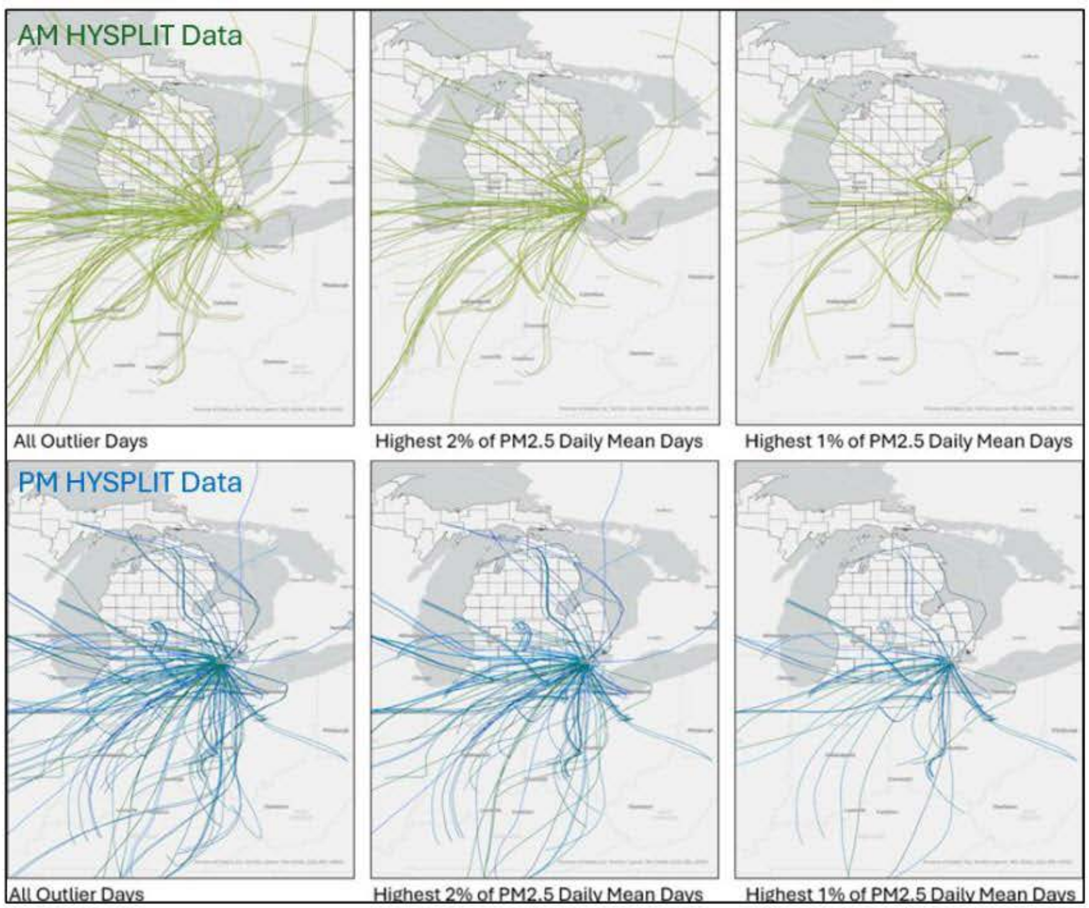


In Figure 32, the dots represent outlier data, that significantly deviate from the majority of the data within the set. The box portion represents the middle 50% of the data, the line inside the box represents the median value, and the lines extending from the box (whiskers) show the minimum and maximum values representing 1.5 times the interquartile range. The following HYSPLIT model analysis examines the resulting outlier dates from this magnitude of exceedance study in relation to back trajectories to identify the path traversed for an air parcel arriving at the monitor location. These back trajectories are used to identify the locations from where pollution may be transported to the monitoring location.

HYSPLIT Model Analysis

HYSPLIT is a model developed by the National Oceanic and Atmospheric Administration (NOAA) and is a complete system for computing simple air parcel trajectories[15]. This tool uses gridded meteorology data to simulate how wind advects air parcels. The USEPA provided AM and PM HYSPLIT modeling for the 2021-2023 period nationally for all exceeding monitors. The methodology they used can be found in the Designations Guidance document. Michigan plotted the exceeding monitor HYSPLIT data using ArcGIS Pro to geographically analyze the data. Utilizing the results of the magnitude of exceedance study Michigan created definition queries to review back trajectories for all outlier dates, representing the highest 2% and 1% of $PM_{2.5}$ daily means. Figure 33 shows a compilation of the resulting maps from this analysis for both the AM and PM HYSPLIT datasets. The AM dataset shows the back trajectory of each outlier day at 8 AM backwards for 24 hours, illustrating where air traveled primarily from the day prior. The PM dataset shows the back trajectory of each outlier day at 10 PM backwards for 24 hours, illustrating where air traveled primarily the day of and night prior to the outlier day. Both are important considerations when pairing with the $PM_{2.5}$ daily mean data, which represent the whole day rather than a particular time period within the day.

Figure 33. HYSPLIT Maps showing outlier days from the Magnitude of Exceedance study for the Wayne County Exceeding Air Monitors for 2021-2023.



[15] HYSPLIT. (n.d.). Air Resources Laboratory. https://www.arl.noaa.gov/hysplit/

The maps in Figure 33 show a majority of the air parcels coming from the southerly and westerly directions, and to a lesser extent from the northerly, easterly, and westerly directions. This distribution remains similar even when looking at only the highest 1% of $PM_{2.5}$ daily mean days. Michigan utilized tools within ArcGIS Pro to determine the start and end points of each daily back trajectory and calculate the general direction of each line. There are limitations to this methodology since these trajectories are not straight lines and a line could curve and end in a different directional quadrant than where it spent most of its time. Figures 34 and 35 show the number of lines that originated from the northeast, northwest, southeast, and southwest quadrants from the monitoring location for both the AM and PM HYPLIT data, respectively. This analysis includes all outlier dates determined from the previous magnitude of exceedance analysis for 2021-2023 for the seven monitors in Wayne County. The figures also include a 20% error bar to conservatively represent the limitation of determining the directional quadrant, as discussed earlier.

Figure 34. Count of AM HYPSLITs for each directional quadrant at all exceeding Wayne County monitors for all outlier dates from 2021-2023.

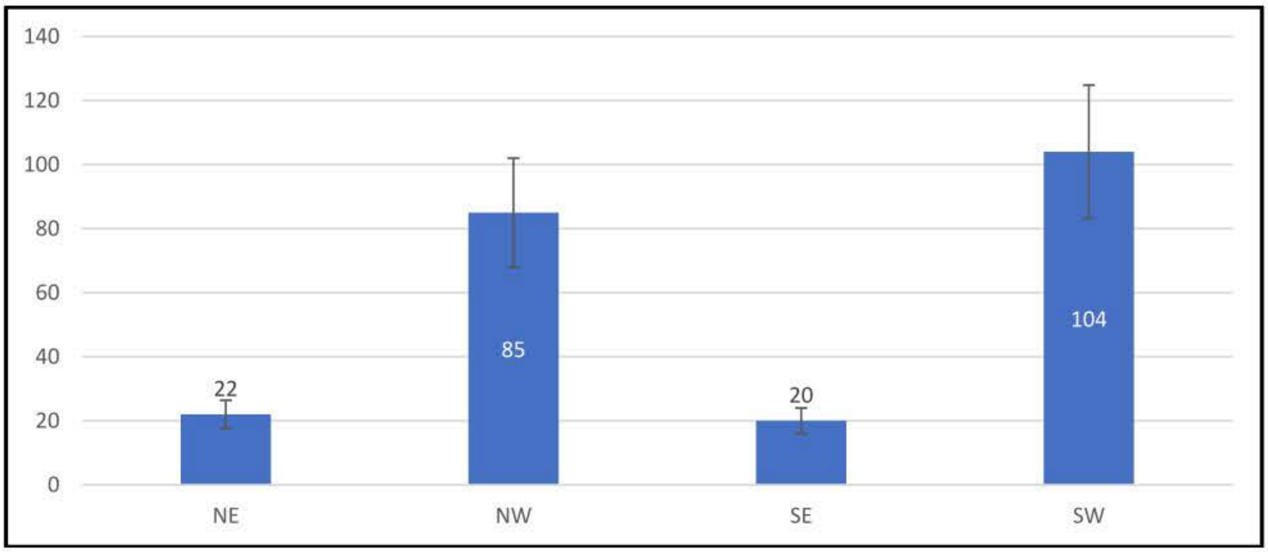
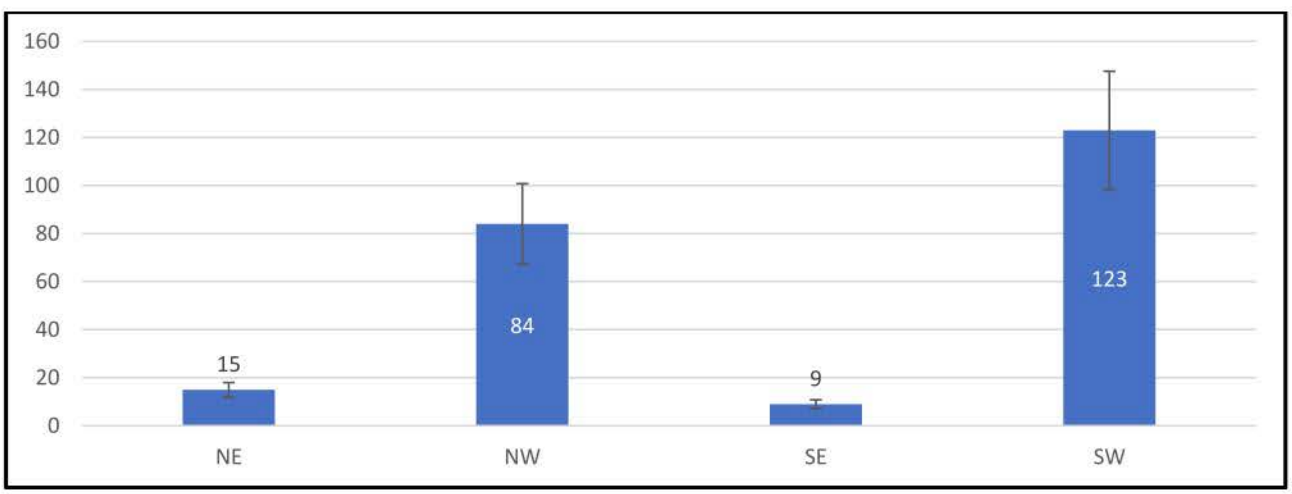


Figure 35. Count of PM HYPSLITs for each directional quadrant at all exceeding Wayne County monitors for all outlier dates from 2021-2023.



Figures 34 and 35 show that, for both AM and PM HYSPLITs on the outlier dates, the most influence comes from the southwest (45-53%) and northwest (36-37%). The wind rose analysis discussed earlier showed that the dominant wind is from the southwest quadrant, so that was expected; however, this HYSPLIT analysis also detects a significant northwesterly influence on days when the monitor experiences higher $PM_{2.5}$. Since this data is broken down into four directions there are limitations on determining how much of the influence may be coming from westerly winds as opposed to northwesterly or southwesterly winds. When the quantitative data from Figures 34 and 35 are paired with the qualitative maps in Figure 33, it can be deduced that for higher daily levels of $PM_{2.5}$ air parcels come from the west, as well as the northwest and southwest, with more coming from the southwest. As stated previously the USEPA's Regulatory Impact Assessment (see Footnote 2) found that large reductions in NO_x and SO_2 in recent decades have reduced regional background concentration and increased the importance of urban influences for $PM_{2.5}$ emissions. Michigan acknowledges there may be limitations to deriving directional data from HYSPLIT trajectories that can, in many cases, have end points outside the urban areas.

4.1.4 Wayne County AoA - Geography and Topography

The Wayne County AoA does not have any significant geographical or topographical obstructions known to affect air pollution transport. Therefore, this factor does not impact the analysis of this area.

4.1.5 Wayne County AoA - Jurisdictional Boundaries

The Detroit-Warren-Dearborn CBSA currently includes Lapeer, St. Clair, Macomb, Oakland, Livingston, and Wayne counties. Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne counties were previous designated as nonattainment under the 1997 and 2006 annual $PM_{2.5}$ standard as part of the Detroit-Ann Arbor NAA.

4.1.6 Wayne County AoA - Environmental Justice

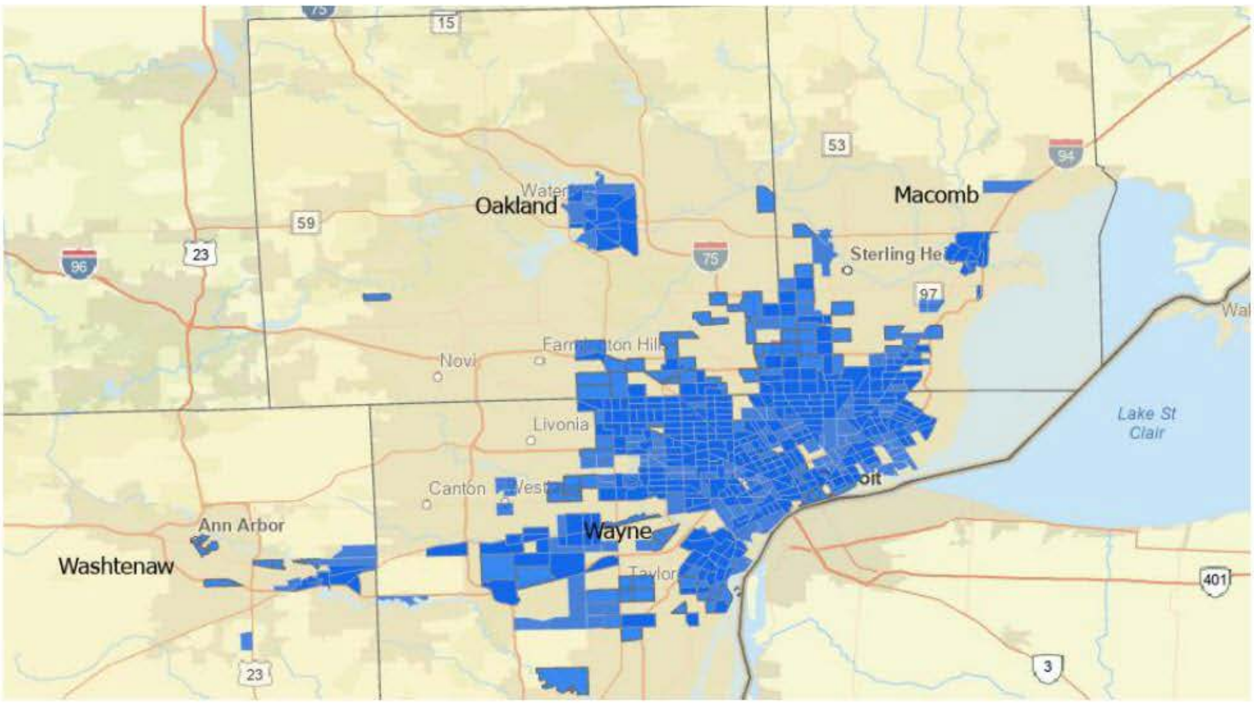
The Designations Guidance suggested, for the purposes of outreach or developing designation recommendations, that states use the USEPA's classification criteria for "disadvantaged communities" in identifying areas of environmental justice concern around monitors violating the $PM_{2.5}$ NAAQS. According to the USEPA, "Disadvantaged communities are defined as any community that meets at least one of the following characteristics: communities reflected in the Climate and Economic Justice Screening Tool (CEJST); any census block group that is at or above the 90th percentile for any of the Environmental Justice Screening and Mapping Tool's (EJSCREEN) Supplemental Indexes when compared to the nation or state; and/or any geographic area within Tribal lands as included in EJSCREEN" (see Footnote 1).[16,17]

For the Wayne County AoA, Michigan identified census tracts that meet the USEPA's "disadvantaged community" criteria. Michigan chose to conduct an environmental justice analysis for only four of the eight Wayne County AoA counties (Macomb, Oakland, Washtenaw, and Wayne County) considering that these four counties make up approximately 88% of the total population of the Wayne County AoA (as shown in Table 12). In Figure 36, those census block groups that meet the USEPA's criteria for being

[16] (n.d.). Climate and Economic Justice Screening Tool [Review of Climate and Economic Justice Screening Tool]. US Council on Environmental Quality. https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5
[17] (2024, November 18). EJScreen: Environmental Justice Screening and Mapping Tool [Review of EJScreen: Environmental Justice Screening and Mapping Tool]. USEPA. https://www.epa.gov/ejscreen

classified as a "disadvantaged community" are shown in blue. The largest continuous cluster and concentration of these "disadvantaged community" census block groups encompasses a large area within the northeast portion of Wayne County, the southeast portion of Oakland County, and the southwest corner of Macomb County. Additionally, scattered "disadvantaged community" census block groups can be seen in the eastern part of Washtenaw County, as well as Central Oakland, Macomb, and Wayne counties.

Figure 36. "Disadvantaged Communities" at the Census Block Group Level in Macomb, Oakland, Washtenaw, and Wayne Counties.



Per the Designations Guidance, Michigan completed outreach to interested parties in the Detroit area. Michigan spoke with the following communities and associations regarding the revised 2024 $PM_{2.5}$ NAAQS, the designations process, and future attainment planning: Detroit Hamtramck Coalition, Eastside Community Network, Asthma Collaborative of Detroit, The Ecology Center Air Quality Sensor Learning Collaborative, SEMCOG, and the Eastern Chapter of the Air & Waste Management Association.

On December 2, 2024, the USEPA posted a non-regulatory docket (EPA-HQ-OAR-2024-0078) on the purpose of providing an opportunity for the public to provide feedback on the outreach process states might undertake in developing the recommendations they submit to the USEPA, and outreach that the USEPA might undertake associated with issuing final designations.[18] In an effort to better inform the public of this, Michigan utilized its GovDelivery email distribution service to disseminate the links to the non-regulatory docket and other recently posted USEPA $PM_{2.5}$ resources.

[18] (2024, December 2). Regulations.gov. https://www.regulations.gov/search?documentTypes=Other&filter=EPA-HQ-OAR-2024-0078