Requested Revision of the Milwaukee, Wisconsin Nonattainment Area Boundaries for the 2015 Ozone National Ambient Air Quality Standards

Developed By:
The Wisconsin Department of Natural Resources

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EXECUTIVE SUMMARY

This document is a formal request to the U.S. Environmental Protection Agency (EPA) from the State of Wisconsin under Section 107(d)(3)(D) of the Clean Air Act (CAA) to revise the boundary of the Milwaukee, Wisconsin 2015 Ozone NAAQS Nonattainment Area (Milwaukee Nonattainment Area). Specifically, Wisconsin requests that the current nonattainment area (NAA) be split into two distinct nonattainment areas for the 2015 ozone NAAQS: a Western Milwaukee NAA, encompassing Waukesha and Washington counties and the inland portions of Ozaukee and Racine counties, and a revised Milwaukee NAA, comprised of the remainder of the current nonattainment area. Together, the proposed separate nonattainment areas would encompass the identical geographic area as the current Milwaukee NAA.

In following guidance for establishing nonattainment area boundaries and precedent set by rulemakings that revised nonattainment area boundaries in other areas, the Wisconsin Department of Natural Resources (WDNR) completed a five-factor technical analysis supporting the requested revision to the Milwaukee NAA boundaries. The analysis clearly demonstrates that circumstances surrounding the EPA's delineation of the Milwaukee NAA boundaries have changed, and thus it is no longer appropriate to include the western part of the Milwaukee NAA (consisting of Washington and Waukesha counties and the inland portions of Ozaukee and Racine counties) in the Milwaukee NAA.

- First, the western part of the Milwaukee NAA has demonstrated attainment of the 2015 ozone NAAQS since at least 2014, based on data from the ozone monitor located in Waukesha County.
- Second, the emissions profile across the Milwaukee NAA varies greatly, with the vast majority of emissions, population, and vehicle miles traveled being located in the more urbanized, shoreline portions of the area. In contrast, emissions and emissions-related data for Washington and Waukesha counties and the inland portions of Ozaukee and Racine counties, is low, indicating a lack of contribution to violating monitors in the Milwaukee area.
- Third, the meteorological analysis demonstrates that it is extremely unlikely that emissions from the western part of the Milwaukee area contributed to any of the exceedances at violating monitors in the Milwaukee area in 2024 and 2025. The meteorology on those days showed that NO_2 transport from the western Milwaukee area to violating monitors also was unlikely to have occurred.
- Fourth, the geography and topography of the area illustrate how the presence of Lake Michigan, combined with meteorological patterns, strongly influences the ozone values measured at the violating monitors in the Milwaukee area. The well-documented lake breeze results in a narrow band of high-ozone air that is limited to the Milwaukee shoreline and distinct from the air mass present in western part of the Milwaukee area.
- Fifth, the proposed split would result in boundaries that would align the Milwaukee NAA with the adjacent 2015 ozone NAAQS nonattainment areas located in Sheboygan and Kenosha counties. This would simplify CAA implementation, facilitate regulatory compliance, and promote efficient regional air quality planning.

The five-factor analysis demonstrates that the western Milwaukee area does not have monitored violations of the 2015 ozone NAAQS. This analysis also demonstrates that the western Milwaukee area does not contribute to violations of the 2015 ozone NAAQS in the Milwaukee NAA and that the unique factors driving ozone formation in the separate areas warrant a revision to the boundaries.

The creation of a Western Milwaukee NAA would recognize that it is no longer reasonable or scientifically justifiable for the western part of the Milwaukee area to be included in the Milwaukee NAA as it currently exists. The requested revision to the area boundaries will provide Wisconsin with the flexibility and independence needed to meet the CAA's nonattainment area planning and emissions control requirements and will promote more effective and efficient air quality management in the region.

Separate but related to this Section 107(d)(3)(D) request to split the Milwaukee NAA, Wisconsin requests that the EPA correct the initial designation dates for the Milwaukee, Sheboygan, and Kenosha nonattainment areas for the 2015 Ozone NAAQS (Appendix A). This correction to designation dates would reverse the accelerated reclassification path these areas have been on since the EPA's June 2021 action that revised the initial designations of these areas.

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List of Acronyms

AQS	Air Quality System
CAA	Clean Air Act
CART	Classification and regression tree
DV	Design Value
EMP	Emissions Modeling Platform
EPA	U.S. Environmental Protection Agency
ESA	European Space Agency
HYSPLIT	Hybrid Single-Particle Lagrangian Integrated Transport
LADCO	Like Michigan Air Directors Consortium
LMOS	Lake Michigan Ozone Study
MCD	Minor Civil Division
MDA8	Maximum daily 8-hour average
MPO	Metropolitan planning organization
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen oxides
PM-10	Particulate matter with a diameter of 10 micrometers or less
ppb	Parts per billion
ppm	Parts per million
SEWRPC	Southeast Wisconsin Regional Planning Commission
SJV	San Joaquin Valley
SJVAB	San Joaquin Valley Air Basin
TROPOMI	Tropospheric Monitoring Instrument
VMT	Vehicle miles traveled
VOC	Volatile Organic Compounds
WDNR	Wisconsin Department of Natural Resources
WisDOT	Wisconsin Department of Transportation

1. INTRODUCTION AND BACKGROUND

1.1. Promulgation of the 2015 Ozone NAAQS Area Designations in Wisconsin

On October 26, 2015, the U.S. Environmental Protection Agency (EPA) promulgated revisions to the primary and secondary National Ambient Air Quality Standards (NAAQS) for ozone.[1] The revised NAAQS increased the stringency of both the primary and secondary 8-hour ozone NAAQS from 0.075 parts per million (ppm) to 0.070 ppm (70 parts per billion (ppb)). The NAAQS are based on the annual 4th highest daily maximum 8-hour average (MDA8) ozone concentration, averaged over three consecutive years. This average is referred to as the design value for each 3-year period.

In accordance with Section 107(d) of the Clean Air Act (CAA), whenever the EPA establishes a new or revised NAAQS, the EPA must promulgate designations (i.e., attainment, nonattainment, or unclassifiable) for all areas of the country for that NAAQS and establish boundaries for nonattainment areas. Also under Section 107(d), states are required to submit area designation and boundary recommendations to the EPA following promulgation of the new or revised NAAQS.[2]

On September 21, 2016, the State of Wisconsin submitted to the EPA its designation recommendation for the 2015 ozone NAAQS. In its submittal, Wisconsin recommended that all counties in Wisconsin be designated as attainment, since elevated ozone levels in Wisconsin are primarily due to emissions originating in other states. On April 20, 2017, the state submitted additional information in support of this recommendation. In response to the EPA's intended designations, on February 28, 2018, the state submitted technical support for the maximum area to be considered for nonattainment if the EPA did not concur with the governor's recommendation.[3]

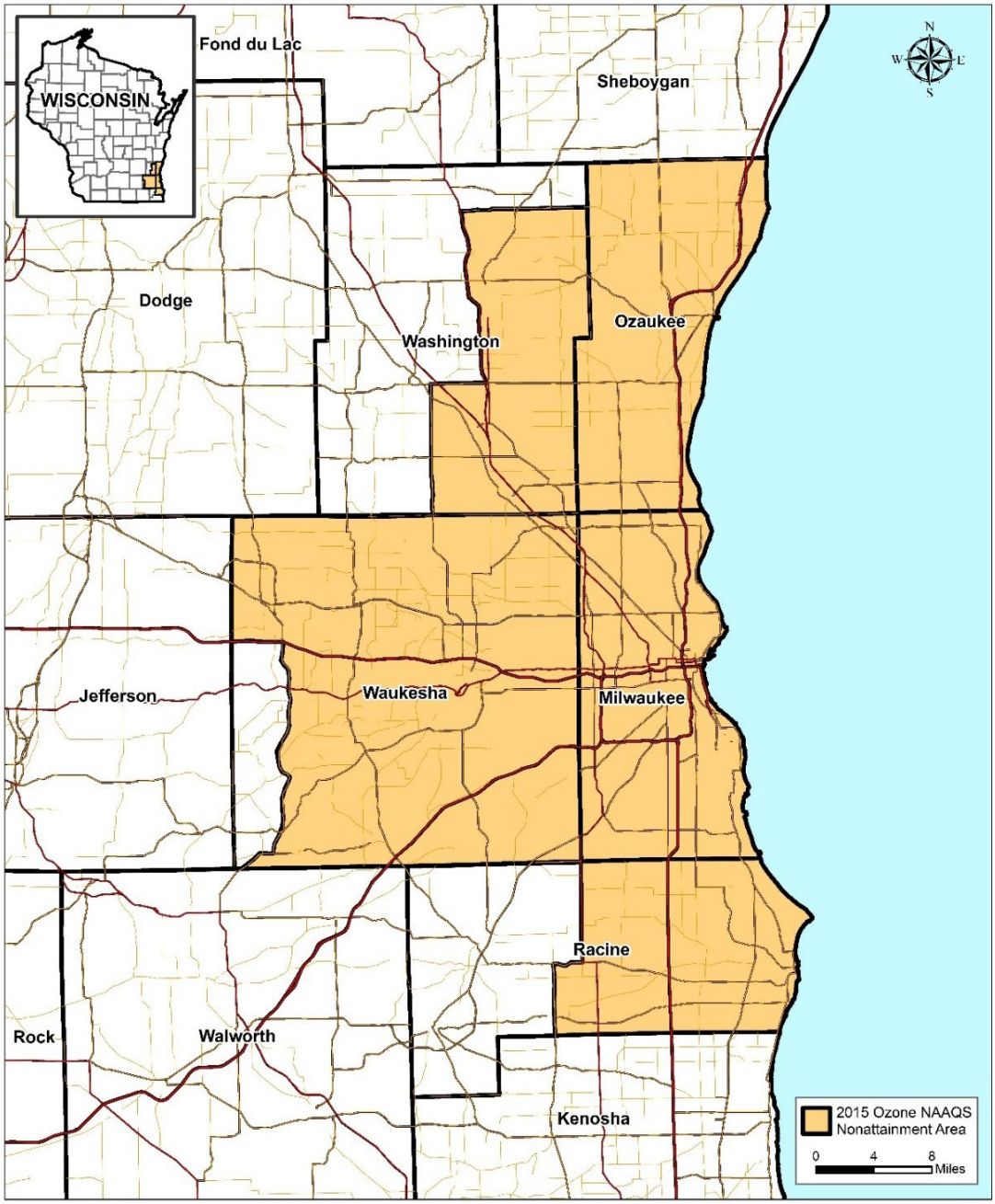
On June 4, 2018, the EPA published a final rulemaking that designated parts of Milwaukee and Ozaukee counties as Marginal nonattainment for the 2015 ozone NAAQS (83 FR 25776).[4] On June 14, 2021, in response to a July 10, 2020 decision by the D.C. Circuit Court, the EPA published a final rule revising the 2015 ozone NAAQS designations for 13 counties, including those counties located in the greater Milwaukee area (86 FR 31438). As part of this action, the EPA revised and expanded the nonattainment area in Milwaukee to include all of Milwaukee and Ozaukee counties and part of Racine, Washington, and Waukesha counties.[5] This revised designation was effective July 14, 2021. This area retained the original nonattainment area's Marginal area classification and attainment date of August 3, 2021.

[1] National Ambient Air Quality Standards for Ozone. 80 FR 65292 (Oct. 26, 2015).
[2] Clean Air Act, 42 U.S. Code § 7407
[3] These submittals can be found on the Wisconsin DNR's ozone webpage.
[4] This area was designated the "Northern Milwaukee/Ozaukee Shoreline, Wisconsin" nonattainment area.
[5] This area was designated the "Milwaukee, Wisconsin" nonattainment area. This designation replaced the previous Northern Milwaukee/Ozaukee Shoreline area.

1.2. The Milwaukee Nonattainment Area

The current Milwaukee, Wisconsin 2015 ozone NAAQS nonattainment area ("Milwaukee NAA"), as revised by the EPA in July 2021, consists of all of Milwaukee and Ozaukee counties and parts of Racine, Washington, and Waukesha counties (Figure 1-1). The nonattainment area constitutes a large portion of the Milwaukee-Waukesha-West Allis (Milwaukee, Waukesha, Washington, and Ozaukee counties) and Racine (Racine County) metropolitan statistical areas.

Figure 1-1: Map of the Milwaukee, WI Nonattainment Area.



1.3. Status of the Milwaukee Nonattainment Area

The Milwaukee NAA did not attain the 2015 ozone NAAQS by its August 3, 2021 Marginal attainment date. On October 7, 2022, the EPA promulgated a rule reclassifying the area to Moderate nonattainment, setting a new attainment date of August 3, 2024 (87 FR 60897). On December 17, 2024, the Milwaukee NAA was subsequently reclassified to Serious nonattainment (89 FR 101901). This rule was challenged by Wisconsin in the U.S. Seventh Circuit Court of Appeals and is currently stayed.[6]

1.4. Request to Correct Initial Area Designation Dates

Separate but related to this Section 107(d)(3)(D) request to split the Milwaukee NAA, Wisconsin also includes in this submittal a request that the EPA correct the initial designation dates for the Milwaukee, Sheboygan, and Kenosha nonattainment areas for the 2015 Ozone NAAQS (Appendix A). This correction to designation dates would reverse the accelerated reclassification path these areas have been on since the EPA's June 2021 action that revised the initial designations of these areas. The appendix includes the details and supporting information associated with this request.

2. REQUEST TO REVISE THE MILWAUKEE NONATTAINMENT AREA BOUNDARY UNDER SECTION 107(D)(3)(D) OF THE CLEAN AIR ACT

The State of Wisconsin, through the Department of Natural Resources (WDNR), requests that the EPA revise the boundaries of the Milwaukee NAA for the 2015 ozone NAAQS. Under Section 107(d)(3)(D)[7] of the CAA:

> "…the Governor of any state may, on the Governor's own motion, submit to the EPA a revised designation of any area or portion thereof within the state. Within 18 months of receipt of a complete state redesignation submittal, the Administrator shall approve or deny such redesignation."

Wisconsin requests, under CAA Section 107(d)(3)(D), to revise the boundaries for the existing Milwaukee NAA for the 2015 ozone NAAQS and create a stand-alone "Western Milwaukee NAA." This new Western Milwaukee NAA would be comprised of the following geographic areas:

- In Washington and Waukesha counties, the portion of these counties currently included in the Milwaukee NAA.
- In Ozaukee County, the portion of the county located west of County Road KW, Cedar Beach Road, 6 Mile Road, County Road A, Lovers Lane Road, Woodland Road, County Roud KK, Willow Road, Highway 57, County Road W, North Riverside Drive, E. Green Bay Avenue, S. Main Street, N. Green Bay Road, 12th Avenue, Wisconsin Avenue, Green Bay Road, S. Main Street, N. Cedarburg Road/Highway 57 (<u>not</u> inclusive of roadways).

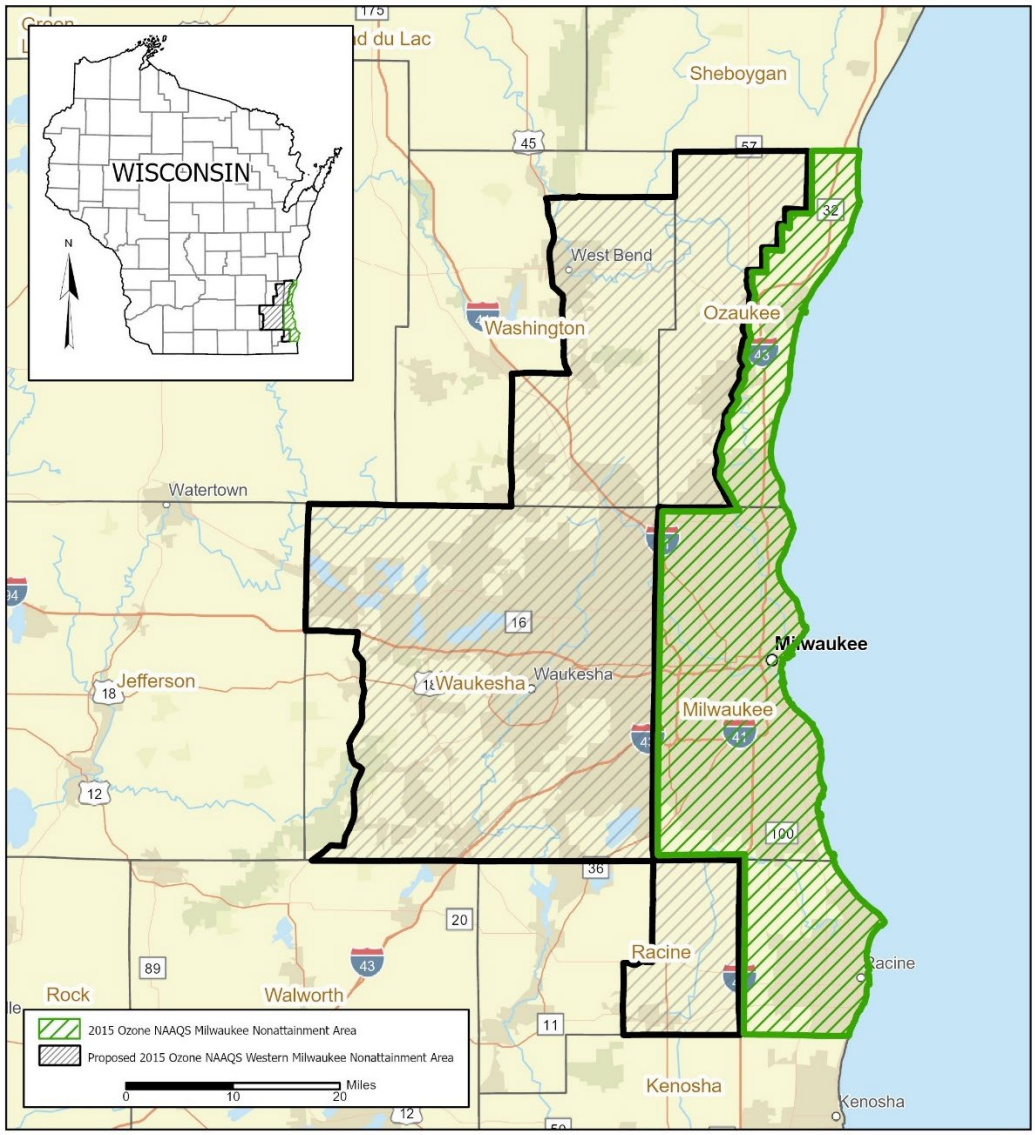
[6] *State of Wisconsin v. EPA*, No. 25-1239 (7th Cir., 2025).
[7] 42 U.S. Code § 7407

- In Racine County, the portion of the county located west of Interstate 94 (not inclusive of the interstate).

Figure 1-2 shows the boundaries of the requested Western Milwaukee NAA. In this document, this multicounty geographic area is referred to as the "western Milwaukee area" or the "western part of the Milwaukee area."

As shown in the figure, the Milwaukee NAA, as revised following the creation of the Western Milwaukee NAA, would consist of the entirety of Milwaukee County and remaining portions of Ozaukee and Racine counties. Together, the two separate nonattainment areas would cover the identical geographic area as the current Milwaukee NAA.

Figure 1-2. Map of Proposed Western Milwaukee, WI Nonattainment Area. Showing also the Milwaukee, WI NAA as it would be revised following the boundary adjustment.



This requested action would acknowledge the differences in the factors contributing to ozone levels in the individual counties within the current Milwaukee NAA and provide Wisconsin with additional flexibility in meeting the CAA's nonattainment area planning and emissions control requirements. This flexibility would include the ability to account for differences in air quality between the inland and shoreline portions of the Milwaukee area such that one part could attain the ozone NAAQS faster than others. Overall, the creation of a stand-alone Western Milwaukee NAA is technically supported and would promote more effective and efficient air quality management in the region.

2.1. Precedent Case Studies

The EPA has granted, or has proposed granting, requests for revisions to nonattainment area boundaries under CAA Section 107(d)(3)(D) on multiple prior occasions:

2.1.1. Sheboygan County, Wisconsin

On July 15, 2019, the EPA issued a final rulemaking[8] under the authority of Section 107(d)(3)(D) of the CAA to:

> "…revise the designation for the Sheboygan nonattainment area for the 1997 primary and secondary ozone NAAQS and the 2008 primary and secondary ozone NAAQS, by splitting the existing area into two distinct nonattainment areas that together cover the identical geographic area of the existing nonattainment area. This revised designation is supported by air quality data, emissions and emissions-related data, meteorology, geography/ topography, and jurisdictional boundaries. Both areas will retain their nonattainment designation and Moderate classification. In this action, EPA is also making a clean data determination for one of the two separate areas for the 2008 ozone NAAQS."

2.1.2. San Joaquin Valley and East Kern, California

On November 12, 2008, the EPA issued a final rulemaking[9] under the authority of Section 107(d)(3)(D) of the CAA to:

> "…revise the designation for the San Joaquin Valley (SJV) serious nonattainment area for particulate matter of ten microns or less (PM-10) (SJV nonattainment area) by splitting the area into two separate nonattainment areas: The San Joaquin Valley Air Basin (SJVAB) serious PM–10 nonattainment area and the East Kern serious PM-10 nonattainment area. EPA is also redesignating the SJVAB nonattainment area to attainment for the PM-10 national ambient air quality standard (NAAQS)..."

2.1.3. Power-Bannock Counties and Fort Hall Indian Reservation, Idaho

[8] Revision of Sheboygan County, Wisconsin Nonattainment Designation for the 1997 and 2008 Ozone Standards and Clean Data Determination for the 2008 Ozone Standards. 84 FR 33699 (July 15, 2019).
[9] Approval and Promulgation of Implementation Plans; Designation of Areas for Air Quality Planning Purposes; State of California; PM-10; Revision of Designation; Redesignation of the San Joaquin Valley Air Basin PM-10 Nonattainment Area to Attainment; Approval of PM-10 Maintenance Plan for the San Joaquin Valley Air Basin; Approval of Commitments for the East Kern PM-10 Nonattainment Area. 73 FR 66759 (Nov. 12, 2008).

On November 5, 1998, the EPA issued a final rulemaking[10] under the authority of Section 107(d)(3)(D) of the CAA to revise:

> "…the designation for particulate matter with an aerodynamic diameter of less than a nominal 10 microns (PM-10) for the Power-Bannock Counties PM-10 nonattainment area, located in Idaho, by creating two distinct nonattainment areas that together cover the identical geographic area as the original nonattainment area. The revised areas are divided at the boundary between State lands and the Fort Hall Indian Reservation, with one revised area consisting of State lands and the other revised area consisting of lands within the exterior boundaries of the Fort Hall Indian Reservation. The redesignation is based upon a request from the State of Idaho, which is supported by monitoring and modeling information. Both areas retain PM-10 nonattainment designation and classification as moderate PM-10 nonattainment areas as a result of this action."

2.1.4. Boulder Flat, Nevada

On November 13, 2002, the EPA issued a final rulemaking[11] under the authority of Section 107(d)(3)(D) of the CAA to:

> "…redesignate the current single unclassifiable area for particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM-10) into numerous individual areas to be consistent with the area definitions for other pollutants. EPA is also approving a State-requested subdivision of one of those individual areas, referred to as hydrographic area 61 (Boulder Flat), into two areas. EPA's approval of these requests establishes hydrographic areas as the section 107(d) unclassifiable areas for PM-10 and replaces hydrographic area 61 with two new section 107(d) areas for PM-10, sulfur dioxide (SO2), and NO_2 [nitrogen dioxide]: upper area 61 and lower area 61."

2.1.5. Cecil County, Maryland and New Castle County, Delaware

On June 4, 2026, the EPA issued a final rulemaking[12] under the authority of Section 107(d)(3)(D) of the CAA to:

> "…to revise the designation for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area for the 2008 primary and secondary ozone national ambient air quality standards (NAAQS) and the 2015 primary and secondary ozone NAAQS. Due to the concurrent requests from Maryland and Delaware, the EPA is revising the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area boundary into three distinct nonattainment areas that together cover the identical geographic area of the existing area. The

[10] Designation of Areas for Air Quality Planning Purposes: State of Idaho and the Fort Hall Indian Reservation. 63 FR 59722 (Nov. 5, 1998).
[11] Designation of Areas for Air Quality Planning Purposes; Redesignation of Particulate Matter Unclassifiable Areas; Redesignation of Hydrographic Area 61 for Particulate Matter, Sulfur Dioxide, and Nitrogen Dioxide; State of Nevada. 67 FR 68769 (Nov. 13, 2002).
[12] Revisions of the Nonattainment Designation for the 2008 and 2015 Ozone Standards and Clean Data Determinations for the 2008 and 2015 Ozone Standards: Cecil County, MD and New Castle County, DE. 91 FR 33610 (June 4, 2026).

EPA is also issuing clean data determinations (CDDs) for the revised Maryland and Delaware nonattainment areas for both the 2008 and 2015 ozone NAAQS."

2.2. Five-Factor Analysis Requirements

In each of the aforementioned rulemakings, the EPA conducted an analysis of the same factors Congress directed the agency to consider when the EPA initiates a revision to a designation of an area on its own motion under CAA Section 107(d)(3)(A).[13] These factors include, "...air quality data, planning and control considerations, or any other air quality-related considerations the Administrator deems appropriate…."[14]

In its rulemaking for Sheboygan County, Wisconsin, the EPA further cites additional guidance, such as the March 2000 *Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards*[15] and the December 2008 memo entitled *Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards*[16] which provide a framework establishing nonattainment area boundary recommendations. Additionally, the EPA provided updated guidance for the 2015 ozone NAAQS area designations entitled *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*.[17] These documents establish five specific factors the EPA considers to be relevant when evaluating proposed revisions to nonattainment boundaries under Section 107(d)(3): air quality data, emissions and emissions-related data, meteorology, geography and topography, and jurisdictional boundaries.

In following precedent set by the aforementioned rulemakings, Wisconsin submits the following five-factor technical analysis supporting the requested revision to the Milwaukee NAA boundaries:

1. Air quality data, including the ozone design value calculated for each Federal Reference Method or Federal Equivalent Method monitor;

2. Emissions and emissions-related data, including an overview of sources, amount of emissions, traffic and commuting patterns, population, and urbanization patterns;

3. Meteorology, including weather and transport patterns;

4. Geography and topography, including mountain ranges or other physical features that may influence the fate and transport of emissions and ozone concentrations; and

[13] 42 U.S. Code § 7407
[14] Revision of Sheboygan County, Wisconsin Nonattainment Designation for the 1997 and 2008 Ozone Standards and Clean Data Determination for the 2008 Ozone Standards. 84 FR 33699 (2019)
[15] *Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards (NAAQS or Standard).* U.S. EPA Memo. (2000).
[16] *Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards*. U.S. EPA Memo. (Dec. 4, 2008).
[17] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*. U.S. EPA Memo. (2016).

5. Jurisdictional boundaries, e.g., counties, air districts, existing nonattainment areas, areas of Indian country, and metropolitan planning organizations.

2.3. Additional Considerations Under Clean Air Act Section 107(d)(1)(A)(i)

CAA Section 107(d)(1)(A)(i) defines nonattainment as any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the NAAQS. The EPA also stated in the proposed rulemaking for Sheboygan County, Wisconsin:

> "… consistent with the statute and EPA's March 28, 2000, and December 4, 2008, memoranda, EPA will not redraw the boundaries of nonattainment areas where one portion of the area, though monitoring clean data, contributes to the nonattainment of another portion of the area."[18]

It is therefore understood that for the EPA to grant Wisconsin's request to revise the Milwaukee NAA into two distinct nonattainment areas, the demonstration must show that each separate area does not contribute to a violation of the NAAQS in the other area.

Currently, there are four monitors violating the NAAQS in the Milwaukee NAA; these monitors are located in Racine, Milwaukee and Ozaukee counties. This demonstration is accordingly structured as a five-factor analysis of the potential for contribution from the western part of the Milwaukee area (Washington and Waukesha counties, and the inland portions of Ozaukee and Racine counties) to monitored violations in Racine, Milwaukee, and Ozaukee counties. This analysis does not consider whether Racine, Milwaukee, or Ozaukee counties contribute to a violation in the western Milwaukee area, as monitoring data shows that no such violation exists in that area.

3. FIVE-FACTOR ANALYSIS

3.1. Air Quality

3.1.1. Overview

In its guidance on *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, the EPA states that when determining boundaries and designations, states should "identify all monitored violations of the NAAQS using the most recently available design values," which are 3-year averages of the annual 4th highest daily maximum 8-hour average concentrations. Additionally, examining historical ozone air quality data can "improve understanding of the nature of the ozone ambient air quality problem in an area and thereby, inform decisions regarding the nonattainment area boundary."[19]

The WDNR operates and maintains a network of ambient air quality monitors located throughout state.[20] The network consists of monitors that have been designated by the EPA as either Federal

[18] Revision of Sheboygan County, Wisconsin Nonattainment Designation for the 1997 and 2008 Ozone Standards and Clean Data Determination for the 2008 Ozone Standards.
[19] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*
[20] Available at: https://dnr.wisconsin.gov/topic/AirQuality/Monitor.html

Reference Method or Federal Equivalent Method monitors. All ambient air monitors are subjected to the federal quality assurance requirements of 40 CFR Part 58.

Wisconsin currently operates seven air monitoring sites in the Milwaukee NAA that measure ground level concentrations of ozone (Figure 3-1). These monitors are:

- Racine-Payne & Dolan (Racine County)
- Milwaukee 16th Street Health Center (Milwaukee County)
- Milwaukee-UPark (Milwaukee County)
- Bayside (Milwaukee County)
- Grafton (Ozaukee County)
- Harrington Beach State Park (Ozaukee County)
- Waukesha-Cleveland Ave. (Waukesha County)

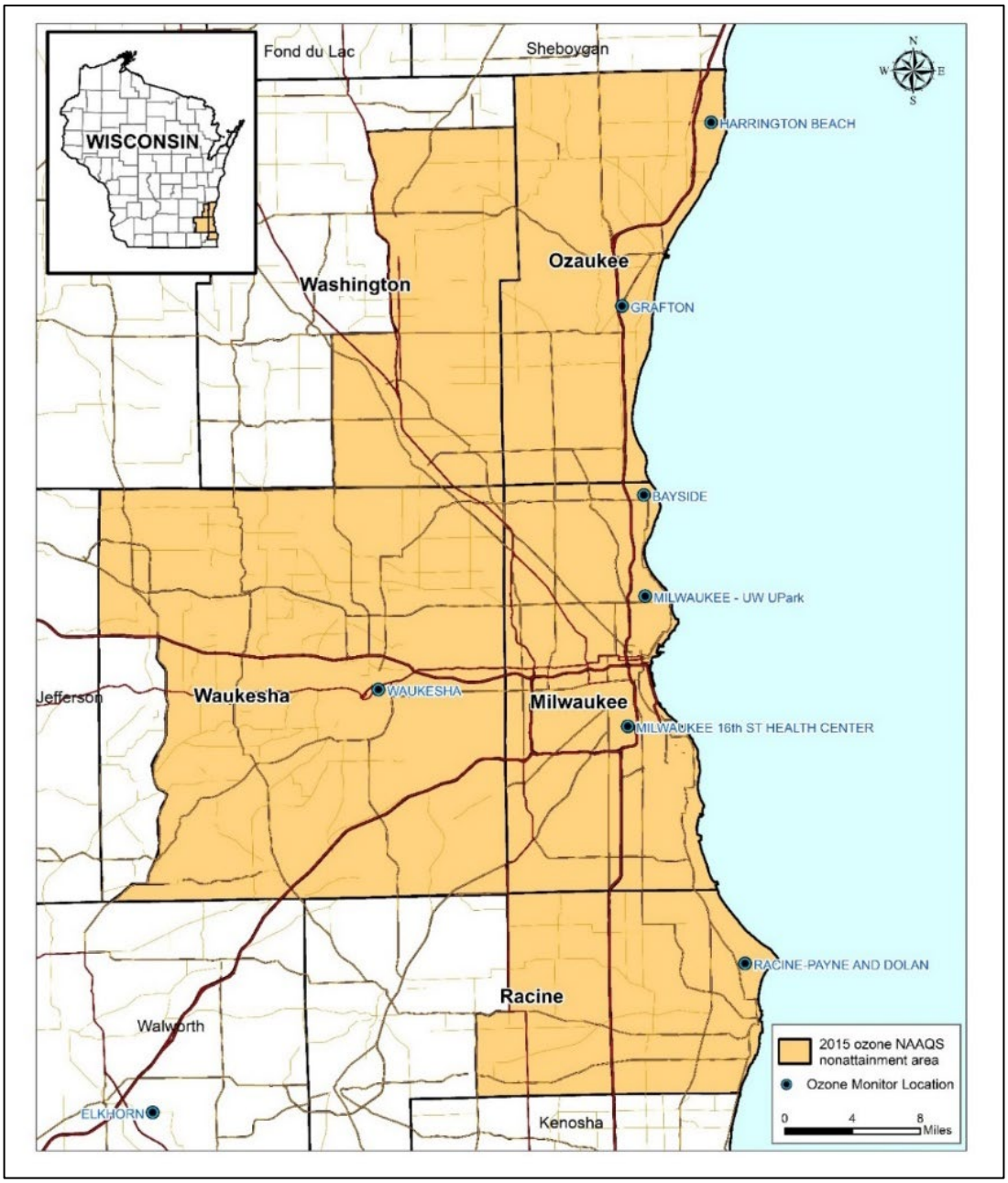
The WDNR does not operate an ambient air quality monitor in Washington County. As illustrated in Figure 3-1, one monitor (Waukesha) would be located in the proposed Western Milwaukee NAA, while the remaining six monitors would be located in the revised Milwaukee NAA.

States report monitoring data to the EPA via the EPA's Air Quality System (AQS). The data are collected, aggregated, and made available to the public via the EPA's AirData website.[21] The ozone monitoring data provided in the following analyses are collected using the daily air data download query tool available on the AirData website.[22]

[21] U.S. EPA. *AirData: Air Quality Data Collected at Outdoor Monitors Across the US.* Available at: www.epa.gov/outdoor-air-quality-data

[22] U.S. EPA. *Outdoor Air Quality Data: Download Daily Data*. Available at: www.epa.gov/outdoor-air-quality-data/download-daily-data

Figure 3-1: Map of Ozone Ambient Air Monitoring Sites in the Milwaukee, WI Nonattainment Area.



3.1.2. Exclusion of Air Quality Data Due to Exceptional Events

Ozone concentrations in the Milwaukee NAA in 2023 were heavily influenced by large-scale smoke events originating from wildfires in Quebec, Canada. In Appendix B to this document, the WDNR has included an ozone exceptional event demonstration for four days in 2023[23] that affect ozone values at the Waukesha and Milwaukee-UPark monitors. Table 3-1 summarizes the impact of this exceptional event demonstration on ozone values at the monitors. Should the EPA concur with this demonstration, the 2023-2025 design values at both Waukesha and Milwaukee-UPark will decrease from 71 ppb (nonattainment of the 2015 ozone NAAQS) to 70 ppb (attainment).[24]

For the purposes of this submittal, the WDNR treats both the Waukesha and Milwaukee-UPark monitors as in attainment of the 2015 ozone NAAQS based on their 2023-2025 design values, as modified through the exceptional event process.

Table 3-1: Ozone Values at the Waukesha and Milwaukee-UPark Monitors After Excluding Data Due To Exceptional Events. Showing impact on 2023 fourth-highest MDA8 values and 2023, 2024 and 2025 design values (DVs). All values in parts per billion (ppb).

Monitor	Original 2023 4th High	Revised 2023 4th High	Original 2021-23 DV	Revised 2021-23 DV	Original 2022-24 DV	Revised 2022-24 DV	Original 2023-25 DV	Revised 2023-25 DV
Waukesha	80	76	73	71	71	70	71	70
Milwaukee-UPark	76	73	72	71	70	69	71	70

3.1.3. Air Quality Data in the Milwaukee NAA

Wisconsin is providing quality-assured air quality data through 2025 for all the ozone monitors in the Milwaukee NAA. As previously noted, this data reflects the exclusion of four days in 2023 due to exceptional events, which affect values at the Waukesha and Milwaukee-UPark monitors in the 2023-2025 period. All air quality data presented in this section is certified data from AQS (as adjusted by the exceptional event request).

Under the 2015 ozone NAAQS, the design value is defined as the three-year average of the annual fourth-highest MDA8 ozone concentration.[25] The 2015 ozone NAAQS is met when the design value is 70 ppb or less. Whenever several monitors are located in a county (or designated

[23] 6/2/2023, 6/19/2023, 6/29/2023, and 7/23/2023

[24] There are additional days in 2023 with smoke-influenced ozone values that would likely qualify as exceptional events. The four days included in the exceptional event demonstration are just the minimum needed to meet the regulatory purpose of the demonstration.

[25] 40 CFR 50.19(b). The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50, appendix U.

nonattainment area), the design value for the county or area is determined by the monitor with the highest valid design value.

As previously noted, one monitor (Waukesha) would be located in the proposed Western Milwaukee NAA, while the remaining six monitors would be located in the revised Milwaukee NAA. This discussion focuses on the differences in air quality data between the Waukesha monitor and the other, nonattaining monitors in the Milwaukee NAA.

3.1.3.1. Fourth-High Daily Maximum 8-Hour Ozone Concentrations

Table 3-2 shows the annual fourth-highest MDA8 average ozone concentration for the monitors in the Milwaukee NAA from 2012 through 2025. This data indicates that the Waukesha monitor has not had a fourth-highest MDA8 ozone value exceeding 70 ppb since 2012, with the exception of 2023, when ozone concentrations were highly influenced by Canadian wildfire smoke.

The table also shows that Waukesha's fourth-highest MDA8 value in 2023 was an extreme outlier, being on average over 7 ppb higher than the fourth-highest values measured in the two years proceeding and following 2023, even after adjusting the monitor's 2023 value to account for exceptional events. This illustrates the extreme and pervasive influence of wildfire smoke on ozone levels at this and other Milwaukee area monitors during the 2023 ozone season.

3.1.3.2. 3-Year Design Values

Table 3-3 presents 8-hour ozone design values for the monitors in the Milwaukee NAA, starting with the 2012-2014 design value period. There are four monitors in the Milwaukee NAA that are violating the 2015 ozone NAAQS based on certified 2023-2025 design values (as modified by exceptional events process): Racine, Bayside, Grafton, and Harrington Beach.

Of the three monitors in Milwaukee County, two of them (Milwaukee 16th St. Health Center and Milwaukee-UPark) are in attainment, while the Bayside monitor, located in northern Milwaukee County near the border with Ozaukee County, is in nonattainment.

The Waukesha monitor has a design value of 70 ppb, which indicates this monitor is attaining the 2015 ozone NAAQS. With the exception of the 2023 wildfire-smoke influenced year, the Waukesha monitor has been attaining the NAAQS since at least 2012-2014 design value period, the earliest period included in this analysis. When discounting the 2021-2023 through 2023-2025 design value periods, which all include smoke-influenced 2023 data, the Waukesha monitor's average design value since 2012-2014 is 65 ppb, which is 5 ppb below the 2015 ozone NAAQS.

Table 3-2: Annual Fourth-Highest Daily Maximum 8-Hour Average (MDA8) Ozone Concentrations in the Milwaukee NAA. Values in ppb. Highlighted values are those >70 ppb.

Monitor	County	AQS Site ID	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Milwaukee 16th St Health Center	Milwaukee	550790010	83	61	62	63	68	64	70	58	59	66	65	68	60	63
Milwaukee-UPark[1]	Milwaukee	550790068	89	66	68	66	70	67	71	58	75	71	70	73*	66	72
Bayside	Milwaukee	550790085	93	69	69	68	77	70	73	64	74	72	74	76	73	75
Grafton	Ozaukee	550890008	90	68	74	70	71	73	73	68	73	72	72	77	73	71
Harrington Beach	Ozaukee	550890009	83	68	70	71	79	71	73	66	71	73	71	77	75	72
Racine	Racine	551010020	No data	No data	No data	68	76	80	78	66	77	78	70	76	78	75
Waukesha	Waukesha	551330027	75	56	67	66	67	63	68	58	67	70	69	76*	66	69

Table 3-3: Ozone Design Values for all Monitors in the Milwaukee NAA. Values in ppb. Highlighted values are those >70 ppb.

Monitor	County	AQS Site ID	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023	2022-2024	2023-2025
Milwaukee 16th St Health Center	Milwaukee	550790010	68	62	64	65	67	64	62	61	63	66	64	63
Milwaukee-UPark[1]	Milwaukee	550790068	74	66	68	67	69	65	68	68	72	71*	69*	70*
Bayside	Milwaukee	550790085	77	68	71	71	73	69	70	70	73	74	74	74
Grafton	Ozaukee	550890008	77	70	71	71	72	71	71	71	72	73	74	73
Harrington Beach	Ozaukee	550890009	73	69	73	73	74	70	70	70	71	73	74	74
Racine	Racine	551010020	No data	No data	No data	74	78	74	73	73	75	74	74	76
Waukesha	Waukesha	551330027	66	63	66	65	66	63	64	65	68	71*	70*	70*

[1] Milwaukee-UPark replaced Milwaukee SER monitor on April 4, 2021; datasets were combined. Milwaukee-UPark AQS Site ID changed from 550790026 to 550790068 in 2022.
* Values shown are as adjusted based on the 2023 exceptional events demonstration submitted with this TSD.

3.1.3.3. Comparing Trends in Ozone Concentrations

Figure 3-2 shows trends in annual fourth-highest MDA8 values since 2012 for the four Milwaukee nonattainment monitors (Racine, Bayside, Grafton, and Harrington Beach) compared to the Waukesha monitor. This data illustrates how the ozone values measured at the Waukesha monitor are consistently lower than those measured at the Milwaukee nonattainment monitors, even after considering the variability that can affect ozone values in any given year.

Figure 3-2: Annual Fourth-High MDA8 Value Trends at the Waukesha and Milwaukee Nonattainment Monitors.

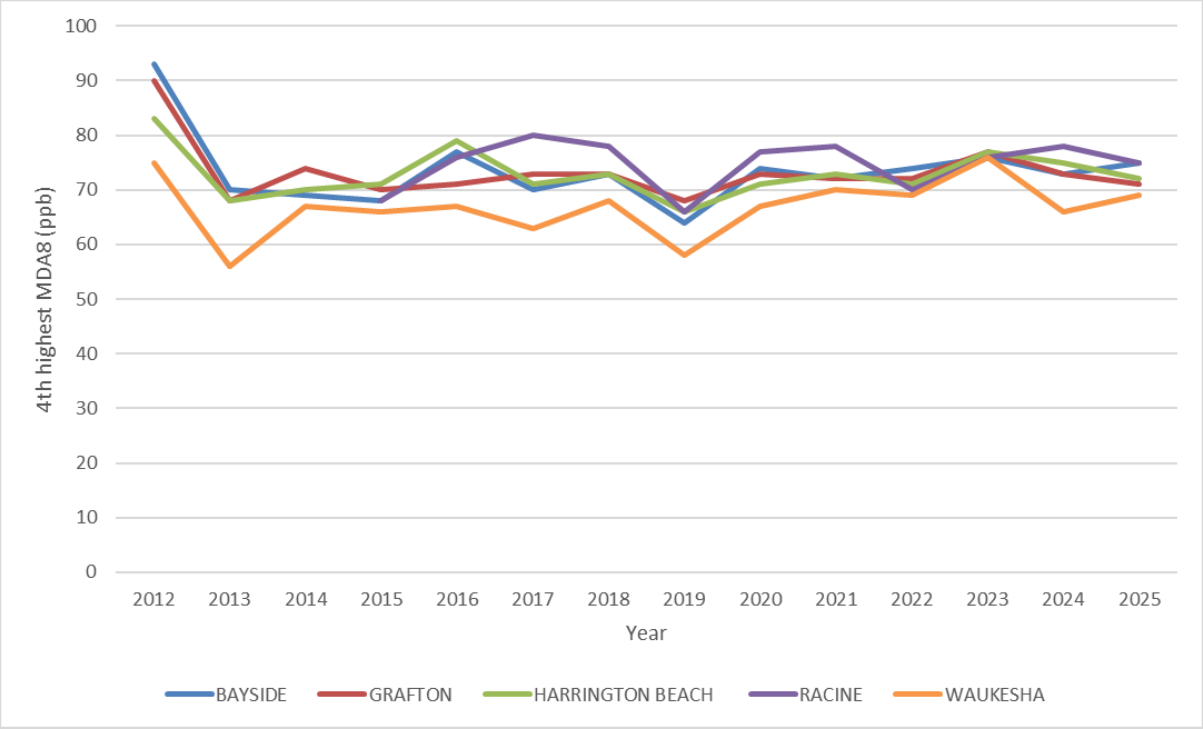


Figure 3-3 provides trends in ozone design values for these five monitors from the 2012-2014 period through the most recent, 2023-2025 period. Similar to the annual fourth-highest MDA8 value trends, this data shows that design values at the Waukesha monitor are always lower than those measured at the Milwaukee nonattainment monitors.

This comparative analysis shows that ozone concentrations measured at the Waukesha monitor are consistently lower than those measured at the nonattainment monitors of Racine, Bayside, Grafton, and Harrington Beach. This is not an irregular or periodic occurrence, but a constant trend observed over the entire 14-year period evaluated in this assessment.

Figure 3-3: Design Value Trends at the Waukesha and Milwaukee Nonattainment Monitors.

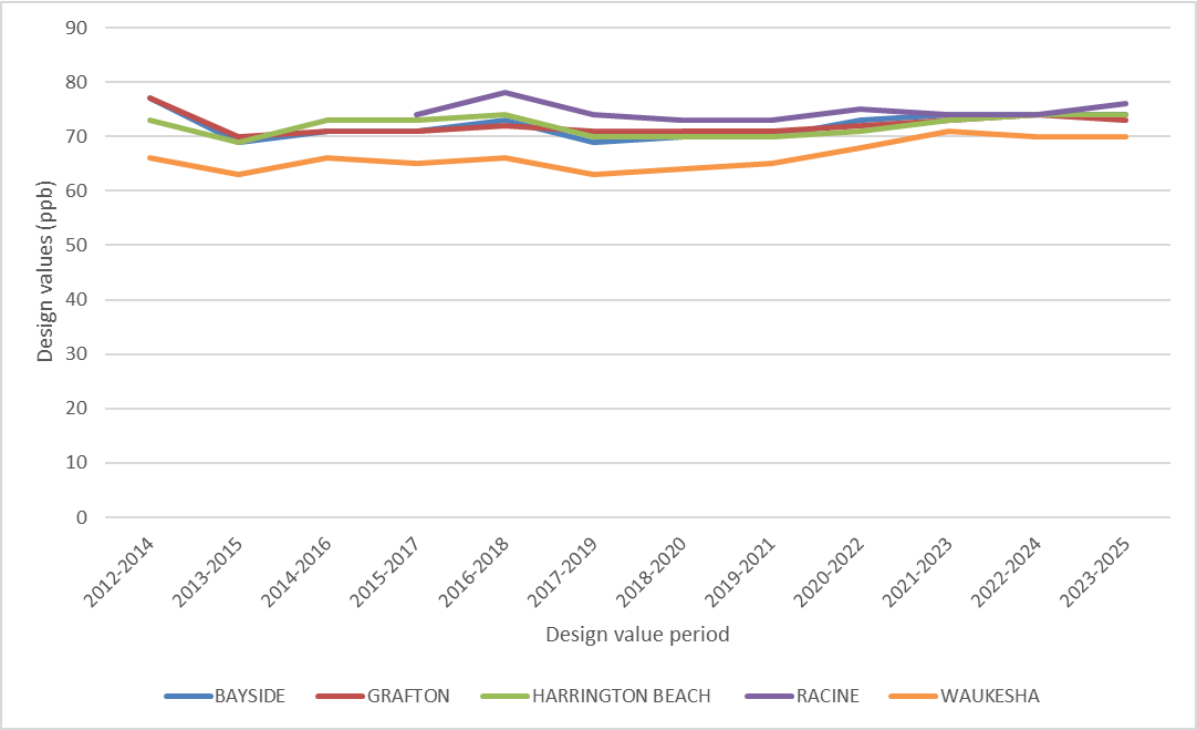


Figure 3-2 and Figure 3-3 also show that ozone values at the Waukesha monitor were more strongly influenced by the wildfire smoke events in 2023, even though these events also affected the other monitors in the area. While all five monitors demonstrate an uptick in ozone values in 2023, the increase is notably greater at Waukesha. The weaker signal from smoke events at the Racine, Bayside, Grafton, and Harrington Beach monitors in 2023 is additional evidence that ozone values in the western and shoreline parts of the Milwaukee area are driven by different meteorological, physical, and/or chemical processes. This difference in air masses supports splitting the current Milwaukee NAA into two distinct nonattainment areas.

As explained in detail in Section 3.4 (the topography and geography factor), the key geographic feature influencing ozone formation in the Milwaukee area is Lake Michigan, which drives peak ozone levels along the entire Wisconsin coastline. The presence of the lake results in high-ozone air and ozone precursors being transported from the south and over the lake. This ozone-rich air is then transported to the Wisconsin shoreline via the lake breeze, where it causes high ozone values in a narrow band along the lakeshore.

This impact of the lake breeze can be seen clearly in the ozone monitoring data. As presented in Table 3-4, the Milwaukee nonattainment monitors are all located less than 2 miles from the Lake Michigan shoreline. These monitors are therefore highly susceptible to the high ozone air contained within the lake breeze, which explains the elevated ozone values measured at these monitors. The Waukesha monitor, located considerably further inland (over 16 miles) is much less impacted by the lake breeze, and measures considerably lower ozone concentrations as a result. This difference in monitored ozone concentrations, which is entirely consistent with the

predicted outcome of the lake breeze effect, is discussed further in Section 3.4. This variation in ozone values provides strong evidence that the western part of the Milwaukee area (i.e., Washington and Waukesha counties, and the inland portions of Ozaukee and Racine counties) should be designated separately from the shoreline portion of the area.

Table 3-4: Distance of Ozone Monitors from Lake Michigan.

Monitor	Approx. Distance from Lake Michigan (Miles)
Racine	1.3
Bayside	0.8
Grafton	1.8
Harrington Beach	0.8
Waukesha	16.3

3.1.4. Summary of Air Quality Data Factor

Air quality data helps delineate nonattainment areas by showing where the ozone levels are exceeding the standard. The Waukesha monitor has a current design value of 70 ppb, which meets the 2015 ozone NAAQS. With the exception of the 2023 wildfire-smoke influenced year, the Waukesha monitor has been attaining the NAAQS since at least 2012-2014 design value period.

A comparative analysis of ozone data trends between the Waukesha monitor and the Milwaukee nonattainment monitors of Racine, Bayside, Grafton, and Harrington Beach show that ozone concentrations at Waukesha have been consistently lower than the other four monitors since at least 2012. This analysis also provides clear evidence that ozone values at the inland Waukesha monitor are driven by significantly different processes than those at the Milwaukee area monitors located closer to the lakeshore.

The demonstrated disparity in annual fourth-high MDA8 values and design values support the conclusion that, from an air quality perspective, the inland parts of the Milwaukee area are unique compared to the current Milwaukee NAA. This analysis shows that there does not appear to be a connection between the western part of the Milwaukee area (as represented by the Waukesha monitor) and the rest of the Milwaukee nonattainment area. The air quality data, in conjunction with the other four factors, strongly supports a split of the current nonattainment area and the creation of a stand-alone Western Milwaukee NAA.

3.2. Emissions and Emissions-Related Data

3.2.1. Overview

In its guidance on *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, the EPA states that analyses should include "data from the latest National Emissions Inventory (NEI) and other relevant sources," as well as the "magnitude of county-level emissions and the geographic locations of NOx and Volatile Organic Compound (VOC) sources." Additionally, under this factor, the EPA recommends states examine population, degree of urbanization, traffic, and commuting patterns, which can be "indicators of emissions that may contribute to ozone concentrations at the violating monitor."[26]

This section assesses emissions for each county in the Milwaukee NAA and provides an overview of point sources in the nonattainment area, an analysis of population and degree of urbanization, and information regarding traffic and commuting. While only parts of Washington, Waukesha, and Racine counties are included in the Milwaukee NAA, unless otherwise noted, emissions are provided for the entirety of each county as a conservative approach. Data from the 2022v2 Emissions Modeling Platform (EMP) is used along with historical NEI data in the analyses in this section.

3.2.2. Emissions Assessment

This emissions analysis examines emissions of ozone precursors, nitrogen oxides (NOx) and volatile organic compounds (VOCs), within the current Milwaukee NAA. Emissions data can indicate the potential for contributions to observed violations within the nonattainment area, making it useful in assessing boundaries of nonattainment areas.

The National Emissions Inventory (NEI) is "a comprehensive and detailed estimate of air emissions of criteria pollutants, criteria precursors, and hazardous air pollutants from air emissions sources."[27] It is produced every three years using data provided by state, local, and tribal air agencies for sources in their jurisdictions and supplemented by data developed by the EPA. Emissions are categorized into four major sectors: point sources (e.g., power plants, large industry), nonpoint sources (e.g., residential heating, consumer products), onroad sources (e.g., cars and trucks), and nonroad sources (e.g., construction equipment, lawn and garden equipment).

The latest available NEI is for the year 2020.[28] For the intervening years between NEIs, the EPA may produce "modeling platforms" for regulatory purposes that use NEI data adjusted to reflect a more recent year. The EPA's 2022v2 EMP is based on the 2020 NEI, with updates to better represent emissions in 2022. The modeling platform contains emissions inventories for 2022, spatial surrogates, temporal profiles, and other associated data. Complete information about the

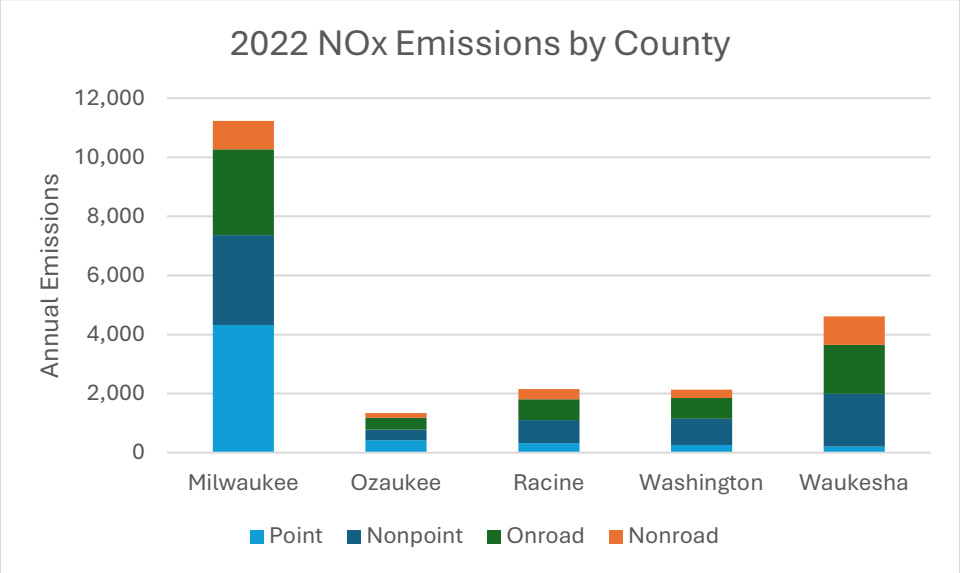
[26] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*
[27] U.S. EPA. *National Emissions Inventory (NEI)*. Available at: www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei
[28] The 2023 NEI, which has been under development for several years, has not been released at the time of drafting.

2022v2 platform can be found on the EPA's website.[29] The 2022v2 EMP represents the most recently available emissions data at a resolution and scale appropriate for this analysis and is therefore used instead of the 2020 NEI. For point source emissions, the most recent reported annual data (2025) is used.

3.2.2.1. 2022 Emissions by County

Figure 3-4, Figure 3-5 and Table 3-5 show total NOx and VOC emissions for each county within the Milwaukee NAA. Milwaukee County has substantially higher NOx and VOC emissions compared to other counties in the nonattainment area, accounting for 48% of the 5-county area's total emissions. Waukesha County has the second highest emission total (23% of the total), but is still less than half of Milwaukee. In contrast, Racine, Washington, and especially Ozaukee County have comparatively low emissions, each responsible for just 6-12% of total area emissions.

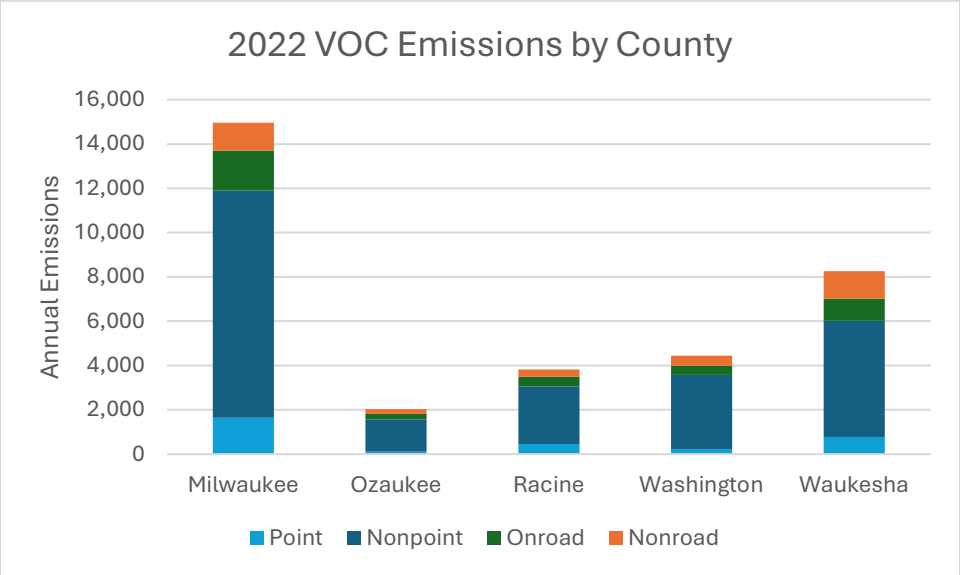
Figure 3-4: 2022 NOx Emissions by County in the 5-County Milwaukee Area.



Source: EPA's 2022v2 EMP data.

[29] U.S. EPA. *2022v2 Emissions Modeling Platform.* Available at: www.epa.gov/air-emissions-modeling/2022v2-emissions-modeling-platform

Figure 3-5: 2022 VOC Emissions by County in the 5-County Milwaukee Area.



Source: EPA's 2022v2 EMP data.

Table 3-5: 2022 NOx and VOC Emissions in the 5-County Milwaukee Area.

County	NOx Emissions (tons per year)	% of Area NOx Emissions	VOC Emissions (tons per year)	% of Area VOC Emissions	Total County Emissions	% of Total Area Emissions
Milwaukee	11,232	52%	14,967	45%	26,199	48%
Ozaukee	1,338	6%	2,036	6%	3,374	6%
Racine	2,157	10%	3,820	11%	5,977	11%
Washington	2,131	10%	4,443	13%	6,574	12%
Waukesha	4,614	22%	8,258	25%	12,872	23%
Total	21,473	100%	33,525	100%	54,997	100%

Source: EPA's 2022v2 EMP data.

Tables 3-6 and 3-7 show the breakdown of NOx and VOC emissions for each county by emission sector. Milwaukee County has the largest emissions of both NOx and VOCs across all sectors and is responsible for 68% of point source emissions. Milwaukee County's high population density and degree of urbanization (see Section 3.2.3) explain its relatively higher nonpoint, onroad and nonroad emissions compared to the other counties. Individual sector totals for the other counties are small, especially NOx emissions. The nonpoint VOC emissions in Ozaukee, Racine, Washington, and Waukesha likely reflect the relatively rural nature of these counties.

Table 3-6: 2022 NOx Emissions by Sector in the 5-County Milwaukee Area. Figures in tons per year.

County	Point	Nonpoint	Onroad	Nonroad
Milwaukee	4,326	3,044	2,897	966
Ozaukee	423	353	402	160
Racine	319	786	702	350
Washington	259	884	703	285
Waukesha	205	1,786	1,657	965
Total	5,532	6,853	6,361	2,726

Source: EPA's 2022v2 EMP data.

Table 3-7: 2022 VOC Emissions by Sector in the 5-County Milwaukee Area. Figures in tons per year.

County	Point	Nonpoint	Onroad	Nonroad
Milwaukee	1,642	10,262	1,800	1,264
Ozaukee	105	1,472	236	219
Racine	461	2,592	433	334
Washington	410	3,359	410	446
Waukesha	782	5,230	999	1,243
Total	3,400	22,915	3,878	3,506

Source: EPA's 2022v2 EMP data.

This emissions data show that emissions in the 5-county area are heavily concentrated in Milwaukee County. Ozaukee and Racine counties, although they contain monitors that are violating the 2015 ozone NAAQS, contain the fewest emissions of the five counties. Conversely, the monitor in Waukesha County, which has more emissions than either Ozaukee or Racine county (but far fewer than Milwaukee County), is attaining the NAAQS. This strongly suggests that there are factors other than local emissions that are responsible for the ozone concentrations measured in the Milwaukee area.

3.2.2.2. 2025 Point Source Emissions

To assess stationary (point source) emissions within the Milwaukee NAA, the more recent annual emissions (for the year 2025) reported by facilities to the WDNR's air emissions inventory system were analyzed.

Within the current Milwaukee NAA, there are six large point sources with greater than 100 tons-per-year of NOx or VOC emissions (Tables 3-8 and 3-9). These sources are located in Milwaukee County (three), Ozaukee County (two), and Racine County (one). Three of these sources, including the largest, are electrical utilities. One source (the We Energies – Oak Creek Power Plant) is responsible for 56% of all the point source NOx emissions in the nonattainment area. No large point sources are located in either Washington or Waukesha County.

Relative to the requested split of the area, one large point source (Charter Steel in Ozaukee County) would be located in the proposed Western Milwaukee NAA. The remaining large point sources would remain in the revised Milwaukee NAA.

Table 3-8: 2025 Large NOx Point Sources in the Milwaukee NAA.

County	Source	Annual Emissions in Tons	% of Total Area Point Source Emissions
Milwaukee	WE Energies – Oak Creek Power Plant	2,910	56%
Ozaukee	WE Energies – Port Washington Generating Station	270	5%
Milwaukee	WE Energies – Valley Power Plant	256	5%
Ozaukee	Charter Steel	108	2%

Source: WDNR's 2025 Air Emissions Inventory.

Table 3-9: 2025 Large VOC Point Sources in the Milwaukee NAA.

County	Source	Annual Emissions in Tons	% of Total Area Point Source Emissions
Milwaukee	MMSD – Jones Island Water Reclamation Facility	130	5%
Racine	S C Johnson & Sons Inc	103	4%

Source: WDNR's 2025 Air Emissions Inventory.

3.2.2.3. Emissions by Minor Civil Division

Figures 3-6 and 3-7 show NOx and VOC emissions for the 5-county Milwaukee area spatially allocated to minor civil divisions (MCDs), which consist of subcounty governmental units including towns and unincorporated areas. These maps use the same 2022 EMP data described in Section 3.2.2.1. The maps also include the locations of large point sources identified in Section 3.2.2.2. The data and methodology used to generate these maps can be found in Appendix C.

Figure 3-6: 2022 NOx Emissions Spatially Allocated by Minor Civil Division

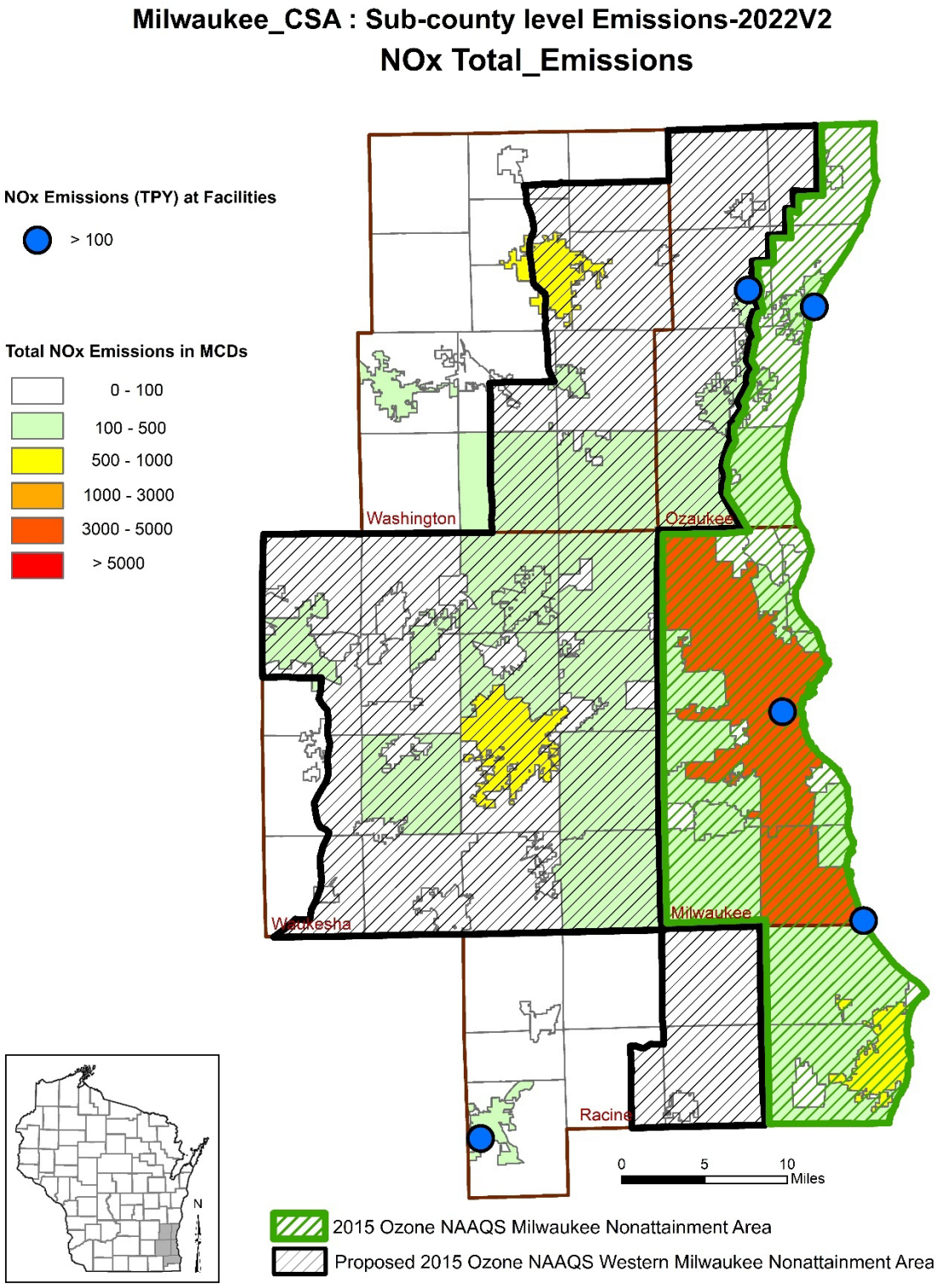
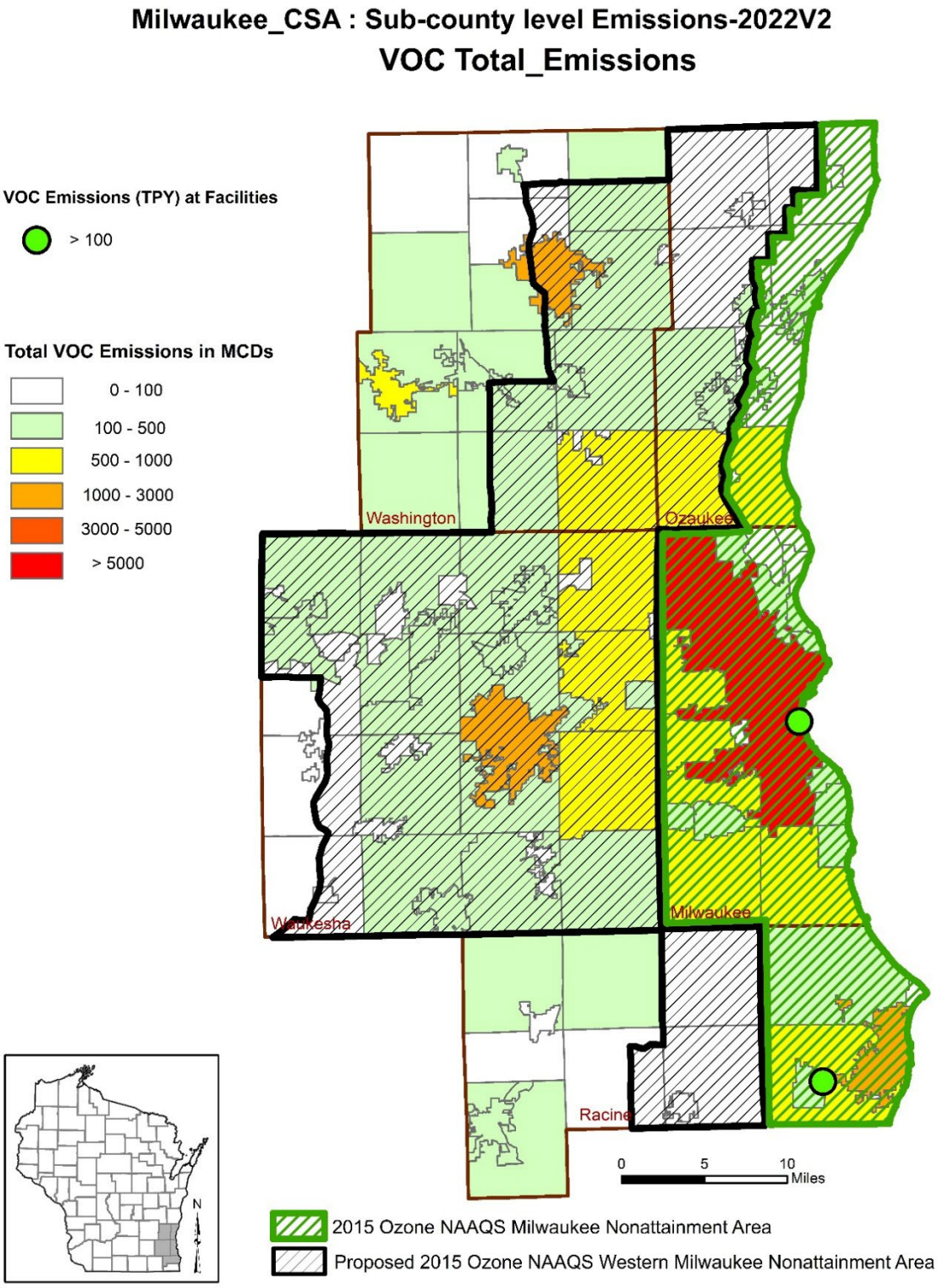


Figure 3-7: 2022 VOC Emissions Spatially Allocated by Minor Civil Division



The boundaries of the proposed Western Milwaukee NAA and revised Milwaukee NAA are included on these maps to show the spatial distribution of emissions. Table 3-10 provides the approximate distribution of emissions between the two areas, based on the WDNR's evaluation of MCD emissions data. Note that this data is being provided to help assess the impact of the proposed split of the area from an emissions perspective. A complete emissions inventory in each area would need to be completed following an approved split to comply with CAA nonattainment area baseline emissions inventory requirements.

Table 3-10 reveals that the current Milwaukee NAA includes about 93% of the 5-county area's total NOx emissions and 91% of the 5-county area's total VOC emissions. These percentages would not change following a split of the Milwaukee NAA into two separate nonattainment areas, since the total geographic area in nonattainment would remain the same.

When it comes the distribution of emissions between the two areas, the proposed Western Milwaukee NAA would include about 15% of Ozaukee County's total emissions, 7% of Racine County's emissions, 98% of Waukesha County's emissions, 58% of Washington County's emissions, and none of Milwaukee County's emissions. The revised Milwaukee NAA area, following the split, would include about 85% of Ozaukee County's emissions, 69% of Racine County's emissions, 100% of Milwaukee County's emissions, and none of the emissions in Waukesha or Washington counties.

In all, the proposed Western Milwaukee NAA would include 28% of the 5-county area's NOx emissions and 33% of its VOC emissions, while the revised Milwaukee NAA would include 64% of the area's NOx emissions and 58% of its VOC emissions. This breakout reflects the fact that emissions in the five counties are concentrated in the more urbanized, eastern portions of the area, especially in Milwaukee County.

As previously noted, the revised Milwaukee NAA would also include both large VOC point sources and three of the four large NOx point sources that are in the current Milwaukee NAA (one additional large NOx source, in western Racine County, is outside the current nonattainment area). The locations of these sources are shown in Figures 3-6 and 3-7.

Table 3-10: Distribution of 2022 Emissions Between the Proposed Western Milwaukee NAA and the Revised Milwaukee NAA.

County/NAA	NOx Emissions	VOC Emissions	Total Emissions
Milwaukee County	**11,232**	**14,967**	**26,199**
Revised Milwaukee NAA	11,232	14,967	26,199
% of county emissions in a NAA	100%	100%	100%
Ozaukee County	**1,338**	**2,036**	**3,374**
Revised Milwaukee NAA	1,170	1,686	2,856
% of county emissions	87%	83%	85%
Western Milwaukee NAA	168	350	518
% of county emissions	13%	17%	15%
% of county emissions in a NAA	100%	100%	100%
Racine County	**2,157**	**3,820**	**5,977**
Revised Milwaukee NAA	1,446	2,659	4,105
% of county emissions	67%	70%	69%
Western Milwaukee NAA	138	272	411
% of county emissions	6%	7%	7%
% of county emissions in a NAA	73%	77%	76%
Washington County	**2,131**	**4,443**	**6,574**
Western Milwaukee NAA	1,271	2,511	3,782
% of county emissions in a NAA	60%	57%	58%
Waukesha County	**4,614**	**8,258**	**12,872**
Western Milwaukee NAA	4,512	8,083	12,595
% of county emissions in a NAA	98%	98%	98%
Total 5-County Area Emissions	**21,473**	**33,525**	**54,997**
Total 5-county area emissions in a NAA	19,938	30,529	50,466
Revised Milwaukee NAA	13,849	19,312	33,160
Western Milwaukee NAA	6,089	11,217	17,306
% of 5-county area emissions in a NAA	93%	91%	92%
Revised Milwaukee NAA	64%	58%	60%
Western Milwaukee NAA	28%	33%	31%

3.2.2.4. Historical Emissions Trends

Figures 3-8 and 3-9 show the EPA's NEI data for 5-county Milwaukee area from 2002 to 2020. Across all five counties, emissions have been steadily decreasing for decades, indicating that it is unlikely emissions in the area will increase in a way that prevents attainment of the 2015 ozone NAAQS. This also indicates that factors other than local precursor emissions are responsible for violations of the NAAQS in the Milwaukee area.

Figure 3-8: NOx Emissions Trends for the 5-County Milwaukee Area.

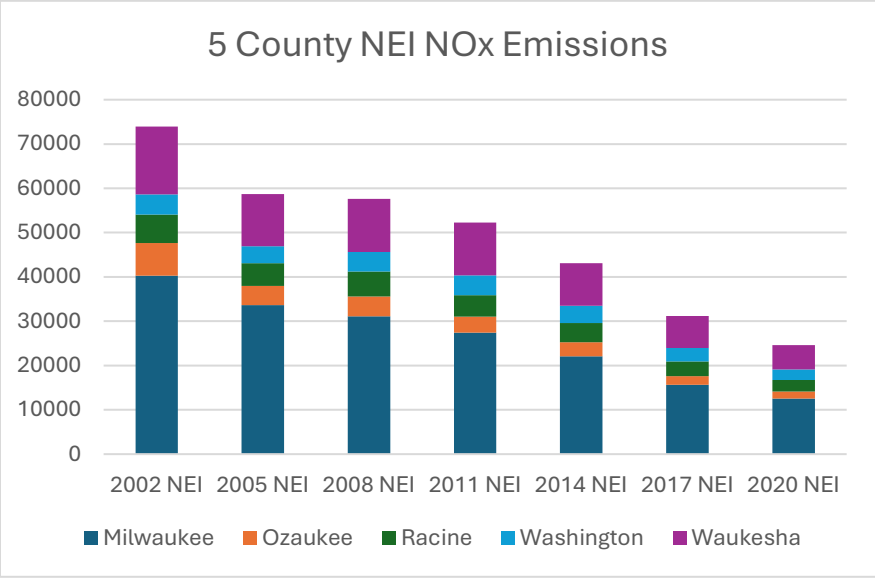
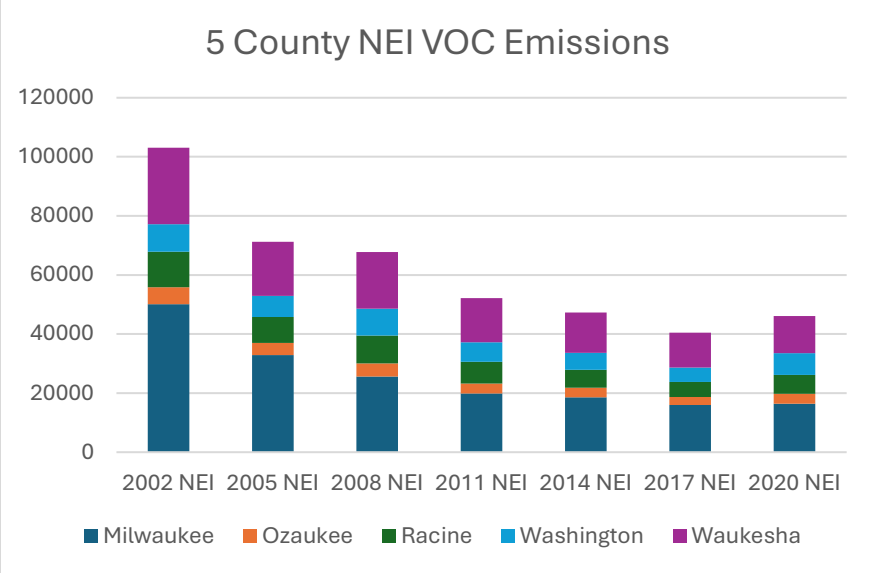


Figure 3-9: VOC Emissions Trends for the 5-County Milwaukee Area.[30]



3.2.2.5. Emissions Inventory Summary

The emissions data presented in this section indicates that the majority of NOx and VOC emissions in the 5-county area are in Milwaukee County; this is true not only when considering total emissions, but also sector-specific results. The share of emissions in the other four counties is significantly smaller, and, as a result, the opportunities for emissions reductions are also fewer. Low emissions levels and a lack of potential for the western Milwaukee area to contribute to

[30] In 2020, the EPA made substantial methodology changes from 2017 for calculating emissions for several area source categories which resulted in significant increases in Wisconsin's area source VOC emissions when compared to 2017. Due to these changes, the 2020 NEI VOC emissions are not directly comparable with the 2017 NEI emissions.

monitored values in the Milwaukee NAA supports the creation of a stand-alone Western Milwaukee NAA.

3.2.3. Population Density and Degree of Urbanization

In its guidance on *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, the EPA states that population information, such as the location and recent trends in population growth can serve as potential indicators of the probable location and magnitude of emissions sources that may contribute to ozone concentrations within a given nonattainment area. The following analysis describes population and urbanization trends in the 5-county Milwaukee area.

3.2.3.1. Population Trends

Table 3-11 shows population data and trends for the 5-county area. Milwaukee is by far the most populous county, with twice the population of the second most populous county (Waukesha). In addition, this is a very low growth metropolitan area, with every county experiencing a change in population between 2020 and 2025 of less than 3%. When considering trends from 2010, Milwaukee County's population actually decreased.

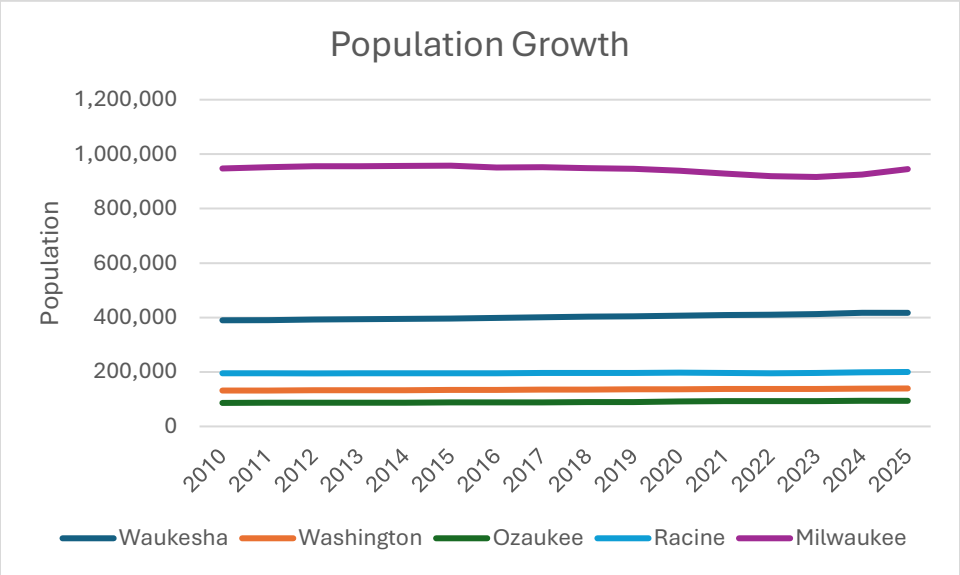
Table 3-11: Population and Population Growth in the 5-County Milwaukee Area.

County	2010 Census Population	2020 Census Population	2025 Estimated Population[a]	Absolute Change 2020-2025	Percentage Change 2020-2025
Milwaukee	947,735	939,489	945,292	5,803	0.62%
Ozaukee	86,395	91,503	94,074	2,571	2.81%
Racine	195,408	197,727	200,014	2,287	1.16%
Washington	131,887	136,761	139,504	2,743	2.01%
Waukesha	389,891	406,978	417,230	10,252	2.52%

[a] 2025 population estimates from the Wisconsin Department of Administration's Demographic Services Center.

Figure 3-10 shows population trends over the past 25 years for each county in the Milwaukee area. This data confirms that the greater Milwaukee region experiences little to no growth, with the population remaining more-or-less static over this 25-year period. There are also no significant differences in patterns observed between counties. It is therefore highly unlikely that population growth will lead to meaningful increases in NOx or VOC emissions in this area.

Figure 3-10: Population Growth in the 5-County Milwaukee Area (2010-2025).



Another measure used to evaluate populations in nonattainment areas is population density. As shown in Table 3-12, Milwaukee County ranks first on this metric, with a population density more than five times that of Waukesha County, which ranks second. The other three counties have low population densities. These figures reflect the fact that large portions of Waukesha, Racine, Ozaukee, and Washington counties are rural, with substantial areas of farmland and other open space. In contrast, a far greater proportion of Milwaukee County (which contains the City of Milwaukee) is urbanized.

Table 3-12: 2020 Population Density in the 5-County Milwaukee Area.

County	2020 Population Density (per sq mi)	Rank
Milwaukee	3,890.54	1
Waukesha	740.34	2
Racine	594.42	3
Ozaukee	392.69	4
Washington	317.58	5

Source: U.S. Census Bureau.

3.2.3.2. Degree of Urbanization

The effects of urbanization on ozone concentrations have been widely studied. Land cover and land use modifies local meteorological conditions. Urbanization and urban expansion not only modify land surface, but also increase local emissions due to intensification of traffic, industry and energy consumption resulting from population growth. In its guidance on area designations

for the 2015 ozone NAAQS, the EPA states that counties with higher urbanization should be given greater weight in defining nonattainment area boundaries.[31]

Table 3-13 shows the degree of urbanization for the 5-county Milwaukee area. Consistent with its high population density, Milwaukee County is, by far, the most urbanized of the five counties, with 92.9% of the county classified as urban. Waukesha County has a moderate percentage of urbanization, ranking second. However, while Milwaukee and Waukesha counties have nearly identical square miles of urban land, only 41% of Waukesha County is classified as urban. This highlights the dense urban nature of Milwaukee County, while the majority of Waukesha County is rural. Racine, Ozaukee, and Washington counties are predominately rural in character, with urban classification percentages ranging from 10% (Washington) to 22% (Racine).

Table 3-13: 2020 Urbanization Data for the 5-County Milwaukee Area.

County	Urban Land (sq mi)	% of County Classified as Urban	Rank
Milwaukee	224.34	92.9%	1
Waukesha	224.03	40.8%	2
Racine	72.55	21.8%	3
Ozaukee	46.30	19.87%	4
Washington	46.76	10.86%	5

Source: U.S. Census Bureau.

Areas of dense population or commercial development typically indicate the area produces more area and mobile source NOx and VOC emissions. This is reflected in the data for the Milwaukee area. The low population, growth, density, and urbanization figures for Ozaukee, Racine, Washington and Waukesha counties explain their relatively low NOx and VOC area and mobile source emissions. In contrast, the relatively greater emissions in more urbanized Milwaukee County reflect its significantly larger population and density. This pattern supports a finding that emissions from the western part of the Milwaukee area (Washington and Waukesha counties and the inland portions of Ozaukee and Racine counties) are unlikely to contribute to violations of the 2015 ozone NAAQS recorded in the Milwaukee NAA.

3.2.4. Traffic and Commuting Patterns

Further insight into the contribution of mobile emissions to violating monitors can be gathered from analyzing traffic and commuting patterns. As stated in its *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, the EPA recommends examining "information on traffic volume and commuting patterns in and around the area containing a violating monitor," as well as the vehicle miles traveled (VMT) for each county."[32]

[31] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*.
[32] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*

3.2.4.1. Commuting Activity

The WDNR obtained employment and commuter data for 2023 for each county in the Milwaukee NAA from the U.S. Census Bureau's "On The Map" web page,[33] including the number of county residents who work and the commuting flows between counties within the nonattainment area. Commuting patterns are evaluated based on travel to counties containing a violating monitor, which in the Milwaukee NAA are Ozaukee, Milwaukee, and Racine counties.

As shown in Table 3-14, Milwaukee County has 451,627 residents who work, the highest in the area and more than the other four counties combined. Milwaukee County also has the largest number of commuters (319,329), with 71% of those commuters traveling in or to a county with a violating monitor. The number of Milwaukee County commuters traveling to a county with a violating monitor is over four times larger than Waukesha County, the county with the second largest number of commuters. Washington County stands out by having not only a very small number of commuters to a county with a violating monitor (despite being adjacent to Ozaukee County), but also a very low commuting percentage.

Table 3-14: 2023 Commuting Patterns Within the 5-County Milwaukee Area.

County	Number of Residents Who Work	Number Commuting to a County with a Violating Monitor	Percentage Commuting to a County with a Violating Monitor
Milwaukee	451,627	319,329	71%
Ozaukee	46,452	30,810	66%
Racine	101,180	62,590	62%
Washington	73,406	22,001	30%
Waukesha	208,772	73,132	35%

Source: U.S. Census Bureau's On The Map database.

As stated in the EPA's *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, "commuting activity can be an indicator of the location of mobile source emissions that may contribute to ozone concentrations at the violating monitor."[34] Conversely, a lack of commuting activity could be an indicator of a lack of mobile source emissions contributing to ozone concentrations at the violating monitor(s).

The commuting and employment data for the 5-county area presented above indicates a stronger degree of commuting connection between Ozaukee, Milwaukee, and Racine counties, likely to and from the City of Milwaukee along the I-94 corridor. In contrast, these metrics indicate that the inland counties of Washington and Waukesha are much less connected to the three shoreline counties.

[33] The U.S. Census Bureau's On The Map database
[34] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*

3.2.4.2. Vehicle Miles Traveled

Traffic data can help assess the influence of mobile source emissions in a given area. This includes examining the total VMT for each county. Areas with higher VMT can be an indicator of the location of mobile source emissions (especially NOx) that may contribute to ozone concentrations at a violating monitor.

The Wisconsin Department of Transportation (WisDOT) publishes average daily and annual VMT each year for every county in Wisconsin. Table 3-15 shows WisDOT's VMT data for the five counties in the Milwaukee area for 2024, the most recent year available.

Milwaukee County has the highest daily and annual VMT in the five-county area, accounting for over 43% of the nonattainment area's annual VMT. Waukesha County has the second highest daily and annual VMT, accounting for about 28% of the total 5-county annual VMT. The remaining counties of Racine, Washington, and Ozaukee have significantly lower VMT figures; when combined, as a group they are roughly equal to Waukesha County. Ozaukee County stands out in that it is only responsible for about 7% of the area's total annual VMT, a very low percentage.

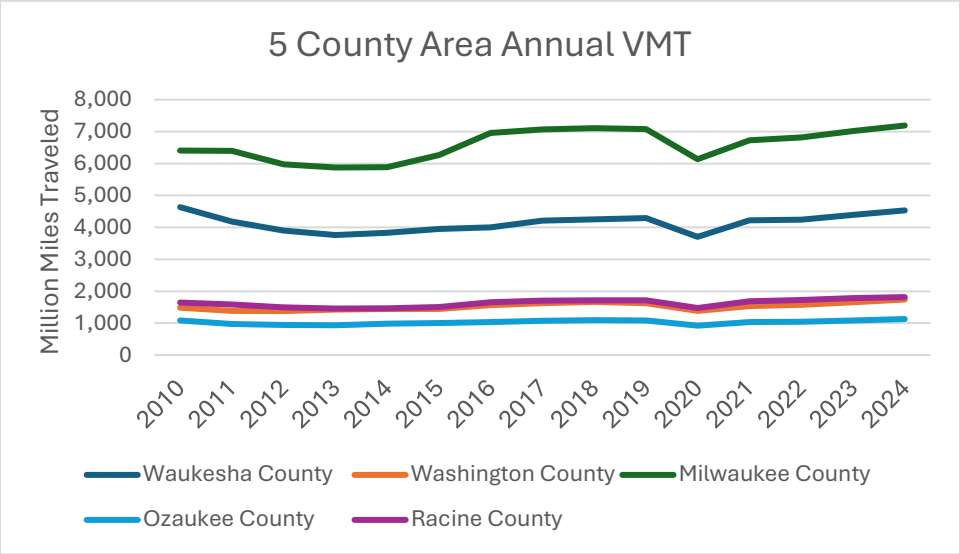
Table 3-15: 2024 Daily Vehicle Miles Traveled in the 5-County Milwaukee Area.

County	Daily VMT (in Million Miles)	Annual VMT (in Million Miles)	Percent of 5-County Annual VMT	Rank
Milwaukee	19.65	7,191	43.84%	1
Waukesha	12.38	4,530	27.61%	2
Racine	4.96	1,815	11.07%	3
Washington	4.75	1,740	10.60%	4
Ozaukee	3.09	1,129	6.88%	5
Total	44.82	16,406		

Source: Wisconsin Department of Transportation.

Rapid VMT growth in a county on the urban perimeter may signify increasing integration with the core of an urban area, which in this case is Milwaukee County. As shown in Figure 3-11, while there have been some fluctuations in county-level VMT from 2010 to 2024 (due to factors such as the 2020 pandemic), the trend over that period has remained relatively stable, with 2024 VMT essentially the same as it was in 2010. There is also no evidence of notable or unusual VMT increases in the counties surrounding Milwaukee County. This indicates that integration across the metro area is static, and that mobile source emissions from Waukesha, Washington, Ozaukee, and Racine counties are unlikely to be significant contributors to ozone violations in this area.

Figure 3-11: Annual Vehicle Miles Traveled in the 5-County Milwaukee Area (2010-2024).



3.2.5. Summary of Emissions and Emissions-Related Data Factor

The data presented for this factor shows how each county in the 5-county area has a unique emissions profile that should be considered when determining the appropriate nonattainment boundaries for this area.

3.2.5.1. Milwaukee County

Milwaukee County's emissions are significantly higher than all other counties in the 5-county area, being responsible for 48% of the area's emissions. The majority (68%) of the nonattainment area's point sources are also located in Milwaukee County. For both NOx and VOCs, Milwaukee County has the highest emissions across all sectors. Milwaukee County's population, population density, and urbanization percentage are also substantially higher than the other counties in the 5-county area. The county also ranks first in VMT, number of workers and commuters, and workers commuting to counties with violating monitors.

3.2.5.2. Ozaukee County

Despite containing two monitors not attaining the 2015 ozone NAAQS, Ozaukee County has the lowest emissions of any of the five counties (just 3,369 tons), accounting for 6% of area's total emissions. Emissions are concentrated in the shoreline area; the proposed Western Milwaukee NAA would encompass 15% of the county's emissions, while the revised Milwaukee NAA would include the other 85%. The county has two large point sources of NOx, one of which would be located in the proposed Western Milwaukee NAA. Ozaukee County ranks fourth or fifth on many metrics and has the smallest population. Based on the county's very low emissions and other emissions-related characteristics, it is unlikely that Ozaukee County's emissions contribute substantially to the high ozone values measured at its two monitors.

3.2.5.3. Racine County

Racine County is only responsible for 11% of the 5-county area's total emissions, emitting just under 6,000 tons of NOx and VOCs combined. Emissions in this county are not evenly

distributed, but are heavily weighted towards the eastern third of the county. The portion of the Racine County east and inclusive of Interstate 94, which would be included in the revised Milwaukee NAA, contains 69% of the county's emissions, while the proposed Western Milwaukee NAA would include 6% of the county's emissions.[35] Racine County otherwise ranks third of the five counties on many metrics, including population, population density, urbanization percentage, and VMT.

3.2.5.4. Washington County

Washington County is responsible for just 12% of the 5-county area's total emissions. There are no major point sources in the county. Washington County has the lowest population density in the 5-county area, is almost entirely rural (only 11% of its land being classified as urban), has the lowest VMT, and only 30% of its population commutes to a county with a violating monitor (also the lowest of the five counties). Given these characteristics, which reflect its predominately agrarian nature, it is unlikely that emissions from Washington County meaningfully contribute to ozone violations in the Milwaukee area.

3.2.5.5. Waukesha County

On multiple metrics Waukesha County ranks second behind Milwaukee County. However, there is a significant gap between the two. While Waukesha County has the second highest total emissions after Milwaukee County, it emits half the emissions (12,867 versus 26,199 tons) and contains no major point sources. Waukesha County has the second highest percentage of land classified as urban at 41%, compared to Milwaukee County's 93%. Waukesha County's population density is 740 people per square mile, a distant second to Milwaukee County's 3,890 people per square mile. When considering absolute figures rather than relative rankings, Waukesha County in many aspects exhibits characteristics associated with the more rural counties of Washington, Ozaukee, and Racine, rather than Milwaukee County.

3.2.5.6. Conclusions

The data presented in this section demonstrate that Milwaukee County is an outlier relative to the other four counties on nearly every metric associated with the emissions and emissions-related data factor. Milwaukee County has the largest emissions of all five counties, accounting for almost half of the 5-county area's total emissions. Of the six large point sources in the current Milwaukee NAA, four are in Milwaukee County. Milwaukee County's population density is orders of magnitude higher than the other four counties, and the county has the highest degree of urbanization, VMT, number of workers and commuters, and percentage of workers commuting to a county with a violating monitor.

The refined emissions maps illustrate how the location of emissions varies greatly across the Milwaukee area, with the majority of emissions located in the more urbanized, eastern portion of the 5-county area. In contrast, areas located further inland (including Washington County and large portions of Waukesha, Ozaukee, and Racine counties) contain far fewer emissions, consistent with the rural nature of these areas. This difference supports splitting the existing

[35] The remainder of the county's emissions (approximately 25%) are outside of the current Milwaukee NAA and therefore would not be in either area following the split.

Milwaukee NAA into two distinct nonattainment areas, which would allow attainment control strategies to be tailored to the emissions profile specific to each area.

The uneven distribution of emissions across the nonattainment area, in conjunction with the meteorological analysis contained in Section 3.3, reinforces a finding that the emissions from the western Milwaukee area are unlikely to contribute to the violations of the ozone NAAQS recorded at monitors located in the shoreline portion of the Milwaukee area. This is strong support for a split of the current Milwaukee NAA into two distinct nonattainment areas.

3.3. Meteorology

3.3.1. Overview

In its guidance on *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, the EPA states that, "evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may support determination of nonattainment area boundaries."[36]

As previously discussed in Section 2.3, Wisconsin is focusing its analysis of the impact of the western Milwaukee area on those monitors that were in violation of the NAAQS based on 2023-2025 design values, after considering certain exceptional events. Based on that criteria, the Racine, Bayside, Grafton, and Harrington Beach monitors were the only monitors in the Milwaukee NAA violating the 2015 ozone NAAQS as of 2025. As such, the analyses in Section 3.3 are oriented around those four monitors (the "Milwaukee nonattainment monitors").

The evaluation of meteorological conditions in the Milwaukee NAA on high ozone days for the Milwaukee nonattainment monitors, as well as an analysis of common meteorological patterns in the region, provide further support for the creation of a stand-alone Western Milwaukee NAA.

One way to evaluate the meteorological impacts is by examining the potential source-receptor relationships on days with high ozone concentrations. Hybrid Single-Particle Lagrangian Integrated Transport (HYSPLIT) is a computer model that is used to compute air parcel trajectories to determine how far, and in what direction, a parcel of air, and subsequently air pollutants, will travel. Specifically, states can utilize the HYSPLIT model to produce trajectories that illustrate the 3-dimensional paths traveled by air parcels to a violating monitor.[37]

This study is conducted in three parts:

- Generating twenty-four-hour HYSPLIT back-trajectories for the Milwaukee nonattainment monitors for the highest ozone days in 2024 and 2025 (identified using AQS data) to analyze air parcel pathways.
- Comparing monitored ozone values for the days with ozone exceedances at the Milwaukee nonattainment monitors in 2024 and 2025 with the results of the HYSPLIT

[36] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*
[37] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*

analysis to analyze the potential for the air parcel pathways to transport ozone from the western Milwaukee area to the four Milwaukee nonattainment monitors.

- Analyzing satellite NO_2 data to assess the potential for ozone precursors to be transported from the western Milwaukee area to the Milwaukee nonattainment monitors for those days when HYSPLIT results indicate an air parcel passed through the western Milwaukee area on its way to the Milwaukee nonattainment monitors.

3.3.2. HYSPLIT Back-Trajectory Analysis

3.3.2.1. HYSPLIT Model and Analysis Methodology

The National Oceanic and Atmospheric Administration (NOAA) HYSPLIT model computes simple air parcel trajectories, as well as complex transport, dispersion, chemical transformation, and deposition simulations. HYSPLIT continues to be one of the most extensively used atmospheric transport and dispersion models in the atmospheric sciences community. A common application is a back-trajectory analysis to determine the origin of air masses and establish source-receptor relationships.[38]

The following steps were taken to determine the extent to which the western Milwaukee area contributes to high ozone levels in the Milwaukee NAA on high ozone days using HYSPLIT:

1. Use the EPA's air quality data to identify all days in 2024 and 2025 with Daily Maximum 8-hour Averages (MDA8) exceeding the 2015 ozone NAAQS (70 ppb) at the four Milwaukee nonattainment monitors.

2. Run the HYSPLIT model to generate 24-hour back-trajectories for the identified days for those monitors.

3. Identify days where HYSPLIT modeling shows that air may have traveled through any part of Washington or Waukesha counties, or the inland portions of Ozaukee and Racine counties, and conduct a qualitative assessment of those counties' influence.

Appendix D describes these analytical steps in more detail.

3.3.2.2. Identification of Days of Interest

The WDNR reviewed AQS data for 2024 and 2025 to identify all days where MDA8 values at the four Milwaukee nonattainment monitors exceeded the 2015 ozone NAAQS. Table 3-16 identifies a total of 49 exceedances: ten exceedances each at the Harrington Beach and Grafton monitors, 11 exceedances at the Bayside monitor, and 18 exceedances at the Racine monitor. These 49 exceedances occurred on 22 calendar days (i.e., multiple monitors had exceedances on the same days).

[38] National Oceanic and Atmospheric Administration. *HYSPLIT*. https://www.arl.noaa.gov/hysplit/

Table 3-16: 2024 and 2025 Ozone Exceedances at Milwaukee Nonattainment Monitors. Figures are MDA8 ozone values in ppb.*

Date	Racine	Bayside	Grafton	Harrington Beach
05/18/2024	69	69	69	71
06/12/2024	82	66	64	76
07/13/2024	73	73	73	67
07/15/2024	86	77	74	88
07/31/2024	76	60	58	56
08/23/2024	72	70	72	75
08/24/2024	72	71	67	68
08/25/2024	69	70	70	71
08/26/2024	84	84	90	90
08/27/2024	78	54	No data	44
09/11/2024	70	68	72	70
09/18/2024	71	62	67	64
09/19/2024	76	73	75	73
09/20/2024	73	56	50	54
06/11/2025	76	73	69	69
06/16/2025	77	75	73	71
06/29/2025	75	79	71	66
07/15/2025	76	75	73	78
08/06/2025	71	69	66	67
08/07/2025	70	77	77	78
08/15/2025	71	72	70	64
09/12/2025	71	52	46	40

* Highlighted values are values that exceed the 2015 ozone NAAQS of 70 ppb.

3.3.2.3. HYSPLIT Back Trajectories and Qualitative Assessment

A twenty-four-hour back-trajectory HYSPLIT run was completed for each of the 49 exceedances identified in Table 3-16. The results of these HYSPLIT runs can be found in Appendix D. The appendix also contains details about how HYSPLIT was configured and run to generate these back-trajectories.

Table 3-17 summarizes the HYSPLIT back-trajectories for all 22 days in 2024 and 2025 in which one or more of the Milwaukee nonattainment monitors had an exceedance and (1) notes if the air parcels pass through any part of the western Milwaukee area (i.e., Washington or Waukesha counties, or the inland portions of Ozaukee and Racine counties), and (2) provides a qualitative description of the modeled trajectories.

Table 3-17: Assessment of 2024 and 2025 HYSPLIT Back-Trajectories for Milwaukee Nonattainment Monitors.

Date	Do HYSPLIT trajectories pass through the western Milwaukee area?	Qualitative description
05/18/2024	No	Classic southerly wind pattern with trajectory starting in central Illinois, passing through Chicago, and arriving at Harrington Beach from over the lake.
06/12/2024	Yes (Racine)	Air mass originates in Missouri, arriving in Wisconsin from the southwest. Trajectories pass through southern Racine County before moving over the lake, arriving at monitors from offshore.
07/13/2024	No	Trajectories arrive at monitors from over the lake after originating in or just offshore northern Indiana and central Chicago.
07/15/2024	Yes (Washington, Waukesha, Ozaukee)	Grafton trajectory passes through southern Wisconsin including Waukesha, Washington, and Ozaukee counties. Trajectories for other monitors originate in Iowa and pass through Chicago.
07/31/2024	No	Winds from the west move air mass from Iowa, across northern Illinois and Chicago, before arriving at Racine from over the lake.
08/23/2024	No	Air mass originates in central Illinois/Indiana and passes through Chicago before arriving at Wisconsin monitors from southeast. Harrington Beach trajectory may clip extreme eastern Racine Co.
08/24/2024	Yes (Racine)	Southerly pattern moves air north from Chicago, where lake breeze transports air mass onshore to Bayside and Racine. Bayside trajectory (only) passes through western portion of Racine County.
08/25/2024	No	Winds move air mass from central Illinois, over northern Chicago, out over the lake, where lake breeze transports air to Harrington Beach. Trajectory may clip southeast corner of Racine County.
08/26/2024	No	Classic summer ozone pattern. Trajectories start in southern Illinois, pass through Chicago, and arrive at all four monitors from over the lake. No trajectories pass through Wisconsin.
08/27/2024	No	Winds move air from central Illinois, over Chicago, then out over the lake. Lake breeze then moves air onshore to Racine.
09/11/2024	No	Similar to 8/27/2024. Winds move air from central Illinois, over Chicago, then out over the lake. Lake breeze then moves air onshore to Grafton.
09/18/2024	No	Trajectory starts in northern Illinois/Indiana, passes through Chicago, and arrives at Racine from over the lake.
09/19/2024	No	Classic summer ozone pattern. Trajectories start in northern Indiana, pass through Chicago metro, and arrive at all four monitors from over the lake. No trajectories pass through Wisconsin.
09/20/2024	Yes (Racine)	Trajectory passes through central Illinois, loops into southern Wisconsin through Racine County, then moves over the lake before arriving back at Racine from offshore.

06/11/2025	Yes (Washington, Waukesha, Ozaukee)	Air masses pass through parts of Washington, Ozaukee, and Waukesha counties before arriving at Bayside and Racine monitors from the west. Bayside trajectory originates near Twin Cities.
06/16/2025	No	Air mass originates in Michigan/Ohio, passes through northern Indiana, and arrives at all four Wisconsin monitors directly over the lake from the east. No trajectories pass through Wisconsin.
06/29/2025	No	Classic summer ozone pattern. Trajectories originate in central Illinois and northwest Indiana, pass through Chicago, and arrive at Wisconsin monitors from over the lake.
07/15/2025	No	Classic summer ozone pattern. Trajectories originate in northern Illinois/Indiana, pass through Chicago, and arrive at all four Wisconsin monitors from over the lake.
08/06/2025	No	Air mass originates in southern Michigan and arrives at Racine directly over the lake from the east.
08/07/2025	No	Classic summer ozone pattern. Trajectories originate in northern Illinois/Indiana, pass through greater Chicago, and arrive at Wisconsin monitors from over the lake.
08/15/2025	No	Classic summer ozone pattern. Trajectories start in east-central Illinois, pass through Chicago, and arrive at Racine and Bayside directly from over the lake.
09/12/2025	No	Air mass originates in northern Indiana and is transported west to the Racine monitor, arriving directly from over the lake.

Figure 3-12 through Figure 3-15 show the consolidated results for these HYSPLIT runs for each Milwaukee nonattainment monitor.[39] The trajectories that pass over Washington or Waukesha counties, or the inland portion of Ozaukee and Racine counties, are highlighted in blue, with all other trajectories in red. If it was unclear if a trajectory passed through the western Milwaukee area or not, the trajectory was assumed to have done so. This conservative approach ensures that all potential contributing HYSPLIT runs are included in the analysis.

[39] These graphics are consistent with those the EPA generated in support of its proposal to separate New Castle County, Delaware from the Philadelphia nonattainment area. Specifically, Figures 5 through 8 (pages 26-27) in *Technical Support Document Proposed Revision of the Nonattainment Designation Boundaries for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area for the 2008 and 2015 Ozone Standards: Cecil County, MD and New Castle County, DE.* U.S. EPA (December 2025). www.regulations.gov/document/EPA-R03-OAR-2025-1872-0022

Figure 3-12: 2024 and 2025 HYSPLIT Back-Trajectories for Racine.

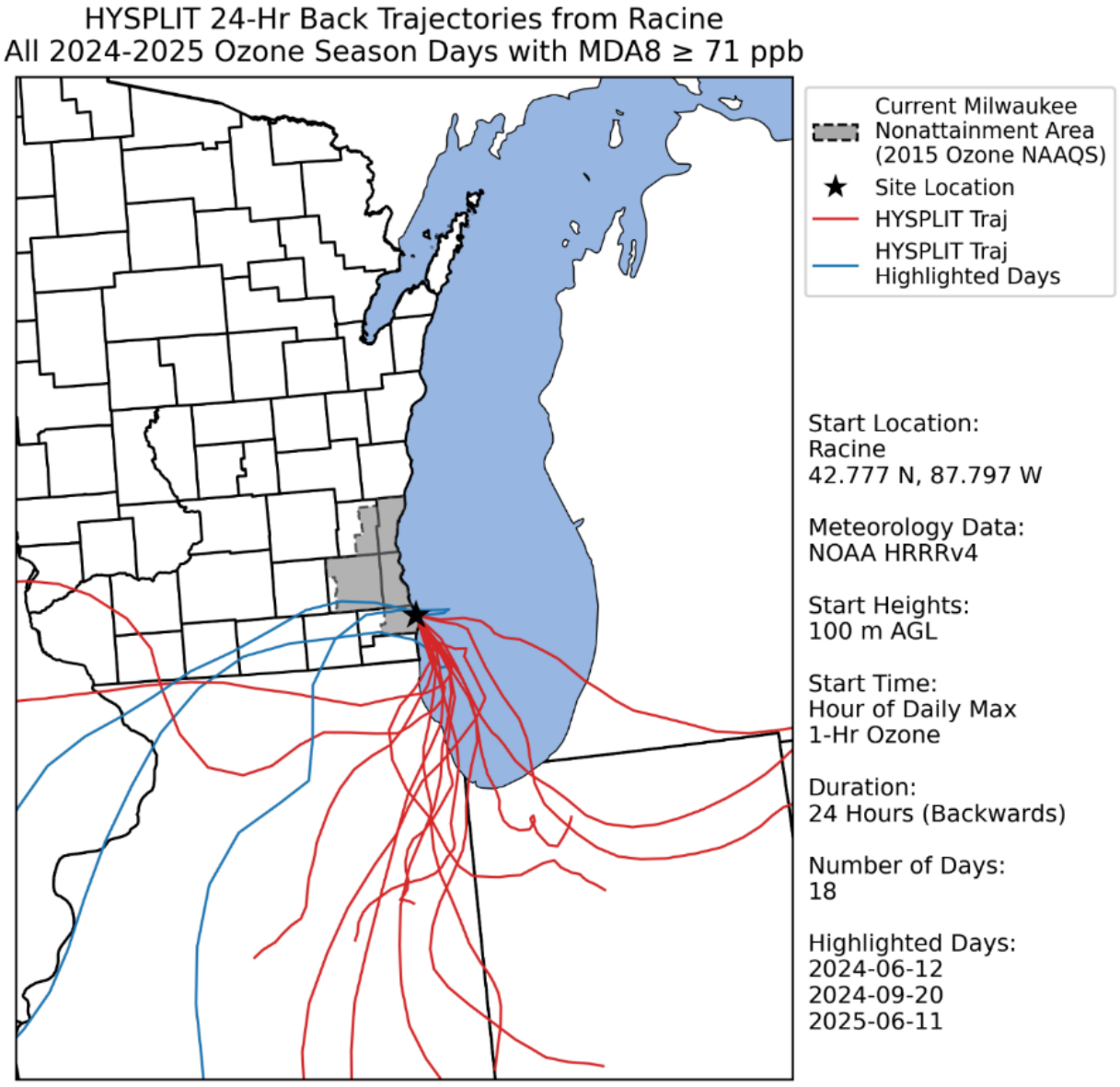


Figure 3-13: 2024 and 2025 HYSPLIT Back-Trajectories for Bayside.

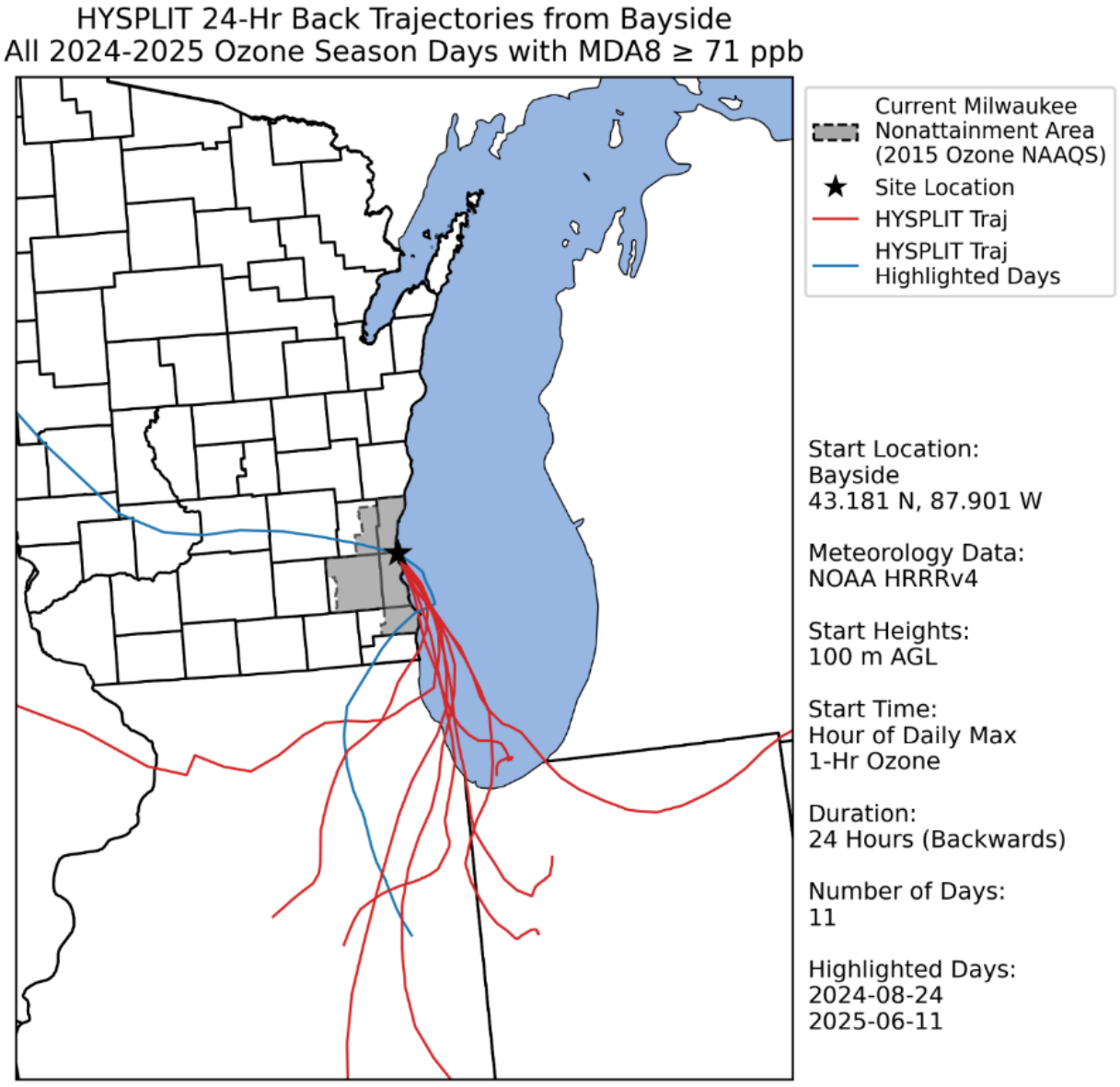


Figure 3-14: 2024 and 2025 HYSPLIT Back-Trajectories for Grafton.

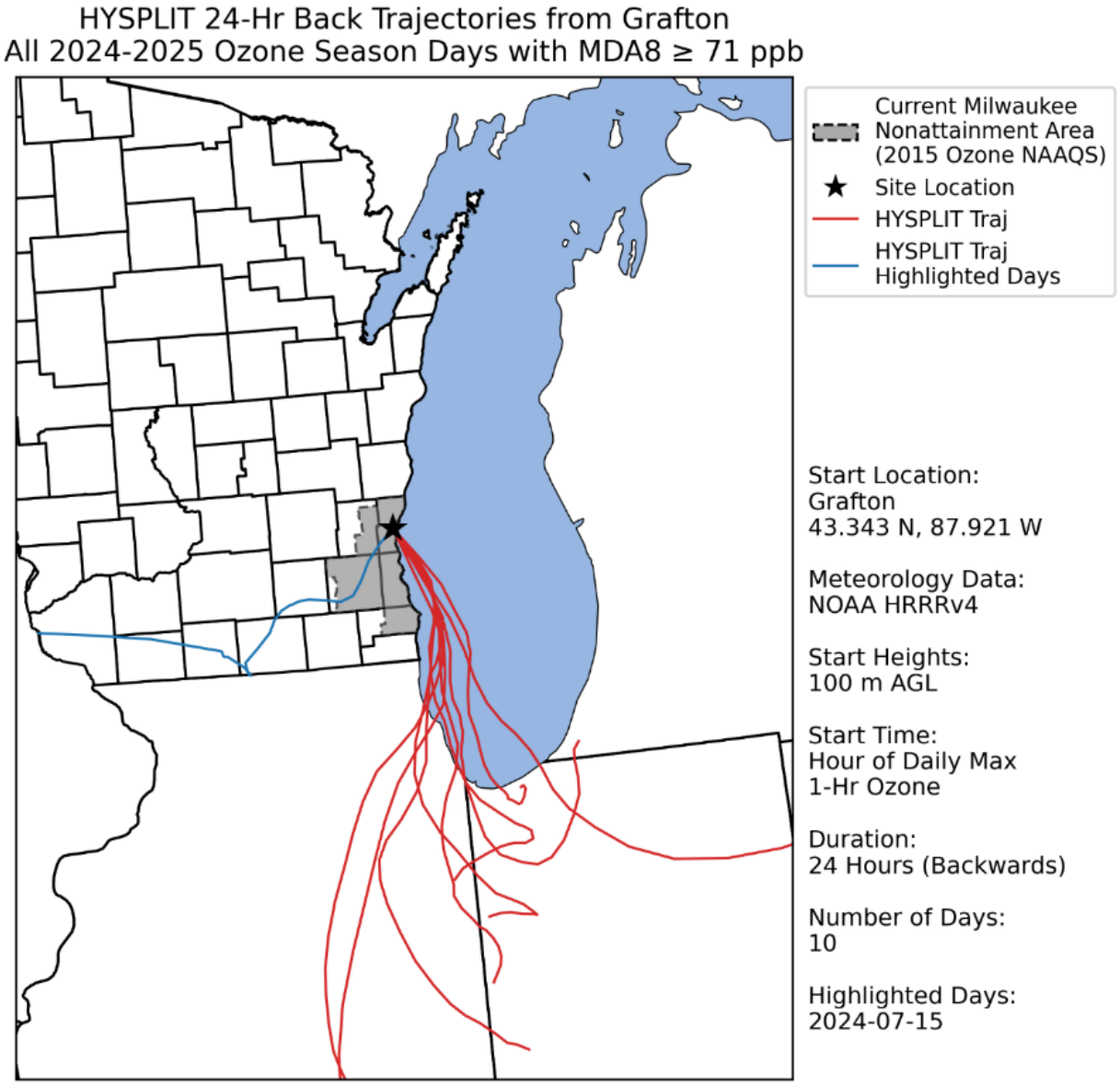
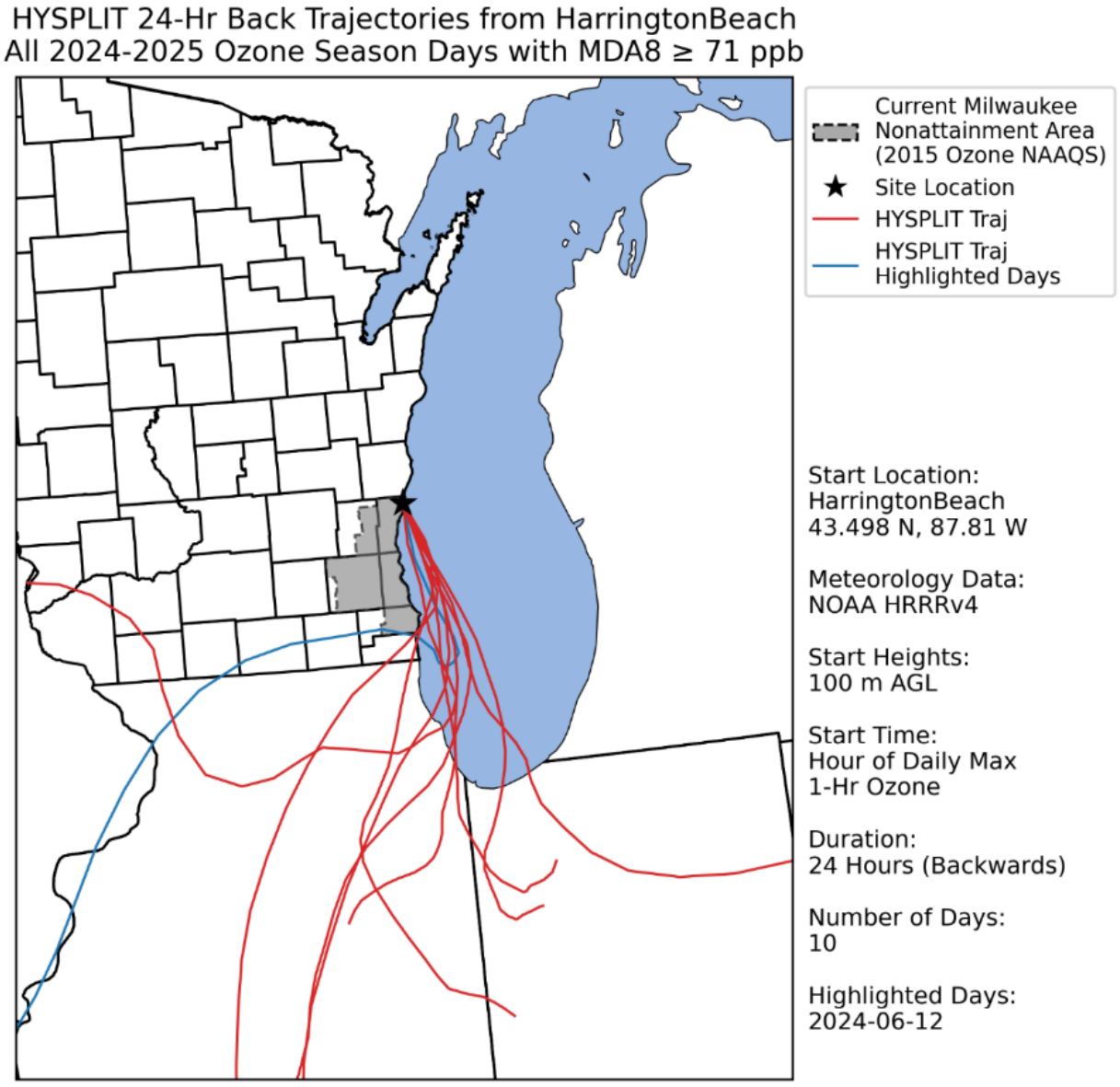


Figure 3-15: 2024 and 2025 HYSPLIT Back-Trajectories for Harrington Beach.



Analysis of the HYSPLIT runs for the Milwaukee nonattainment monitors reveals the following:

- Of the 18 exceedances measured at the Racine monitor in 2024-2025, three days had a trajectory pass through the western Milwaukee area.
- Of the eleven exceedances at the Bayside monitor, two days had trajectories passing through the western Milwaukee area.
- Of the ten exceedances at the Grafton monitor, only one trajectory passed through the western Milwaukee area.
- Likewise, only one of the ten exceedances at the Harrington Beach monitor passed through the western Milwaukee area.

In all, of the 49 total exceedances for which HYSPLIT was run for these four monitors, only seven exceedances (14%) had trajectories that passed through the western Milwaukee area. Those seven exceedances occurred on five calendar days: four in 2024 (6/12/2024, 7/15/2024, 8/24/2024, and 9/20/2024) and one in 2025 (6/11/2025). No trajectories passed through the western Milwaukee area on the remaining 17 days the Milwaukee nonattainment monitors recorded exceedances of the 2015 ozone NAAQS.

As stated in the EPA's guidance, "a set of HYSPLIT trajectories that show no wind flow from a particular region on any day with high ozone concentration measurements might provide support for discounting that region as contributing to ozone concentrations."[40] This is the case for the days in which no trajectories passed through the Western Milwaukee area. For the five days in 2024 and 2025 in which HYSPLIT trajectories did pass through the Western Milwaukee area, it is thereby important to consider other factors, such as emission levels and regional patterns of ozone concentrations, to determine the likelihood that this area contributed to NAAQS violations at the Milwaukee nonattainment monitors on those days.

3.3.3. Validating HYSPLIT Back-Trajectories Using Monitored Ozone Concentrations and Satellite Data

HYSPLIT back-trajectories are useful in characterizing the movement of air parcels through an area. A limitation of HYSPLIT modeling is that it does not tell the user how much ozone is moving along those trajectories, which is essential for determining whether those air parcels are transporting ozone to the violating monitor. It simply tells the user that the air parcel traveled along a certain path.

To address this gap, the WDNR (1) compared ozone values across the nonattainment area, to assess the potential for ozone to be transported from the western part of the Milwaukee area to the Milwaukee nonattainment monitors, and (2) analyzed satellite data to assess the relative concentrations of NO_2 in the region.

3.3.3.1. Comparing Ozone Values to Determine Potential to Transport Ozone

For the 22 days in 2024 and 2025 with exceedances at Milwaukee nonattainment monitors, the WDNR compared MDA8 ozone concentrations at the Waukesha monitor and the four

[40] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*

Milwaukee nonattainment monitors. Table 3-18 provides those ozone values and compares them with the HYSPLIT back-trajectory data.

Although there is not an ozone monitor located in Washington County, or the inland portions of Ozaukee and Racine counties, those areas share a key geographic characteristic with Waukesha in that they are all located well inland. As is explained in Section 3.4, these inland areas are significantly less influenced by the lake breeze meteorology that is the primary driver of ozone concentrations at the four Milwaukee nonattainment monitors. Therefore, using the Waukesha monitor to represent the western Milwaukee area in this intra-area comparison is supported.

Table 3-18 shows that, on four of the five exceedance days in 2024 and 2025 with trajectories that passed through the western Milwaukee area (6/12/2024, 7/15/2024, 8/24/2024, and 9/20/2024), the MDA8 value at the Waukesha monitor was well below the 70 ppb NAAQS. In addition, the MDA8 values at the Waukesha monitor were, on average, 19.3 ppb lower than the *lowest* exceedance value measured at any of the four Milwaukee nonattainment monitors on those days. This significant difference is strong evidence that western part of the Milwaukee area is not contributing ozone concentrations measured at the Milwaukee nonattainment monitors.

On the one remaining Milwaukee exceedance day with trajectories that passed through the western Milwaukee area (6/11/2025), the Waukesha monitor also had values above the NAAQS.[41] On this date, the regional air quality was significantly influenced by wildfire-generated smoke. This smoke event explains the different ozone pattern observed across all five monitors on that day, with the monitors that typically measure some of the highest values in the Milwaukee area (Grafton and Harrington Beach) measuring attainment, with the value at Waukesha being 6 ppb higher. This example is further evidence that the ozone measured in the inland and shoreline portions of the nonattainment area is influenced by different meteorological factors.

The differences in ozone values between the Waukesha monitor and the four Milwaukee nonattainment monitors are very apparent when reviewing the data graphically. Figure 3-16 shows the differences in MDA8 concentrations between the Waukesha monitor and the lowest exceedance value recorded at any of the Milwaukee nonattainment monitors for the 22 days in 2024 and 2025 in which at least one of those monitors measured an exceedance. Figure 3-17 shows the MDA8 concentrations for the Waukesha monitor compared to the four Milwaukee nonattainment monitors on just the five days a HYSPLIT back-trajectory passes through the western Milwaukee area. These figures illustrate the differences in ozone levels across the nonattainment area, and further support that the western part of the nonattainment area is not contributing to ozone on days there are exceedances at the Milwaukee nonattainment monitors.

Combined with the HYSPLIT back-trajectories, the significant differences in ozone concentrations at the Waukesha monitor are further evidence that Washington and Waukesha

[41] All five monitors also had values above the NAAQS on 9/19/2024. However, this day is not included in this assessment, which only analyzed days in which trajectories passed through the western Milwaukee area. As noted in Table 3-17, on 9/19/2024 the trajectories at the Milwaukee nonattainment monitors arrived directly from over the lake.

counties and the inland portions of Ozaukee and Racine counties were unlikely to contribute to violations of the 2015 ozone NAAQS at the Milwaukee nonattainment monitors of Racine, Bayside, Grafton, and Harrington Beach in 2024 and 2025. This strongly supports a split of the current Milwaukee NAA into two distinct nonattainment areas.

Table 3-18: 2024 and 2025 AQS and HYSPLIT Back-Trajectory Data for the Waukesha and Milwaukee Nonattainment Monitors. Figures are MDA8 ozone values in ppb.*

Date	Do HYSPLIT trajectories pass through the western Milwaukee area?	Waukesha	Racine	Bayside	Grafton	Harrington Beach
05/18/2024	No	63	69	69	69	71
06/12/2024	**Yes**	56	82	66	64	76
07/13/2024	No	60	73	73	73	67
07/15/2024	**Yes**	50	86	77	74	88
07/31/2024	No	62	76	60	58	56
08/23/2024	No	59	72	70	72	75
08/24/2024	**Yes**	64	72	71	67	68
08/25/2024	No	52	69	70	70	71
08/26/2024	No	56	84	84	90	90
08/27/2024	No	42	78	54	No data	44
09/11/2024	No	60	70	68	72	70
09/18/2024	No	70	71	62	67	64
09/19/2024	No	71	76	73	75	73
09/20/2024	**Yes**	47	73	56	50	54
06/11/2025	**Yes**	75	76	73	69	69
06/16/2025	No	70	77	75	73	71
06/29/2025	No	56	75	79	71	66
07/15/2025	No	58	76	75	73	78
08/06/2025	No	67	71	69	66	67
08/07/2025	No	61	70	77	77	78
08/15/2025	No	69	71	72	70	64
09/12/2025	No	60	71	52	46	40

* Highlighted values are exceedances of the 2015 ozone NAAQS at any Milwaukee nonattainment monitor (Racine, Bayside, Grafton, or Harrington Beach)

Figure 3-16: Ozone MDA8 Values on Days when Any Milwaukee Nonattainment Monitor Exceeded the NAAQS in 2024-2025

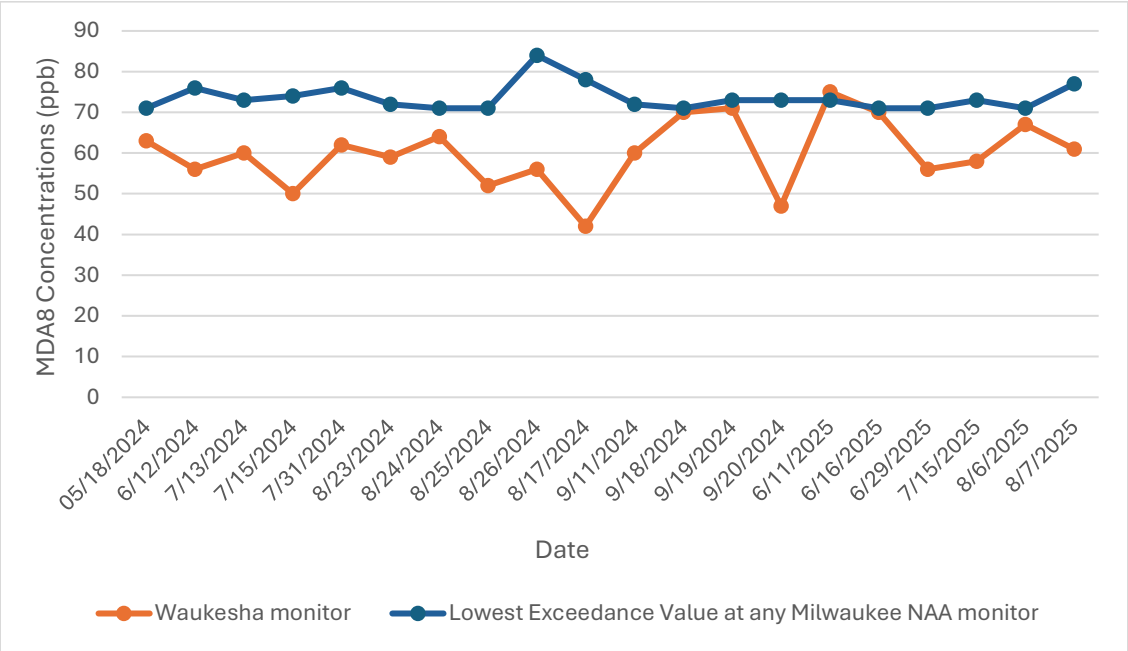
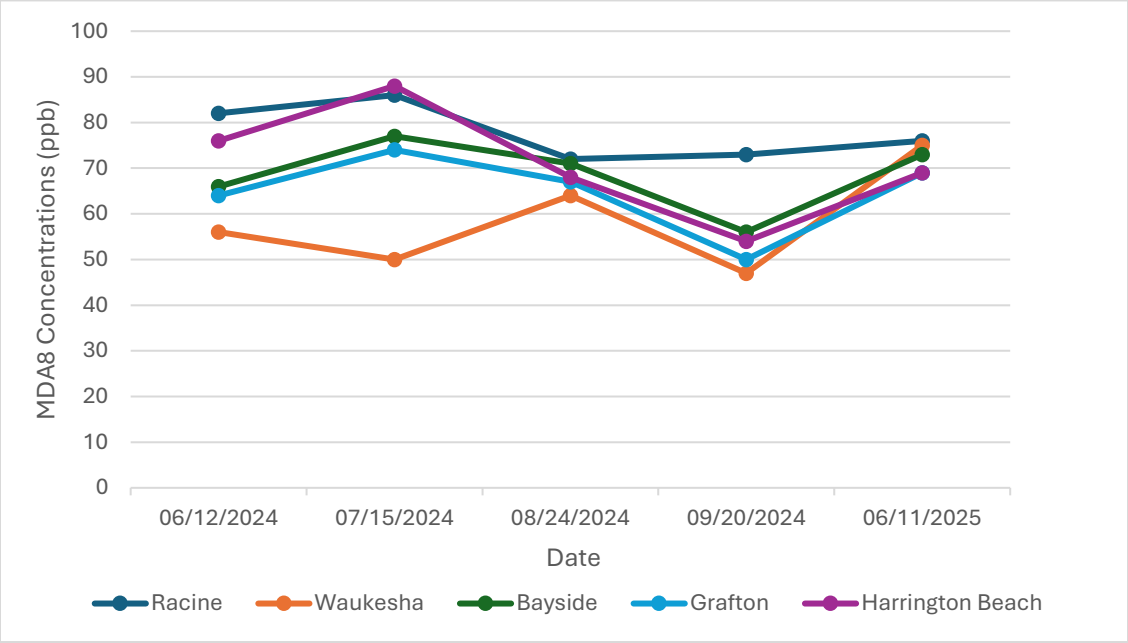


Figure 3-17: Ozone MDA8 Values on Days with HYSPLIT Back-trajectories Through the Western Milwaukee Area in 2024-2025.



3.3.3.2. Analysis of Satellite NO_2 Concentrations Data

The WDNR examined satellite data to further assess whether activity in the western part of the Milwaukee area was a likely contributor to elevated ozone levels at the Milwaukee nonattainment monitors. Specifically, the WDNR obtained vertical column NO_2 data detected by the European Space Agency's (ESA's) Tropospheric Monitoring Instrument (TROPOMI) for all five of the days in which HYSPLIT back-trajectories passed through the western Milwaukee area, as identified in Section 3.3.2.3.

Individual TROPOMI images for each of the five days in which HYSPLIT back-trajectories passed through the western Milwaukee area are provided in Appendix E. The appendix also describes the procedures used to aggregate and present the data.

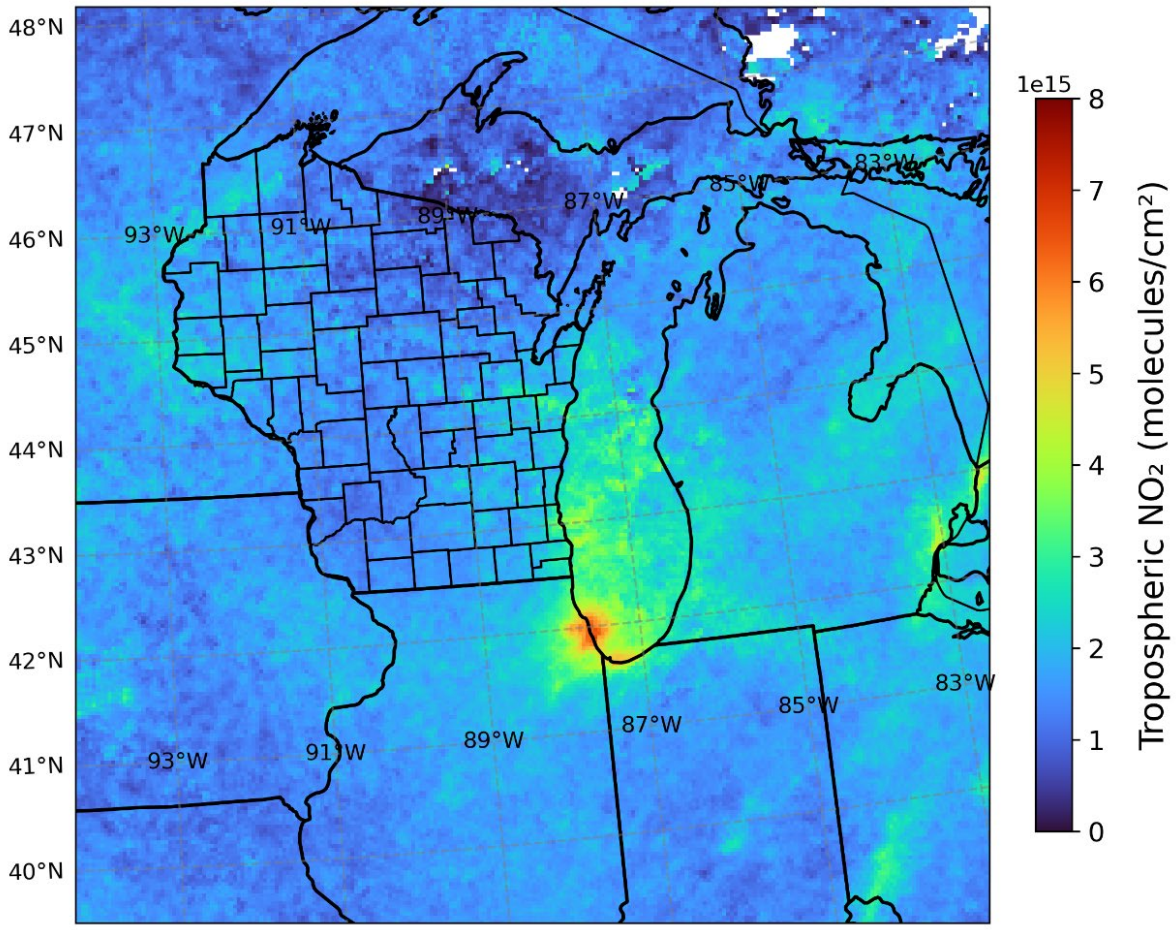
Figure 3-18 shows the mean vertical column NO_2 for all days where HYSPLIT back-trajectories passed through the western Milwaukee area on the way to the violating Milwaukee nonattainment monitors. This composite figure shows that NO_2 column concentrations are significantly higher in the greater Chicago metropolitan area, including northern Indiana, compared to anywhere else in the region. This is indicated by the orange and reddish colors. In contrast, NO_2 concentrations in Southeast Wisconsin are significantly lower, as evidenced by the cooler (green and blue) colors.

An assessment of TROPOMI images for individual days (found in Appendix E) reveals the same pattern. On some days, the NO_2 column has moved from the Chicago area out over Lake Michigan, consistent with known meteorological patterns. Notably, NO_2 concentrations in Washington, Waukesha, Ozaukee, and Racine counties are significantly lower than other areas on all five days examined. These low NO_2 concentrations indicate that these counties have significantly less NO_2, an ozone forming precursor, to influence the ozone measured at monitors in the shoreline portions of the Milwaukee nonattainment area.

These images indicate that there are significantly higher NO_2 column concentrations in the greater Chicago area on days with HYSPLIT back-trajectories through the western Milwaukee area, and that the counties in the Milwaukee area show considerably lower NO_2 concentrations in comparison. The data also indicates that NO_2 concentrations originating in the Chicago area are pulled north over Lake Michigan, consistent with the conceptual model for ozone in this region.

This indicates that even though air parcels may sometimes move through the western parts of the Milwaukee area before arriving at the Milwaukee nonattainment monitors, they are not associated with high levels of the precursor ozone pollutant NO_2. This is strong evidence that the western Milwaukee area is unlikely to contribute to NAAQS violations at the Milwaukee nonattainment monitors.

Figure 3-18: Mean TROPOMI Image Compilation of Days Where Air Parcels Passed Through the Western Milwaukee Area on the Way to a Milwaukee Nonattainment Monitor in 2024-2025.



As stated in the EPA's guidance, "HYSPLIT trajectories are very useful in combination with information on the location and magnitude of ozone precursor emissions sources."[42] The HYSPLIT trajectories, in conjunction with the monitor and satellite data presented, suggests that the magnitude of NO_2 in Southeast Wisconsin, especially in Washington, Waukesha, Ozaukee, and Racine counties, is not significantly impacting the Milwaukee nonattainment monitors.

3.3.4. Summary of Meteorology Factor

Of the 22 days the Milwaukee monitors experienced exceedances of the NAAQS in 2024 and 2025, back-trajectories and wind patterns on 17 days demonstrate that Washington, Waukesha, Ozaukee, and Racine counties had little to no effect on the Milwaukee nonattainment monitors due to a lack of wind flow between the two areas. This "might provide support for discounting that region as contributing to ozone concentrations."[43]

[42] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*
[43] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards.*

For the remaining five days that have back-trajectories through the western Milwaukee area, monitoring data analysis and TROPOMI satellite images demonstrate that the levels of ozone and NO_2 on those specific days are relatively low. It is unlikely these concentrations of ozone and NO_2 in Washington, Waukesha, Ozaukee, and Racine counties were contributing to exceedances at the Milwaukee nonattainment monitors. The TROPOMI satellite images also highlight that the metropolitan areas in the region, especially the greater Chicago area, have significantly higher levels of NO_2 compared to Washington, Waukesha, Ozaukee, and Racine counties on the days analyzed.

The HYSPLIT back-trajectories, analysis of monitoring values at Milwaukee area monitors, and the TROPOMI satellite data support the conclusion that the western part of the Milwaukee area is unlikely to have contributed to the violation of the NAAQS at the Milwaukee nonattainment monitors of Racine, Bayside, Grafton, and Harrington Beach in 2024 or 2025. The meteorology factor therefore supports the split of the current Milwaukee NAA and creation of a stand-alone Western Milwaukee NAA.

3.4. Topography and Geography

3.4.1. Overview

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. Mountains or other physical features may influence the fate and transport of emissions as well as at the formation and distribution of ozone concentrations. The absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given area.

3.4.2. The Influence of Lake Michigan on Ozone Formation and Transport in the Milwaukee Area

3.4.2.1. Lake Michigan's Influence on Milwaukee Area Ozone Levels

A key geographic factor influencing ozone formation in the Milwaukee area is Lake Michigan, which is known to drive peak ozone levels along the Wisconsin coastline. The presence of the lake, combined with synoptic and mesoscale meteorological patterns, strongly influences ozone formation and transport in the region, as described in a conceptual model in Dye et al. (1995).[44] This conceptual model consists of a series of inter-related steps:

- A shallow layer of cool air exists just above the relatively cold lake surface. During the early morning hours, the land breeze or general offshore flow (i.e., southerly to southwesterly winds) transports ozone and ozone precursor emissions into a shallow layer over Lake Michigan. A primary source region is the Chicago area, located at the southwestern edge of the lake.
- After sunrise, the air over land begins warming more quickly than the stable layer of air over the lake. The resulting temperature gradient effectively "cuts off" air in this stable

[44] Dye, T.S., P.T. Roberts, and M.E. Korc. (1995) *Observations of transport processes for ozone and ozone precursors during the 1991 Lake Michigan Ozone Study*. J. Appl. Meteor., 34: 1877-1889.

layer from additional injections of shore-emitted precursors and limits dispersion. High concentrations of ozone precursors are left to react in this layer.

- The ozone-rich air is transported northward over Lake Michigan by the prevailing winds. When a lake breeze is present, it produces southerly to south-southeasterly winds along the western shore of Lake Michigan. This wind pattern transports the ozone originating from sources in the south to downwind receptor regions in southeastern Wisconsin.

Because of these patterns, areas of Wisconsin located along the Lake Michigan shoreline are particularly susceptible to high ozone values and exceedances of the ozone NAAQS. This phenomenon has been extensively studied since the 1990s, most recently in the 2017 Lake Michigan Ozone Study (LMOS 2017).[45]

A comprehensive report updating the conceptual model of ozone formation in the Great Lakes region was released by the Lake Michigan Air Directors Consortium (LADCO) in February 2023. This report, entitled *Conceptual Models of Ozone Formation in the Great Lakes Region*, reflects the latest scientific field work and data analyses on this topic.[46] Relevant to this request, the report includes a specific discussion focused on the Wisconsin lakeshore, including the Milwaukee area. Its key findings for Milwaukee include the following:

- LADCO's classification and regression tree (CART) analysis found that southerly transport or southerly winds are the most important factors driving ozone concentrations along the entire Wisconsin lakeshore, including Milwaukee.
- Lake breeze events are the most important type of high-ozone event along the Wisconsin coastline, including the Milwaukee area, and play a significant role in ozone exceedance days at all of Wisconsin's lakeshore monitors.
- Transport from metropolitan Chicago is particularly important, as indicated by a number of lines of evidence, including source apportionment modeling, HYPSLIT results, and characteristics of the area including the narrow marine boundary layer.[47]

In the Milwaukee area, the eastern boundaries of Ozaukee, Milwaukee, and Racine counties are adjacent to Lake Michigan. LADCO's conceptual model indicates that ozone levels recorded in these areas are severely impacted by both southerly transport and the lake breeze, which drive the high ozone values measured at the Racine, Bayside, Grafton, and Harrington Beach monitors located in the shoreline areas of these counties.

Numerous studies have concluded that lake breezes with ozone-rich air are confined to a narrow band along the Wisconsin lakeshore. For example, analyses of long-term monitoring data from the paired (shoreline and inland) ozone monitors in Sheboygan and Kenosha counties, coupled with observations from the LMOS 2017 campaign, quantified the lakeshore ozone gradient based on different lake breeze conditions. In situations where lake breezes reached the inland monitors

[45] Stanier, C.O. et al. (2021). *Overview of the Lake Michigan Ozone Study 2017*. Bull. Am. Meteor. Soc. https://doi.org/10.1175/BAMS-D-20-0061.1
[46] Dickens, A. F. (2023). *Conceptual Models of Ozone Formation in the Great Lakes Region.* Lake Michigan Air Directors Consortium. Available at: Ozone-conceptual-model-report-FINAL-Feb-2023.pdf
[47] Dickens, A. F.

located 5.2–5.6 km from the lakeshore, the ozone concentrations carried by these lake breezes decrease by an average of 3-5 ppb as they move inland.[48] During "near-shore" lake breeze events (when the lake breeze never reaches the inland monitors), the decrease in ozone concentrations are even more pronounced, reaching 25 ppb in just 5 km in Sheboygan and 15 ppb in 5.5 km in Kenosha.[49]

These findings are reinforced by an independent analysis of LMOS 2017 data that characterized the lake breeze front as a near-vertical wall about 100 meters deep, displacing the predominately westerly flow, with some lake breezes impacting conditions "only within a few hundred meters of the shore or less."[50] This would be consistent with the steep drop-off of ozone values observed at the paired monitors in Sheboygan and Kenosha and indicates that, during high-ozone events, a steep, lake breeze-inducted ozone gradient can exist along all of Wisconsin's Lake Michigan shoreline, including in Milwaukee.

Ground-based measurements conducted during LMOS 2017 suggested that the lake breeze can sometimes reach as far inland as the Waukesha monitor.[51] However, as described in Section 3.1.3.3, years of monitored values indicate that these instances do not occur frequently enough to cause violations of the NAAQS at that monitor. This substantiates that deep lake breezes rarely penetrate that far from the coast, or, if they do, factors such as increasing vertical mixing with distance from the coast dilute concentrations of ozone or ozone precursors to a level insufficient to cause violations of the NAAQS

When considered together, these studies support the conclusion that the lake breeze transports high-ozone air from over Lake Michigan to the Wisconsin lakeshore. This mass of ozone-rich air typically penetrates less than 5-6 kilometers (3-4 miles) inland, resulting in a narrow band of peak ozone that decreases precipitously at the leading edge of the lake breeze front. While the studies documenting this mechanism are largely based on LMOS 2017 observations and data collected to the north and south of metro Milwaukee (Sheboygan and Kenosha counties, respectively), LADCO's conceptual model indicates that the lake breeze phenomenon is not limited to these areas, but occurs all along the Wisconsin lakeshore, including the Milwaukee area. As such, these studies strongly support the finding that, due to the well-documented lake breeze, high ozone values in Ozaukee and Racine counties are likely to be confined to a narrow coastal band along their shorelines.

3.4.2.2. Refining the Spatial Extent of the Lake Breeze

As described above, field studies have concluded that air masses containing ozone-rich air moving onshore from over Lake Michigan will often penetrate just 3-4 miles inland along all of the Southeast Wisconsin, including the Milwaukee area. This will cause ozone values along the

[48] Cleary, P. A., et al. (2022). *Impacts of lake breeze meteorology on ozone gradient observations along Lake Michigan shorelines in Wisconsin*. Atmospheric Environment. Available at: www.sciencedirect.com/science/article/pii/S1352231021006567?utm_source=chatgpt.com.
[49] Cleary, P. A., et al.
[50] Wagner, T. J. et al. (2022) Observations of the Development and Vertical Structure of the Lake-Breeze Circulation during the 2017 Lake Michigan Ozone Study. Journal of the Atmospheric Sciences. Available at: https://journals.ametsoc.org/view/journals/atsc/79/4/JAS-D-20-0297.1.xml
[51] Cleary, P. A. et al.

shoreline to be significantly higher than values measured just a few miles further west. Due to the nature of the lake breeze, studies have shown this difference in ozone levels occurs over a relatively steep gradient.

To help further resolve the spatial extent of the lake breeze, the WDNR reviewed certified data from all of Wisconsin's ozone monitors for the 2020 through 2025 ozone seasons (except for 2023, whose ozone values were substantially influenced by widespread wildfire smoke events). Using this data, the WDNR generated a map illustrating the probability that areas of Southeast Wisconsin would experience ozone values exceeding the 2015 ozone NAAQS of 70 ppb. A description of the data and methods used to generate this graphic is provided in Appendix F.

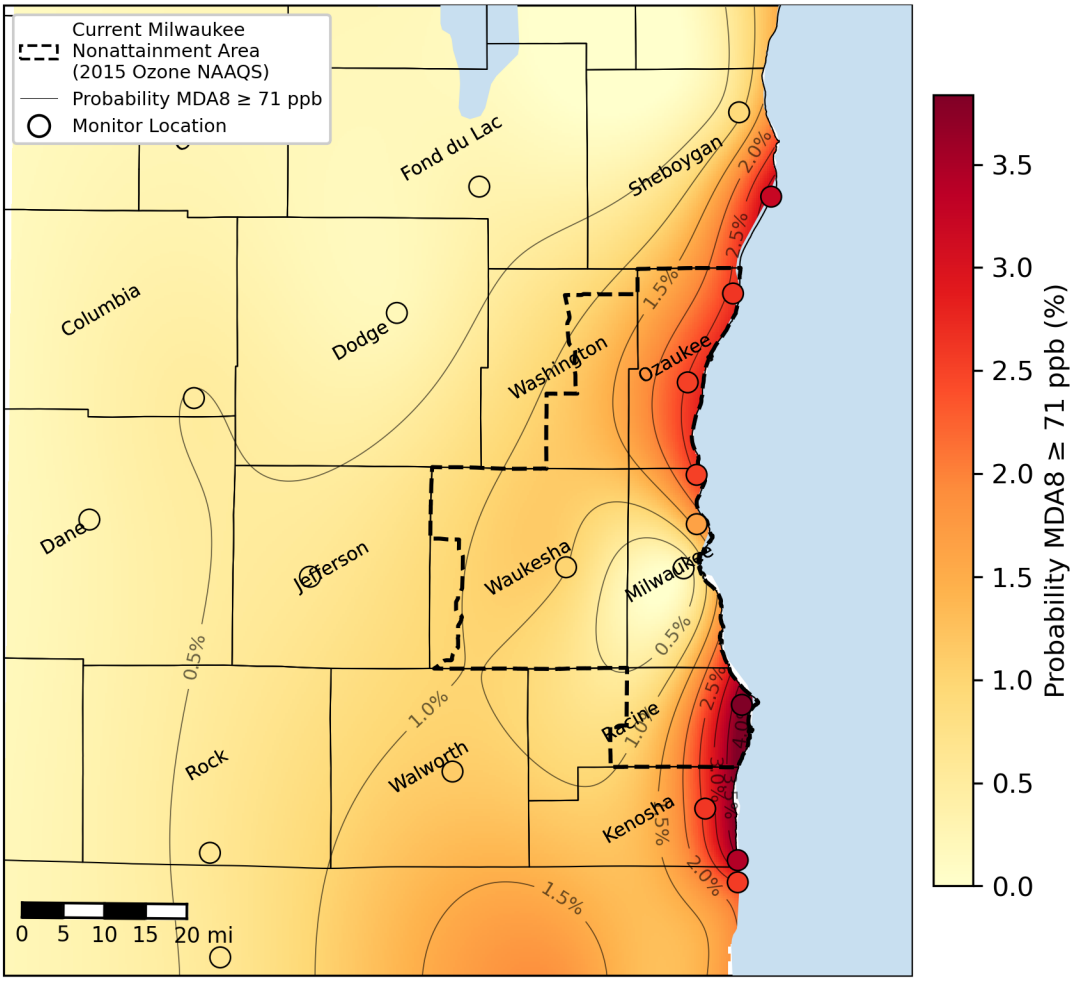
The results of this analysis are provided in Figure 3-19. As this figure illustrates, the chance of the 2015 ozone NAAQS being exceeded on any given ozone day in the Milwaukee area is highest along the lakeshore. This probability decreases substantially as distance from the lake increases, with the area of highest probability being confined to a very narrow band (approximately 5 miles wide) that follows most of the shoreline. This is strong confirmation that the lake breeze-induced high ozone gradient known to exist along the lakeshore in Sheboygan and Kenosha counties extends to the neighboring counties of Ozaukee and Racine as well.

The notable exception to this pattern is central Milwaukee County, which shows a lower probability of exceeding the NAAQS, even near the lake. This is likely due to urban ozone titration, which may outweigh the impact of the lake breeze in this particular portion of the state.

In Ozaukee and Racine counties, the probability of an exceedance is near or above 3% at the lakeshore, decreasing to 1.5% or less in the western portions of those counties. In other words, the shoreline portions of Ozaukee and Racine counties are at least twice as likely to experience an MDA8 value of 71 ppb or higher during the ozone season than areas of those counties located just a few miles to the west. This is consistent with what is known (through LMOS 2017 studies, among others) about the depth of lake breeze penetration in the adjacent counties of Sheboygan and Kenosha.

Of particular relevance to this Section 107(d)(3)(D) request, this figure also shows that the chances of high ozone values being experienced in the western portions of Ozaukee and Racine counties are far more similar to those of Washington and Waukesha counties than the lakeshore parts of Ozaukee and Racine counties. This is strong, corroborating evidence that, during the lake breeze, the western part of the Milwaukee area (i.e., Washington and Waukesha counties, and the inland portions of Ozaukee and Racine counties) is frequently located within an air mass that is distinct from the shoreline parts of the Milwaukee area. This difference strongly supports the designation of a stand-alone Western Milwaukee NAA that is separate from the rest of the Milwaukee NAA.

Figure 3-19: Probability of an MDA8 Value Exceeding the 2015 Ozone NAAQS During the Ozone Season. Based on 2020-2025 monitored ozone values (excluding 2023).



3.4.3. Summary of the Topography and Geography Factor

Southeastern Wisconsin does not have any major terrestrial features that impact ozone concentrations. However, Lake Michigan greatly influences the fate and transport of emissions, as well as the formation and distribution of ozone concentrations in the Milwaukee area. The combination of southerly transport and the lake breeze moves ozone and ozone precursors out over the lake and transports them to the Milwaukee area. This results in exceedances at the Racine, Bayshore, Grafton, and Harrington Beach monitors, all of which are located less than two miles from the lake.

Since the lake breeze often penetrates just a few miles inland, the western parts of the Milwaukee area (Washington and Waukesha counties, as well as the inland portions of Ozaukee and Racine counties) frequently share an air mass distinct from the shoreline parts of the Milwaukee area. This conclusion is supported by both published scientific papers and updated analyses of ozone data, and is strongly supportive of this request to split the current Milwaukee NAA into two distinct nonattainment areas.

3.5. Jurisdictional Boundaries

3.5.1. Overview

In its guidance on area designations for the 2015 ozone NAAQS, the EPA states that "existing jurisdictional boundaries may be considered for the purposes of providing a clearly defined legal boundary and carrying out the air quality planning and enforcement functions for nonattainment areas." The analysis of jurisdictional boundaries looks at the organizational structure of an area to determine if controls in a potential nonattainment area can be implemented in a cohesive manner. Examples of jurisdictional boundaries include counties, air districts, and metropolitan planning organizations.

All of Wisconsin's air quality management is under the jurisdiction of the State of Wisconsin. Air quality issues are handled by a single agency, the Bureau of Air Management within the WDNR. Efficient and effective air quality management will therefore remain intact and will not be affected by the creation of a stand-alone Western Milwaukee NAA.

The Southeast Wisconsin Regional Planning Commission (SEWRPC) is the federally designated Metropolitan Planning Organization (MPO) for Southeastern Wisconsin. Through this role, SEWRPC ensures that all transportation planning and programming requirements (such as transportation conformity) are met through a comprehensive, cooperative, and continuing planning process. The split of the current Milwaukee NAA into two distinct nonattainment areas would not negatively impact the transportation planning process in this part of Wisconsin.

Finally, the WDNR, SEWRPC, and other governmental units in Southeastern Wisconsin have considerable experience implementing $PM_{2.5}$ and ozone nonattainment areas. This includes administering partial county areas in both Kenosha County (for the 2008 and 2015 ozone NAAQS) and the current 2015 ozone NAAQS Milwaukee NAA.

3.5.2. Alignment with Adjacent Nonattainment Areas

The proposed split of the Milwaukee NAA would also enhance air quality planning and enforcement functions in Southeast Wisconsin by aligning with the boundaries of the revised Milwaukee NAA with the adjacent, 2015 ozone NAAQS nonattainment areas located directly north and south of Milwaukee. These are the Sheboygan County, WI nonattainment area, which borders Ozaukee County to the north, and the Kenosha County portion of the Chicago, IL-IN-WI nonattainment area, which borders Racine County to the south.

Specifically, the use of County Road KW as the boundary between the Western Milwaukee NAA and the revised Milwaukee NAA in Ozaukee County would align the split with the western boundary of the Sheboygan County nonattainment area, which is also County Road KW.[52] In

[52] 40 CFR § 81.350 defines the Sheboygan County, WI 2015 ozone NAAQS nonattainment area as: "Inclusive and east of the following roadways with the boundary starting from north to south: Union Road which turns into County Road Y which turns into Highland Drive, to Lower Road which turns into Monroe Street, to Broadway/Main Street to Highway 32 which turns into Giddings Avenue to County Road W to County Road KW."

both Sheboygan and Ozaukee counties, County Road KW itself would be included in nonattainment areas located on the eastern (lakeshore) side of the roadway.

Likewise, the selection of Interstate 94 as the boundary between the Western Milwaukee NAA and the revised Milwaukee NAA in Racine County would align the split with the western boundary of the Kenosha County nonattainment area, which is also Interstate 94.[53] In both counties, the interstate itself would be included in nonattainment areas located on the eastern (lakeshore) side of the highway.

Aligning the boundaries of adjacent nonattainment areas in this manner will simplify CAA implementation, facilitate easier compliance with regulatory requirements such as transportation conformity, and promote efficient regional air quality planning across these ozone nonattainment areas.

3.5.3. Summary of the Jurisdictional Boundaries Factor

There are no issues associated with the jurisdiction factor that would prevent creating a stand-alone Western Milwaukee NAA. Splitting the current Milwaukee NAA as proposed in this request will have the benefit of aligning nonattainment area boundaries with adjacent 2015 ozone NAAQS nonattainment areas, thereby facilitating efficient and effective CAA implementation. The jurisdictional factor therefore supports the creation of a stand-alone Western Milwaukee NAA.

4. CONCLUSION

This document is a formal request to the EPA from the State of Wisconsin to revise the boundary of the Milwaukee NAA.

In following guidance for establishing nonattainment area boundaries, and precedents set by rulemakings revising nonattainment area boundaries in other areas, the WDNR completed a five-factor technical analysis supporting the requested revision to the Milwaukee NAA boundary. The analysis clearly demonstrates that circumstances surrounding the delineation of the Milwaukee NAA's boundaries made by the EPA in its July 14, 2021 rule have changed. Wisconsin requests that the nonattainment area be split into two distinct nonattainment areas for the 2015 ozone NAAQS: a Western Milwaukee NAA encompassing Waukesha and Washington counties and the inland portions of Ozaukee and Racine counties, and a revised Milwaukee NAA comprised of the remainder of the current nonattainment area. Together, the proposed separate nonattainment areas would encompass the identical geographic area as the current Milwaukee nonattainment area.

[53] 40 CFR § 81.350 defines the Kenosha portion of the Chicago, IL-IN-WI 2015 ozone NAAQS nonattainment area as: "The portion of Kenosha County bounded by the Lake Michigan shoreline on the East, the Kenosha County boundary on the North, the Kenosha County boundary on the South, and the I-94 corridor (including the entire corridor) on the West."