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November 25, 2013

Susan Hedman
Regional Administrator
U.S. EPA Region 5
77 West Jackson Boulevard
Mail Code: R-19J
Chicago, IL 60604-3507

Subject: Designation Recommendations for the 2012 Annual Fine Particulate Matter ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS) for the State of Wisconsin

Dear Administrator Hedman:

In accordance with section 107(d)(1)(A) of the Clean Air Act, I am pleased to recommend that all seventy two counties in Wisconsin should be designated as attainment for the 2012 annual $PM_{2.5}$ NAAQS. This recommendation is based on air monitoring data collected by the Wisconsin Department of Natural Resources (WDNR). A technical support document developed by the WDNR is enclosed with this letter that further supports my recommendation.

Thank you for the opportunity to submit the State of Wisconsin's recommendation on this important air quality matter. If you have any questions or need additional information, please feel free to contact WDNR Air Management Bureau Director Bart Sponseller at 608-264-8537.

Sincerely,

Scott Walker
Governor

Enclosures:

(1) 2012 Annual $PM_{2.5}$ National Ambient Air Quality Standard Technical Support Document

cc: Cathy Stepp, Secretary, WDNR

Annual Fine Particle Matter Standard Designation Technical Support Document

Wisconsin Department of Natural Resources (WDNR)
November, 2013

In December 2012, the U.S. Environmental Protection Agency (EPA) promulgated revisions to the 2006 particulate matter National Ambient Air Quality Standard (NAAQS). The revisions became effective in March 2013, lowering the annual fine particulate matter ($PM_{2.5}$) NAAQS from 15 micrograms per cubic meter ($\mu g/m^3$) to 12 $\mu g/m^3$, and retaining the current 24-hour $PM_{2.5}$ standard at 35 $\mu g/m^3$.

In the U.S. EPA's April 2013 "*Guidance for Area Designations for the 2012 Annual $PM_{2.5}$ NAAQS*", they state that a minimum of five factors are appropriate to consider when making nonattainment area boundary recommendations, and each area should be evaluated on a case-by-case basis. These five factors include the following:

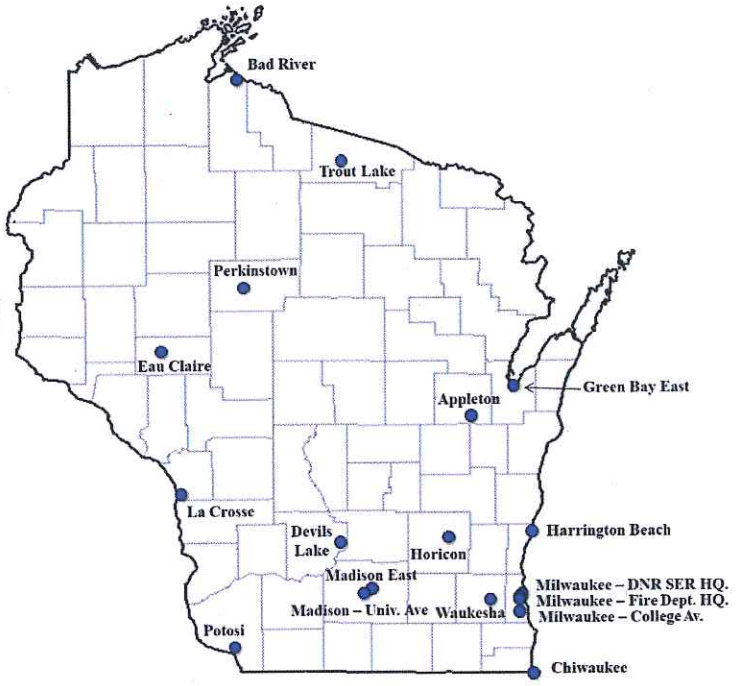
1. Air quality data
2. Meteorology (weather / transport patterns)
3. Geography / topography (mountain ranges or other air basin boundaries)
4. Emissions data
5. Jurisdictional boundaries (e.g., counties, air districts, Reservations, metropolitan planning organizations)

This technical support document evaluates these five factors and recommends that all seventy-two Wisconsin counties be recommended as being in attainment for the revised annual $PM_{2.5}$ NAAQS.

1. Air Quality Data

The following figure shows the Federal Reference Method (FRM) $PM_{2.5}$ monitors in Wisconsin.

Figure 1: Wisconsin $PM_{2.5}$ FRM Monitors



Design values for determining compliance with the annual $PM_{2.5}$ NAAQS are determined as follows:

- Collect three complete years of FRM $PM_{2.5}$ daily monitoring data;
- Calculate four quarterly means for each of the three years;
- Calculate the annual mean from the four quarterly means for each of the three years; and
- Calculate the three-year average of the annual means (rounded to a whole number).

The following table shows annual $PM_{2.5}$ design values from monitoring conducted in Wisconsin based on data periods from 2009 – 2011 and 2010 – 2012. It is important to note that all of the design values are below the annual $PM_{2.5}$ NAAQS of 12 $\mu g/m^3$ and all decreased from 2009 – 2011 compared to 2010 – 2012.

Table 1: Annual $PM_{2.5}$ Design Values in Wisconsin

Site Name	Site ID	County	Latitude	Longitude	Date Established	Sampling Frequency (Day)	Design Values ($\mu g/m^3$)	
							2009 – 2011	2010 - 2012
Appleton	550870009	Outagamie	44.31	-88.40	12/31/1998	Daily	9.8	9.2
Bad River	550030010	Ashland	46.60	-90.66	07/25/2002	1 in 6	5.5	5.3
Chiwaukee	550590019	Kenosha	42.50	-87.80	08/31/2011	1 in 3	Inc.	Inc.
Devils Lake	551110007	Sauk	43.43	-89.67	05/09/2003	1 in 6	9.1	8.3
Eau Claire	550350014	Eau Claire	44.76	-91.41	04/01/2011	1 in 6	Inc.	Inc.
Green Bay East	550090005	Brown	44.51	-87.99	01/01/1999	Daily	10.4	9.6
Harrington Beach	550890009	Ozaukee	43.50	-87.81	06/23/2003	1 in 6	9.5	9.1
Horicon	550270001	Dodge	43.46	-88.62	12/18/2009	1 in 3	Inc.	9.3
La Crosse	550630012	La Crosse	43.77	-91.22	12/07/2005	1 in 3	9.6	8.8
Madison - Univ. Ave.	550250047	Dane	43.07	-89.44	01/03/1999	Daily	10.6	9.9
Madison East	550250041	Dane	43.10	-89.36	04/02/2010	1 in 6	Inc.	Inc.
Milwaukee - 16th St. H.C.	550790010	Milwaukee	43.02	-87.93	01/01/1999	1 in 3	11.1	10.9
Milwaukee - College Ave.	550790058	Milwaukee	42.93	-87.93	11/03/2009	1 in 6	Inc.	11.2
Milwaukee - DNR SER HQ.	550790026	Milwaukee	43.06	-87.91	01/01/1999	1 in 6	10.8	10.2
Milwaukee - Fire Dept. HQ.	550790099	Milwaukee	43.04	-87.93	01/01/2012	1 in 3	Inc.	Inc.
Perkinstown	551198001	Taylor	45.20	-90.60	05/03/2003	1 in 6	7.9	7.8
Potosi	550430009	Grant	42.69	-90.70	01/06/1999	1 in 3	10.7	10.0
Trout Lake	551250001	Vilas	46.05	-89.65	01/01/1999	1 in 6	6.1	5.8
Waukesha	551330027	Waukesha	43.02	-88.22	01/01/1999	1 in 6	11.7	11.3

Inc. – Three years of complete data is not available to calculate a design value.

2. Meteorology

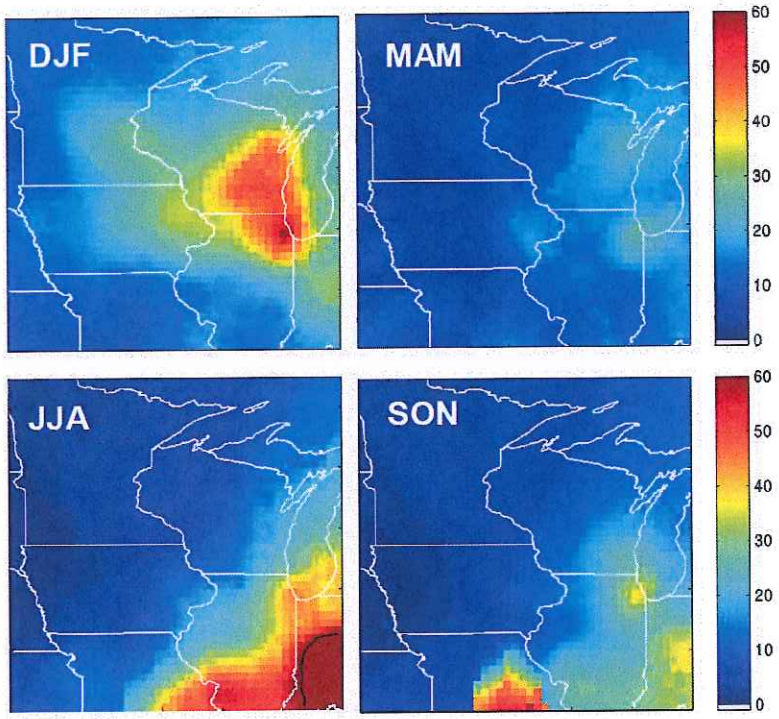
The Phase I report of the Lake Michigan Air Directors Consortium (LADCO) Winter Nitrate Study[1] summarized the impact of meteorology on $PM_{2.5}$ concentrations in the Midwest. The Phase I report states that "a number of studies demonstrate that meteorology and high $PM_{2.5}$ episodes in the Midwestern U.S. are tightly linked." The highest $PM_{2.5}$ concentrations are typically observed in summer and winter. Elevated $PM_{2.5}$ concentrations in the summer are typically linked to elevated sulfate levels, whereas elevated $PM_{2.5}$ concentrations in the winter are typically linked to elevated nitrate levels.

As part of the Winter Nitrate Study, a $PM_{2.5}$ episode indicator was developed. The episode index is calculated as follows:

Episode Index = $\sum$max[0, (Daily $PM_{2.5}$ Concentration – 27 $\mu g/m^3$)]

The following figure shows the episode index based on monitoring data from 2001 – 2009. In Wisconsin, elevated $PM_{2.5}$ levels are typically only observed in the winter months (i.e., December, January and February).

Figure 2: LADCO Winter Nitrate Study Episode Index by Season (2001 – 2009)



Elevated $PM_{2.5}$ concentrations in winter typically occur when a ground-level temperature inversion is present. These inversions can be very strong when snowpack is present and warmer air (i.e., > 32 °F) arrives in the region. In addition to the warmer temperatures, light winds and increased relative humidity can increase or facilitate higher $PM_{2.5}$ concentrations.

[1] http://www.ladco.org/reports/pm25/winter_nitrate/phase1_report_nov11.pdf

3. Geography / Topography

Wisconsin can be divided into five geographic regions as shown in Figure 3. Topography varies across these five regions as shown in Figure 4.

Figure 3: Wisconsin Geographic Regions

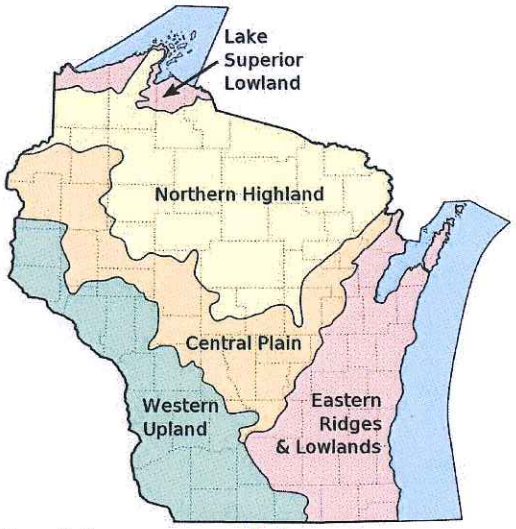


Figure Reference: www.worldofmaps.net

Figure 4: Wisconsin Elevation Map

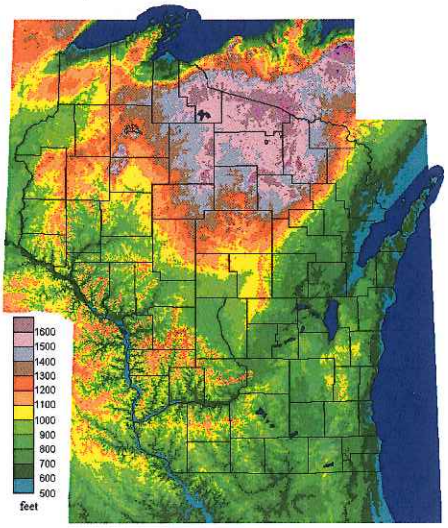


Figure Reference: www.uwgb.edu

Geography does not appear to play a major role in monitored $PM_{2.5}$ concentrations throughout the state. The southeast portion of the state has the highest $PM_{2.5}$ levels (annual average: 10 – 11 $\mu g/m^3$) and is the flattest region of the state. River valleys have the potential to trap pollutants and increase $PM_{2.5}$ concentrations under certain meteorological conditions. However, two WDNR sites (La Crosse and Potosi) located in the Mississippi river valley area are still far below the annual $PM_{2.5}$ NAAQS and consistent with other measurements throughout the state.

4. Emissions Data

$PM_{2.5}$ is emitted directly into the atmosphere and created secondarily in the atmosphere via chemical reactions of precursor pollutants. The precursor pollutants include nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC) and ammonia (NH_3). The following tables show annual emissions data for Wisconsin from the U.S EPA (2008 NEI v3).

Table 2: Annual $PM_{2.5}$ and Precursor Emissions in Wisconsin (Tons/Year)

Pollutant	Point	Nonpoint	Onroad	Nonroad
NO_x	90,939	68,713	118,232	47,205
SO_2	193,625	7,385	628	809
VOC	31,604	607,089	55,690	96,948
NH_3	953	118,067	2,294	57
$PM_{2.5}$	3,632	73,448	4,589	4,675

Data Source: http://www.epa.gov/pmdesignations/2012standards/techinfo.htm#F2

Table 3: Percentage of Annual $PM_{2.5}$ and Precursor Emissions by Source Sector

Pollutant	Point	Nonpoint	Onroad	Nonroad
NO_x	28.0%	21.1%	36.4%	14.5%
SO_2	95.6%	3.7%	0.3%	0.4%
VOC	4.0%	76.7%	7.0%	12.3%
NH_3	0.8%	97.3%	1.9%	0.0%
$PM_{2.5}$	4.2%	85.1%	5.3%	5.4%

5. Jurisdictional Boundaries

Wisconsin consists of 72 distinct counties with 15 metropolitan statistical areas (MSAs) and 13 micropolitan statistical areas (μSAs). It is possible to create nonattainment areas that consist of groups of counties, partial counties, MSAs, μSAs, and/or census tracts. Given that all of the $PM_{2.5}$ monitoring data within the state indicates attainment of the annual $PM_{2.5}$ NAAQS, the WDNR did not consider additional analysis of jurisdictional boundaries beyond the individual county level.