The attached guidance, "Guidance on Air Quality Background Concentrations" was developed to inform and provide background concentrations to be included in air quality assessments. Both internal staff and external stakeholders will utilize this guidance document to determine one part of approvability during review of air pollution control permits.

For a permit to be approvable by the Department, when modeling is required, the total impact of the modeled concentration plus the background concentrations must be below the appropriate National Ambient Air Quality Standard. The background concentration accounts for emissions from nearby industrial sources, residential impacts, and mobile sources.

This draft guidance was developed by Department staff from guidance first released in 2008. This draft guidance was released to the Air Management Study Group on September 5, 2014. No substantive comments were received; however small changes were made to the September 5th version. Once the 21 day public notice period is complete, all comments will be considered, revisions will be made to the guidance as necessary, and the final guidance will be made available to the appropriate internal staff and external stakeholders.

Comments related to this draft guidance document should be sent to John Roth, (608) 267-0805 or john.roth@wisconsin.gov.

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CORRESPONDENCE/MEMORANDUM

DATE: November 1, 2014

TO: Permit & Compliance Staff

FROM: Stationary Source Modeling Team

SUBJECT: Guidance on Background Concentrations[1]

INTRODUCTION

The Air Management Program has prepared the following update to the background concentrations, focusing on particulate matter and the boundaries of areas that use either high or low values. Background concentrations for TSP have been removed and background concentrations for $PM_{2.5}$ have been updated to reflect current statewide monitored values. Air Management is updating these values due to a recent regulatory action to designate the entire state as attaining the $PM_{2.5}$ standards.

The background concentrations listed in the following table are the values that will be used for air dispersion modeling as of the date of this memorandum. WDNR will not consider requests for alternate background concentrations unless the source has installed an ambient monitor in an appropriate location and has a minimum of two (2) full years of data. If the source has this data, WDNR will work with the source to develop source-specific background concentrations.

Wisconsin Background Concentrations
(All Concentrations in $\mu g/m^3$)

Pollutant	Time Period	High Value	Low Value
$PM_{2.5}$	24 Hour Annual	23.6 9.4	19.8 7.6
PM_{10}	24 Hour	47.0	29.4
Pb	Quarterly	0.02	0.01
SO_2	3 Hour 24 Hour Annual	43.2 30.5 8.6	11.8 11.2 5.4
NO_x	Annual	24.1	8.0

[1] This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

CO	1 Hour 8 Hour	1,362.7 1,191.2	950.5 904.7

IMPLEMENTATION

Beginning November 1, 2014 draft permits that have yet to be public noticed and that require a modeling analysis will be evaluated with the $PM_{2.5}$ background concentrations noted in this memo. Permits already in public comment or waiting to be issued can be re-evaluated on a case-by-case basis to determine if the updated background concentrations can be applied. Please note that if a draft permit is already in public comment and the updated background concentrations indicate that a change to emission limits or hours of operation could be allowed, then it is likely that a new public notice and a new comment period would be held. For facilities holding issued permits, any request to increase $PM_{2.5}$ emission limits could trigger the requirement for a construction permit. Current regulations do not contain a special exemption or revision pertaining to changes in model formulation or background concentration

HISTORY

During 2007, as part of the Department's Air Permit Improvement Initiative, WDNR Air Management staff met with consultants, industry representatives, attorneys, and other interested parties to solicit ideas and discuss options for streamlining the ambient air quality assessments performed in conjunction with issuing air pollution control permits. Thirty-two people participated in the Air Quality Assessment group, including representatives from the United States Environmental Protection Agency (USEPA), Wisconsin Manufacturers and Commerce (WMC), Wisconsin Paper Council (WPC), Sierra Club, industry, and several law firms.

One major issue that was discussed with the Air Quality Assessment group was background concentrations. When performing an assessment of the impact of air emissions from a stationary source for an air permit, background concentrations are included to account for nearby and distant emissions from natural and anthropogenic sources that are not explicitly analyzed. Examples of sources not typically explicitly modeled include nearby point sources, mobile sources, and fugitive emissions sources.

METHODOLOGY

Geographic Areas

Historically, background concentrations for each pollutant were established by county in Wisconsin. Ambient air quality monitors do not exist in each county, so representative values from other counties were assigned to counties without monitors. During the 2007 meetings, a sub-group of consultants and DNR staff was formed from the AQA group to assess the validity of the county by county approach and to determine if changes were needed. Since many counties in Wisconsin have one or two large cities with the bulk of the county being suburban, agricultural, or rural, the sub-group decided that background concentrations should be determined for cities or villages, rather than being determined for counties. The sub-group recommended that higher background concentrations be set for areas with greater populations and industry aggregations, and lower background concentrations be set for other areas.

The Department stated it would review the 2010 census date for changes in population that could affect the boundaries between high and low background areas. As part of this update, the following changes were made:

- Altoona (outside Eau Claire) moved to Low Area
- Stevens Point moved to High Area, along with Whiting and Plover
- Mount Pleasant (outside Racine) is in the High Area, along with Sturtevant
- City of Pewaukee and Village of Pewaukee moved to High Area

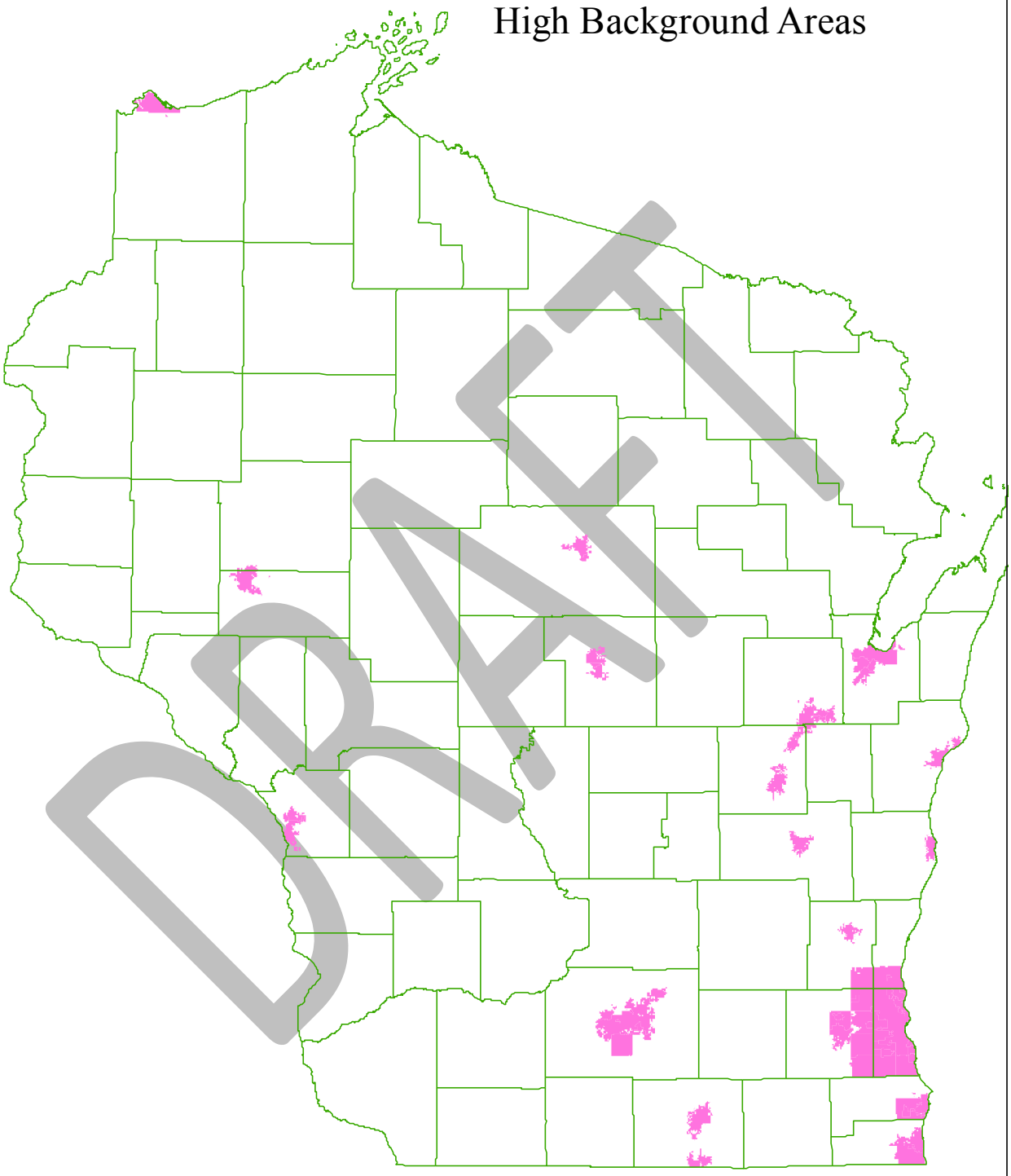
To determine the proper population threshold separating higher background concentrations areas from lower, all cities and villages in Wisconsin were examined using the year 2010 U.S. Census data. Cities and villages with populations of 5 000, 10 000, 15 000, 20 000, and 25 000 residents were identified. Many small cities and villages have populations of 1 000 to 15 000 residents. Using their collective knowledge and professional judgment, the sub-group concluded that these smaller cities and villages (i.e. with a population of 15 000 or less) generally have less industry, fewer residential emissions, and less traffic, so higher background concentrations would not be appropriate.

Areas such as Wisconsin Rapids and Marshfield have populations in the 15 000 to 20 000 resident range. The sub-group concluded that while these cities have industrial development, the industries are often comprised of one or two large facilities that can be, and often are, modeled together and therefore not considered part of the background concentration. It was also determined that the historic background concentrations used for these cities is lower than the higher background concentrations being considered, so moving those cities and villages into a higher background concentration category would not be justified.

Using a 25 000 population threshold, the city of Superior would be in the higher background category, as would the city of Fond du Lac, but the cities of Marshfield and Wisconsin Rapids would be in the lower background concentration category. This approach is consistent with the historic background concentrations that are being used in these cities and also captures the more industrial areas of Wisconsin into the high background category.

Many of the larger cities in Wisconsin have neighboring suburbs that, when combined, are considered one metropolitan area. Legally and administratively, these cities and villages are separate entities but for the purposes of background concentrations these areas are considered as one contiguous region. The year 2010 U.S. Census data was again consulted and a list was created of all cities and villages immediately adjacent to a larger city or village (i.e. one with population of 25 000 people or more). For the purposes of this document, if the population density of the neighboring city or village is more than half the population density of the main city or village, then it is considered a portion of the main city or village. Also, if the larger city or village surrounds another city or village, the surrounded entity was considered a portion of the main city or village. This total area is then assigned the higher background concentration. Using this method, the following map and table were developed to show in what areas the higher background concentration should be used and in what areas the lower concentration should be used.

Wisconsin Background Concentration
High Background Areas



Cities and villages can change their boundaries (e.g. through annexation), so the figure is not an official indicator of the proper background concentrations to use. The following table lists all the areas where the higher background concentrations should be used. If a given area expands due to annexation or incorporation, the higher background concentration values would apply to the additional (i.e. annexed, incorporated) area.

Higher Background Areas in Wisconsin	
Main City	Additional Incorporated (City or Village) Areas
Superior	-
Eau Claire	-
Wausau	Schofield
Stevens Point	Plover, Whiting
La Crosse	Onalaska
Green Bay	Ashwaubenon, Allouez, De Pere
Appleton	Menasha, Neenah, Little Chute, Kimberly, Combined Locks, Kaukauna
Manitowoc	Two Rivers
Oshkosh	-
Fond du Lac	North Fond du Lac
Sheboygan	-
West Bend	-
Madison	Middleton, Shorewood Hills, McFarland, Maple Bluff, Sun Prairie, Monona, Fitchburg
Janesville	-
Beloit	-
Kenosha	Pleasant Prairie
Racine	Mount Pleasant, Sturtevant
Milwaukee	St. Francis, Cudahy, South Milwaukee, Oak Creek, Franklin, Greenfield, Greendale, Hales Corners, West Allis, West Milwaukee, Wauwatosa, Shorewood, Glendale, Whitefish Bay, Brown Deer, Fox Point, River Hills, Bayside, Menomonee Falls, Butler, Lannon, Brookfield, Elm Grove, New Berlin, Muskego, Germantown, Mequon, Theinsville, Pewaukee (city & village), Waukesha

Notes

- The designated areas are based on the corporate boundaries of the city or village, not the ZIP code.
- If the emission sources of a facility are located within the corporate boundaries of an area listed in the table, the high background concentrations should be used.
- If emission sources for a modeling analysis lay both inside and outside of an area listed in the table, the high background concentrations should be used.

Background Concentration Value Determination
During the 2007 meetings, the sub-group also focused on the data values used to calculate the background concentrations. Previously, short-term (24-hour or less) background concentrations were derived from readings from individual ambient air quality monitors, using arithmetic means of three to five years of second-highest values.

Data from the years 2001 through 2006 were obtained from WDNR monitoring staff for PM_{10} (particulate matter with 10 micrometer diameter or less), SO_2 (sulfur dioxide), NO_2 (nitrogen dioxide), and CO (carbon monoxide). The land use in the general vicinity of the monitor was provided with the data, as well as the pertinent statistics (number of observations, ranked percentiles, maximum values). In addition, WDNR monitoring staff also identified each monitor by its main monitoring objective, using standard monitoring classifications such as 'population exposure', 'highest concentration', and 'regional transport'.

PM_{10}, SO_2, NO_2, and CO data were organized into the monitoring objective categories of 'population exposure' and 'general/background', and into the land use categories of 'urban residential', 'suburban residential', and 'urban commercial' where applicable. In reviewing the data it was noted that many of the monitor locations were actually close to industrial facilities, regardless of the land use data category.

For the short-term PM_{10}, SO_2, and CO standards the sub-group concluded that the higher background values should be derived from the arithmetic mean of the 98th percentile data from the 'population exposure' category. The 98th percentile was selected for these pollutants because the values are equivalent to the second-highest concentrations historically used. For the lower background concentration areas, the sub-group concluded the short-term values should be derived from the arithmetic mean of the 98th percentile data from the 'general/background' category. For both areas, the annual background concentrations for PM_{10} and SO_2 were calculated from the arithmetic mean of the annual impacts from either set of monitors. Using the mean of multiple years of data for the monitor categories provide a representative estimate of the general concentrations.

In assessing annual background concentration for NO_2, the sub-group noted that only one year of data was available for a rural location, and two years of data were available for two locations in the City of Milwaukee. When the data was averaged, the Milwaukee data points dominated this five-value mean. Five additional annual values were obtained from data collected during the ozone season at sites in Dodge County. The average of all the recorded NO_2 data values was used for the higher background areas, while the single rural data point was used for the lower background areas.

Wisconsin has limited monitoring for lead (Pb). The WDNR Air Management Monitoring Section was consulted and, based on their professional judgment, background concentrations were established.

Ambient $PM_{2.5}$ concentrations are more evenly distributed across Wisconsin due to the regional nature of the pollutant, so background concentrations were calculated by separating the monitors based on location. The 2011-2013 98th percentile daily values and annual values were averaged for all monitors located in either the high geographic area or the low geographic area, using the same methods as for the other pollutants.