MICHIGAN
Area Designations For the
2008 Lead National Ambient Air Quality Standards

EPA has revised the level of the primary (health-based) standard from 1.5 micrograms per cubic meter (µg/m³) to 0.15 µg/m³ measured as total suspended particles (TSP). EPA has revised the secondary (welfare-based) standard to be identical in all respects to the primary standard.

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as "nonattainment" those areas that violate the NAAQS and those nearby areas that contribute to violations. The table below identifies the partial county in Michigan that EPA intends to designate "nonattainment" for the 2008 lead National Ambient Air Quality Standard (2008 lead NAAQS).

Area	Michigan Recommended Nonattainment County	EPA's Designated Nonattainment County
Belding	Ionia (partial)	Ionia (partial)

Table 1: Michigan Nonattainment Area for the 2008 Lead NAAQS

Technical Analysis for Belding

Introduction

This technical analysis for Belding identifies the partial county with a monitor that violates the 2008 lead NAAQS, and evaluates nearby counties for contributions to lead concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following factors recommended in previously issued EPA guidance:

- Air quality in potentially included versus excluded areas;
- Emissions and emissions-related data in areas potentially included versus excluded from the nonattainment area, including population data, growth rates and patterns and emissions controls;
- Meteorology (weather/transport patterns);
- Geography/topography (mountain ranges or other air basin boundaries);
- Jurisdictional boundaries (*e.g.*, counties, air districts, reservations, etc.); and,
- Any other relevant information submitted to or collected by EPA.

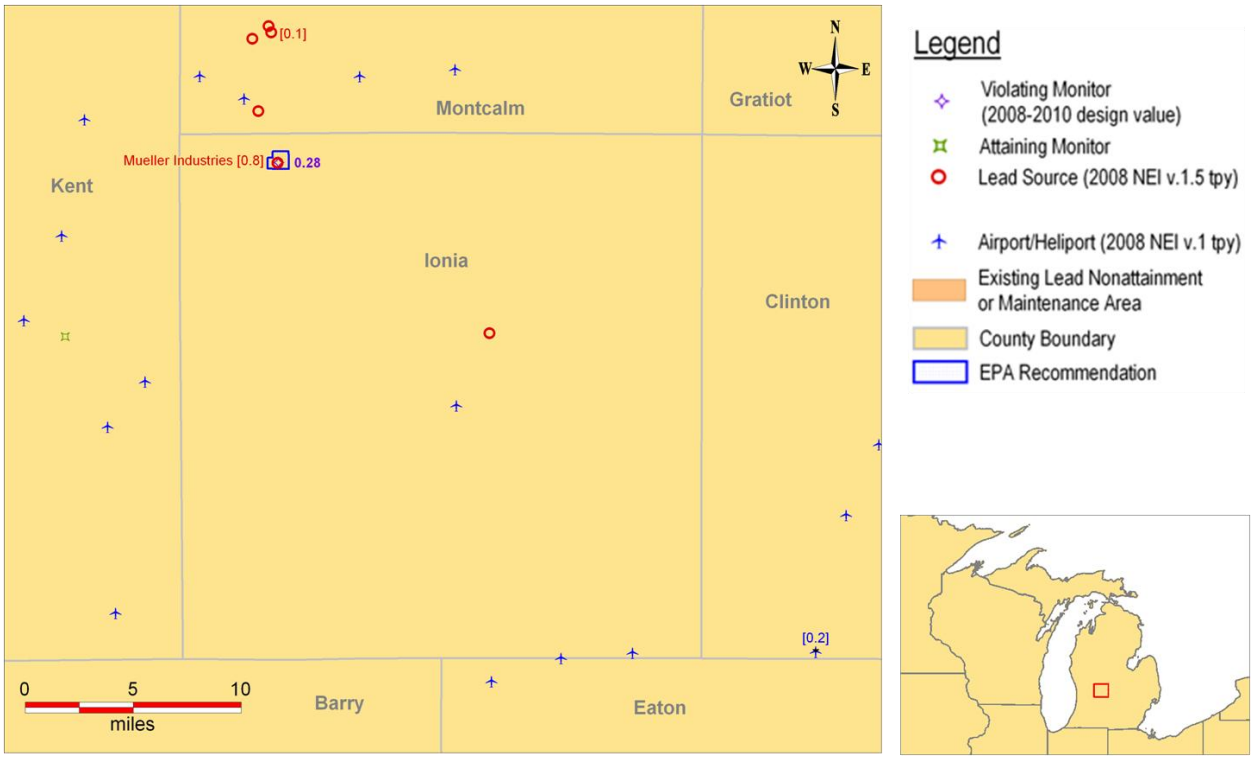

Figure 1: Belding, Michigan State Recommended Nonattainment Area
(Office of Air Quality and Planning Standards - OAQPS)

Figure 1 is a map of the area analyzed showing the locations and design values of air quality monitors in the area, and the counties surrounding any violating air quality monitors. Source data is also labeled in Figure 1 with the following guidelines: if the source emitted 0.50 or more tons per year (tpy), the symbol, name of the facility, and emissions are labeled; if the source emitted 0.10 – 0.50 tpy, only the symbol and emissions are labeled; and if the source emitted less than 0.05 tpy, only the symbol is shown.[1] Emissions in Belding and the surrounding areas will be discussed in the section addressing emissions in Ionia County. The location of the detailed area in relation to the remainder of the State is shown in the bottom right corner of the figure.

[1] Emissions greater than 0.05 tpy round up to 0.10 tpy, and they are marked with the symbol and the emissions value.

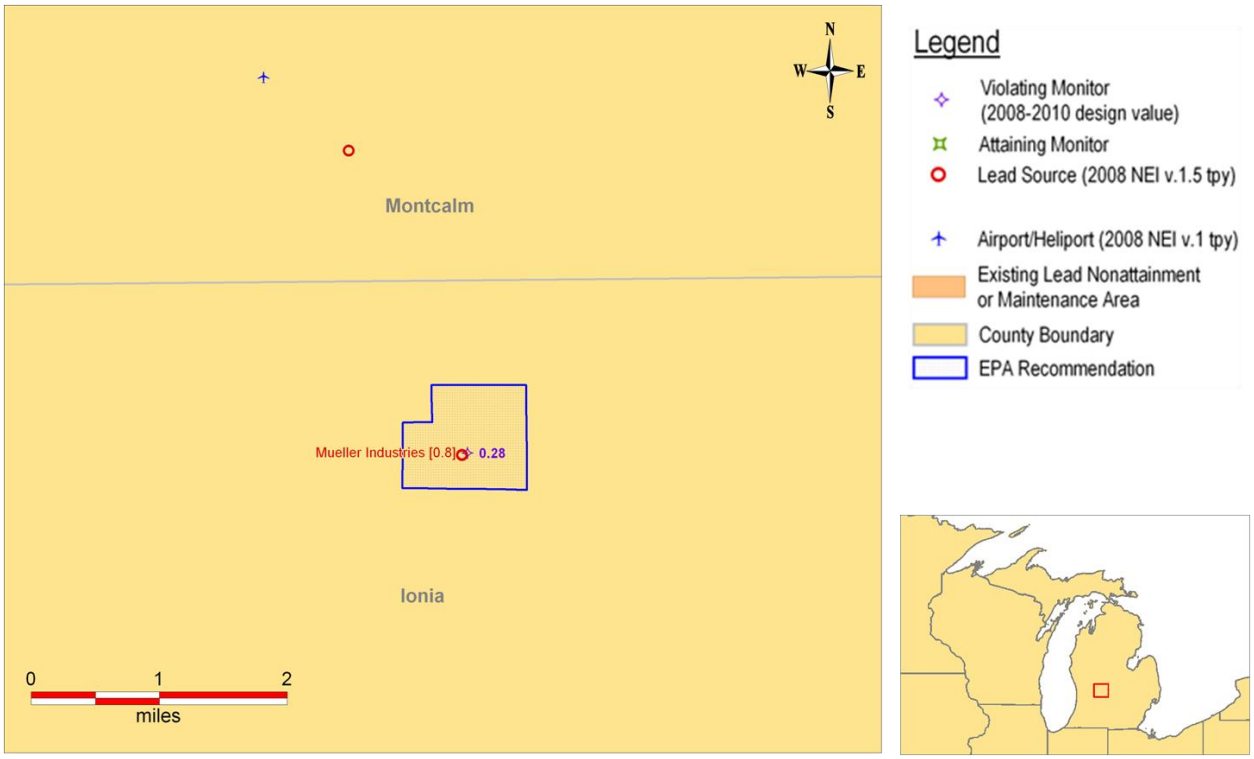

Figure 2: Belding, Michigan State Recommended Nonattainment Area Local View (OAQPS)

In a similar manner, Figure 2 shows the locations and design values of air quality monitors in the area, but on a localized view focusing on the area of the violating monitor. Again, source data is labeled with the following guidelines: if the source emitted 0.50 or more tpy, the symbol, name of the facility, and emissions are labeled; if the source emitted 0.10 – 0.50 tpy, only the symbol and emissions are labeled; and if the source emitted less than 0.05 tpy, only the symbol is shown.

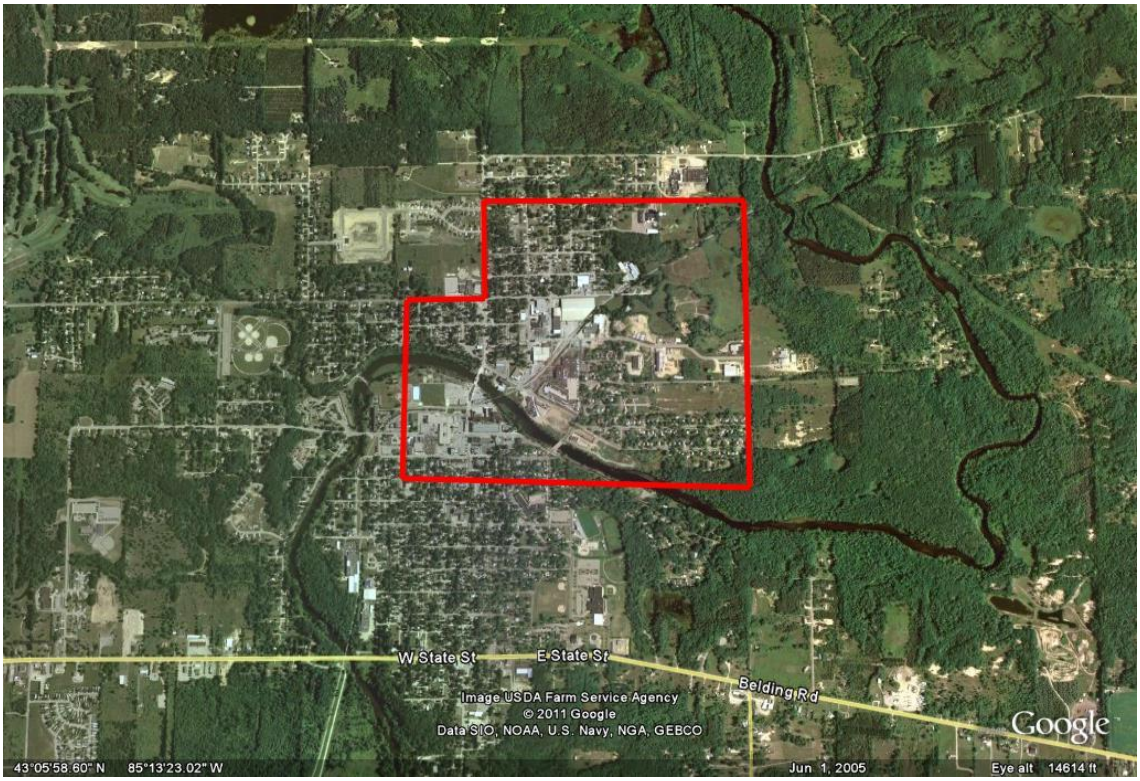

Figure 3: Belding, Michigan State Recommended Nonattainment Area (Google Earth)

Figure 3 shows the State recommended nonattainment area boundary for Belding, Michigan. The boundary is shown with the red outline, and is enclosed by the following boundary points, provided by the State.

Boundary Location	Longitude	Latitude
Southeast Corner	-85.2130771	43.0956705
Southwest Corner (Intersection of S. Broas St. and W. Washington St.)	-85.2324027	43.0960358
Northeast Corner	-85.2132313	43.1074942
Western Boundary 1 (Intersection of W. Ellis St. and the vertical extension of S. Broas St.)	-85.2322553	43.1033277
Western Boundary 2 (Intersection of W. Ellis St. and N. Bridge St.)	-85.2278464	43.1033911
Western Boundary 3 (Intersection of N. Bridge St. and Earle St.)	-85.2279722	43.1074479

Table 2: Belding, Michigan State Recommended Nonattainment Area Boundary Points

In December 2010, Michigan recommended that portions of Ionia County be designated as nonattainment for the 2008 lead NAAQS based on monitored air quality data collected between 2008 and 2010. The State's recommendation was based on data from Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitors located in Michigan. Rebecca

Humphries, Director of the Michigan Department of Environmental Quality (MDEQ)[2], submitted the State's recommendation to EPA in a letter dated December 10, 2010.

On June 15, 2011, EPA notified the State of Michigan of our proposed decision to accept the State's recommended nonattainment designation and associated boundaries. EPA also asked that if the State had additional information that it wanted EPA to consider with respect to the proposed nonattainment area and associated boundaries, the State submit this information by August 15, 2011. EPA received no additional information from the State of Michigan.

On June 21, 2011, EPA published a Federal Register notice notifying the public that we had posted our responses to States' recommendations for the 2008 lead NAAQS (76 FR 36042). This same notice simultaneously opened a comment period inviting the public to comment on our responses to States' recommendations. During the public comment period, which ended on July 21, 2011, we received no comments at all with respect to the nonattainment designation and associated boundaries for the Belding area.

Based on EPA's technical analysis described below, EPA is designating portions of Ionia County in Michigan as nonattainment for the 2008 lead NAAQS as part of the Belding nonattainment area based upon currently available information. This county is listed above in Table 1.

Detailed Assessment

Air Quality Data

This factor considers the lead design values (in $\mu g/m^3$) for air quality monitors in Ionia County in Belding and the surrounding area based on data for the 2008 – 2010 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 2008 lead NAAQS are met at a monitoring site when the identified design value is valid and less than or equal to 0.15 $\mu g/m^3$. A design value is only valid if minimum data completeness criteria are met. A lead design value that meets the NAAQS is generally considered valid if it encompasses 36 consecutive valid 3-month site means (specifically for a 3-year calendar period and the 2 previous months). For this purpose, a 3-month site mean is valid if valid data were obtained for at least 75 percent of the scheduled monitoring days in the 3-month period. A lead design value that does not meet the NAAQS is considered valid if at least one 3-month mean that meets the same 75 percent requirement is above the NAAQS. That is, a site does not have to monitor for 3 full calendar years in order to have a valid violating design value; a site could monitor just 3 months and still produce a valid (violating) design value.

[2] At the time of its December 2010 submittal, MDEQ was a part of the Michigan Department of Natural Resources and Environment, but has since then reverted back to MDEQ.

County	State Recommended Nonattainment?	Monitor Name	Monitor Air Quality System ID	Monitor Location	Lead Design Value, 2008-2010 ($\mu g/m^3$)
Ionia, Michigan	**Yes**	**Mueller Industries**	**260670003**	**509 Merrick St. (43.09994, -85.22227)**	**0.28**

The monitor in bold has the highest 2008 - 2010 design value in the respective county.

Table 3: Belding, Michigan and Surrounding Area Air Quality Data

The 2008 lead NAAQS design values for Ionia County in Belding and the surrounding area are shown in Table 3, and a monitor in Ionia County violates the 2008 lead NAAQS. Therefore, some area in this county and possibly additional areas in surrounding counties must be designated nonattainment. The absence of a violating monitor alone is not a sufficient reason to eliminate nearby counties as candidates for nonattainment status. Each area has been evaluated based on the weight of evidence of these factors and other relevant information.

The monitor located at 509 Merrick St. (AQS ID 260670003) has an objective of determining the highest concentration for lead. This monitor is in very close proximity to Mueller Industries. The location of this monitor will be discussed in the section addressing emissions for Ionia County.

Emissions and Emissions-Related Data

Evidence of lead emissions sources in the vicinity of a violating monitor are an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county level emission data for lead and any growth in lead emitting activities since the date represented by those emissions data.

Emissions

Emissions data for industrial were derived from the 2008 National Emissions Inventory, version 1.5 (NEI08V1.5), which was the most current version of the national inventory available in 2011 when these data were compiled for the designations process.[3] See http://www.epa.gov/ttn/chief/net/2008nei_v1/lead_facility_v1_5_final.xls. EPA recognizes that for certain counties, we have no information on any emissions increases or decreases that may have occurred since 2008. For example, certain large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2008. Some States provided updated information on emissions and emission controls in their comments to EPA. Michigan provided emissions data in its December 2010 submittal that is consistent with the NEI08V1.5 and NEI08V1data. These data are provided in Table 4.

Table 4 shows total emissions of lead for violating and potentially contributing counties in and around Belding and sources emitting (or anticipate to contribute) 0.1 tpy or greater of lead

[3] There are approximately 20,000 airport facilities in the U.S. at which leaded aviation gasoline is consumed; this fuel is used almost exclusively in piston-engine aircraft. Emissions data from the 2008 National Emissions Inventory version 1 (NEI08V1) is the most accurate depiction for the airport facilities in the United States, and NEI08V1 data was used in evaluating emissions from these facilities in Ionia County.

according to the NEI08V1.5 and NEI08V1. The county that is part of the Belding nonattainment area for the 2008 lead NAAQS is shown in **boldface**.

County	Facility in State Recommended Nonattainment Area?	Facility Name	NEI08V1.5 (tpy)	Location	City
Ionia County, Michigan	Yes	Mueller Industries	0.8	302 Ashfield St.	Belding
		Ionia County Total Lead Emissions	0.8*		

Table 4: Belding, Michigan and Surrounding Areas Lead Emissions for Stationary Sources

* Total lead emissions for Ionia County were calculated by adding all emissions from the county, including those from facilities using leaded aviation gas.

As seen in Figure 1 and Figure 2, there are several airport facilities in the Belding area that use leaded aviation gasoline. However, the most recent emissions data for airports using leaded aviation gasoline indicates that the emissions are below 0.1 tpy.

Figure 4: Mueller Industries Monitor Location (Google Earth)

Mueller Industries accounts for virtually all of the lead emissions in Ionia County; as a result, the Belding nonattainment area should include the Mueller Industries facility in its entirety. Figure 4 shows the location of Mueller Industries (red star) and the monitor associated with this facility (yellow pin). The distance between the center of the facility and the monitor is approximately

340', or 0.07 miles. The monitor was deployed in January 2010 as an addition to Michigan's ambient air monitoring network for lead.[4]

Population Data, Growth Rates, and Patterns

Table 5 shows the 2008 population for each county in the area being evaluated, as well as the population density (people/square mile) for each county in that area. These data help assess the extent to which the concentration of human activities in the area and concentration of population-oriented commercial development may indicate emissions-based activity contributing to elevated ambient lead levels. This may include ambient lead contributions from activities that would disturb lead that has been deposited on the ground or on other surfaces. Re-entrainment of historically deposited lead typically is not reflected in the emissions inventory.

County	State Recommended Nonattainment?	2008 Population	2008 Population Density (pop/sq mi)	Population Change 2000-2008	Population % Change 2000-2008
Ionia, Michigan	Yes (partial)	63,833	110	2,156	3

Table 5: Population Data for Ionia County, Michigan

(U.S. Census Bureau estimates for 2008 and estimation of the area of U.S. Counties)
http://www.census.gov/popest/datasets.html

EPA has considered the population growth rate for this area and does not believe that it affects the boundary recommendation.

Emissions Controls

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 3 represent emissions levels taking into account any control strategies implemented on stationary sources in Belding before 2008. As part of its December 10, 2010 submittal, MDEQ included additional information on controls put into place since 2008.

Specifically, MDEQ's submittal addresses emissions points and control measures for Mueller Industries, including: 2 chip dryers (west and east) and 3 induction furnaces (No. 7, No. 8, and No. 9). MDEQ informed EPA that the west chip dryer is a rotary kiln, and the only operational chip dryer as of August 9, 2010. This chip dryer is permitted under State new source review (NSR) permit number 505-93. Emissions from this dryer are controlled by a multi-clone unit, followed by a thermal oxidizer and pre-cooler/wet scrubber. In September 2010, Mueller Industries installed enhancements to the pre-cooler/wet scrubber to control system efficiency. These enhancements included the installation of a new spray nozzle system as well as the addition of a de-mister unit. The east chip dryer has not been operational since August 9, 2010, and is permitted under State NSR permit number 281-86A. Emissions at this unit are controlled by a multi-clone unit followed by a thermal oxidizer and pre-cooler/wet scrubber. Mueller Industries has agreed not to restart this unit unless compliance testing is conducted.

[4] Counties in Michigan with lead monitors deployed prior to January 2010 include: Wayne, Kent, Washtenaw, Genesee, and Missaukee.

Induction furnace No. 7 and No. 8 are permitted under State NSR permit number 30-83B, while No. 9 is permitted under State NSR permit number 30-83C. The emissions from these furnaces are controlled by fabric baghouses.

Meteorology (weather/transport patterns)

For this factor, EPA considered 32 years of data from National Weather Service instruments and other meteorological monitoring sites in the area. Historical wind direction frequencies are included in Figure 5 and Table 6. These data may provide evidence of the potential for lead emissions sources located upwind of a violating monitor to contribute to ambient lead levels at the violation location. MDEQ included a wind rose for Ionia County in their submittal, as well as a graphical representation of average lead concentrations correlated to wind direction. These are shown in Figure 6 and Figure 7, respectively.

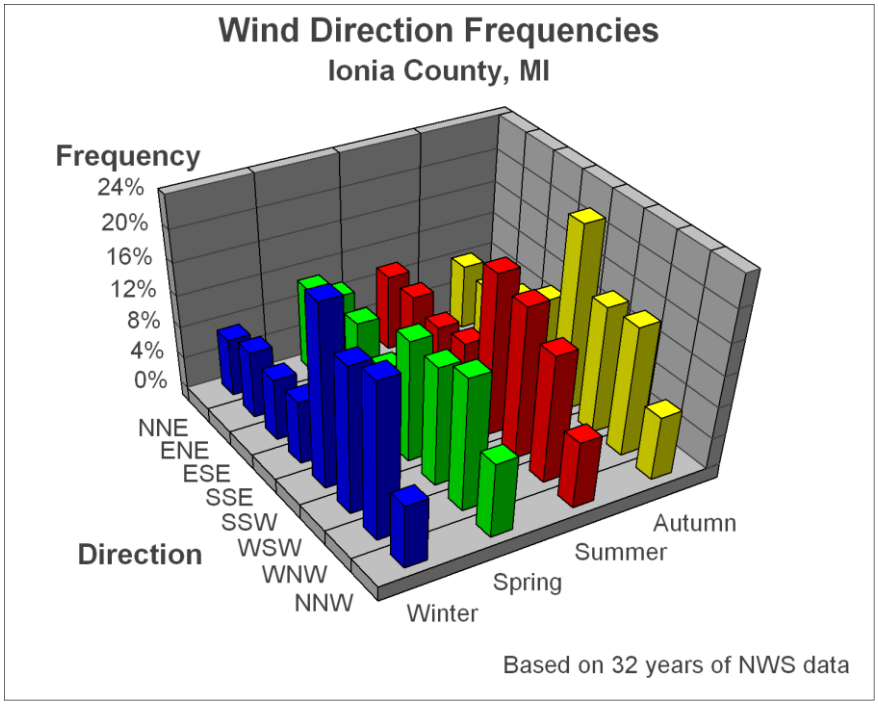

Figure 5: Historical Wind Direction Frequencies for Ionia County, Michigan

Figure 5 is a 3-dimensional bar chart that shows the wind frequencies in 8 directions for the 4 seasons. These data are taken from 1960-1992 Solar and Meteorological Surface Observation Network information issued jointly by the U.S. Department of Commerce: National Climatic Data Center and the U.S. Department of Energy: National Renewable Energy Laboratory. The chart frequencies reflect the directions from which the winds come.

Ionia County Wind Frequencies	
Frequency as a %	Seasonal Wind Directions
7.2	WINWINDFNNE

8.4	WINWINDFENE
7.8	WINWINDFESE
8	WINWINDFSSE
22.7	WINWINDFSSW
18.3	WINWINDFWSW
19.6	WINWINDFWNW
8	WINWINDFNNW
10.7	SPRWINDFNNE
12.4	SPRWINDFENE
11.8	SPRWINDFESE
8.9	SPRWINDFSSE
15.2	SPRWINDFSSW
14.9	SPRWINDFWSW
16.6	SPRWINDFWNW
9.4	SPRWINDFNNW
9.6	SUMWINDFNNE
9.5	SUMWINDFENE
8.3	SUMWINDFESE
9	SUMWINDFSSE
20.2	SUMWINDFSSW
19	SUMWINDFWSW
16	SUMWINDFWNW
8.4	SUMWINDFNNW
8.2	AUTWINDFNNE
7.7	AUTWINDFENE
9.1	AUTWINDFESE
11.5	AUTWINDFSSE
23.2	AUTWINDFSSW
16	AUTWINDFWSW
16.3	AUTWINDFWNW
8.1	AUTWINDFNNW

Table 6: Historical Wind Frequency Data as Percents for Ionia County, Michigan

As shown in Figure 5 and Table 6, the period with the least variability in wind is the winter months, with winds blowing from the south southwest. With the consistently strong representation of winds from a variation of the west in all seasons, special care must be made when determining the nonattainment boundary to the east of the violating monitor.

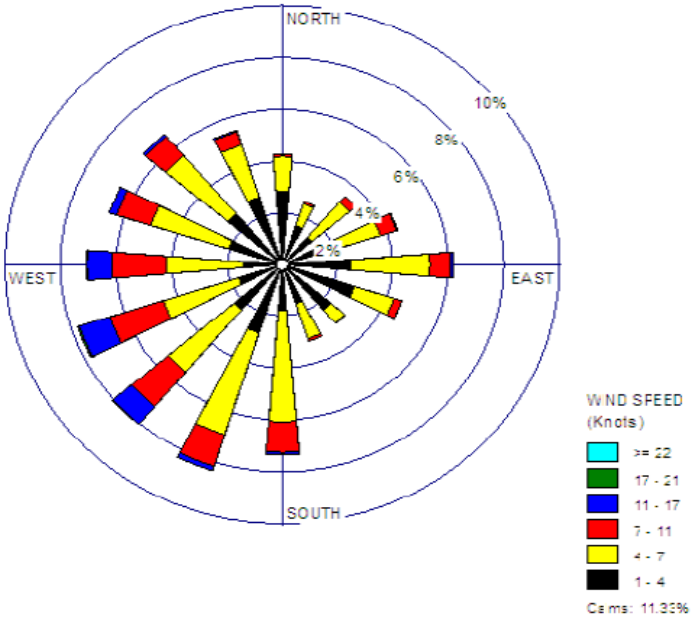

Figure 6: Wind Rose Data from Grand Rapids (MDEQ)

Figure 6, which represents wind frequencies collected at Grand Rapids between 2005 and 2009, corroborates the data already presented in Figure 5 and Table 6.

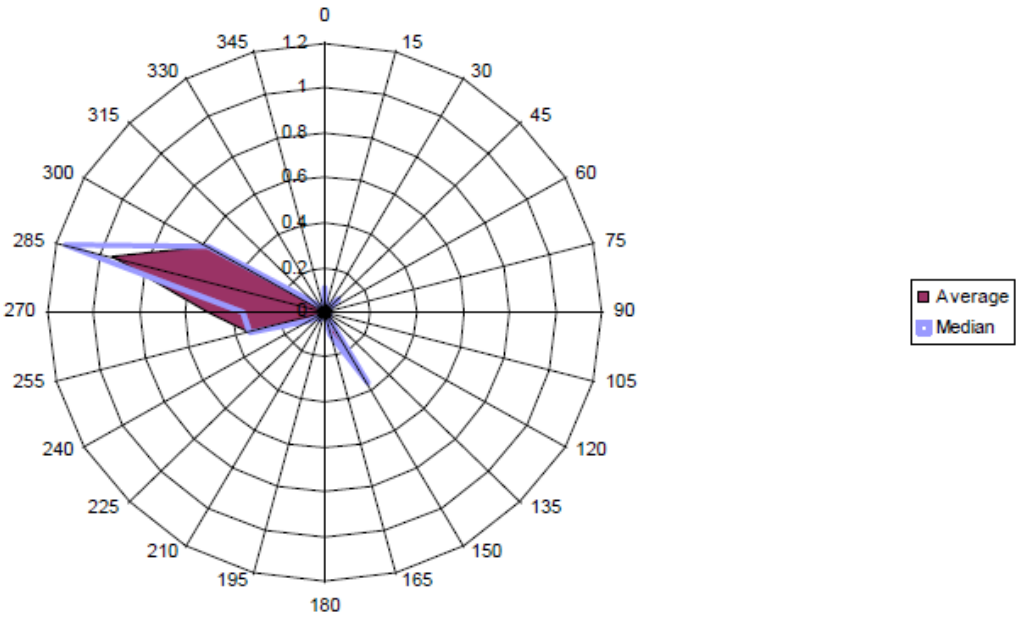

Figure 7: Average Concentration of Lead by Wind Direction (MDEQ)

MDEQ also provided Figure 7 in its December 2010 submittal. This graphical representation shows that when the wind is blowing from the west (or a variation thereof), the average concentration of lead is the highest. Again, this data indicates that special care must be made when determining the nonattainment boundary to the east of the violating monitor.

Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might have an effect on the air shed and, therefore, on the distribution of lead over Belding and the surrounding area.

The Belding area does not have any geographical or topographical barriers significantly limiting air-pollution transport within its air shed. Therefore, this factor did not play a significant role in determining the nonattainment boundary.

Jurisdictional boundaries

Existing jurisdictional boundaries may be helpful in articulating a boundary for purposes of nonattainment designations, and for purposes of carrying out the governmental responsibilities of planning for attainment of the lead NAAQS and implementing control measures. These existing boundaries may include an existing nonattainment or maintenance area boundary, a county or township boundary, a metropolitan area boundary, an air management district, or an urban planning boundary established for coordinating business development or transportation activities.

In EPA's August 21, 2009 guidance memorandum, "Area Designations for the 2008 revised Lead National Ambient Air Quality Standard," EPA reiterated that the presumptive boundary for each nonattainment area should be the county containing the violating monitor. This concept was first introduced in the guidance for the 1978 lead NAAQS designations, and is described in the 1992 General Preamble (57 FR 13549). This same presumptive boundary guidance was addressed most recently in the final rulemaking for the 2008 lead NAAQS (73 FR 66964). EPA observed, however, that States have the flexibility in their recommendations to deviate from the presumptive county boundary to portions of the county containing the violating monitor, stating that any "nonattainment area boundaries that deviate from presumptive county boundaries should be supported by an assessment of several factors…," all of which have been discussed already in this document, except for jurisdictional boundaries.

For the Belding area, there are several jurisdictional boundaries that can be considered. Belding is located completely in Ionia County, which is part of the Grand Rapids-Wyoming Metropolitan Statistical Area. Ionia County is also part of a larger Grand Rapids-Muskegon-Holland Combined Statistical Area. The Grand Rapids Air Quality District Office is responsible for air quality planning within all areas of Ionia County. As a result, air quality planning efforts to address the impending lead nonattainment area in Belding should not be problematic; it should be noted that the final rulemaking for the 2008 lead NAAQS (73 FR 66964) specifically addressed transportation conformity by stating, "In light of the elimination of lead additives from gasoline, transportation conformity does not apply to the Lead NAAQS." Lastly, MDEQ has

recommended that the boundaries for the Belding nonattainment area follow well-known streets and extensions of those streets.

Other Relevant Information

EPA received additional relevant information from Michigan for establishing the nonattainment area boundary for Belding. This information will be discussed below.

MDEQ conducted air dispersion modeling (using AERMOD) of emissions to demonstrate that all predicted NAAQS exceedances fall within the recommended nonattainment boundary. In performing their AERMOD analysis, MDEQ took into account land use and terrain, building wake effect (effect on local air concentrations and particle deposition resulting from air flow around the buildings), and 2005 – 2009 Grand Rapids meteorological data.

Additionally, MDEQ used potential-to-emit (PTE) emissions of likely operations instead of the actual emissions from the NEI08V1.5; using PTE emissions in modeling inputs results in a much more conservative (larger) nonattainment area because PTE emissions represent the maximum allowable rate. The primary chip dryer (west) has a PTE rate of 0.3 pounds per hour, and the induction furnaces have an associated PTE rate of 5 micrograms per dry standard cubic foot. In its submittal, MDEQ observed that because the relatively short facility stacks are subject to building downwash, the maximum impacts were anticipated to be near the facility structure. The graphical result of MDEQ's modeling analysis is below in Figure 8.

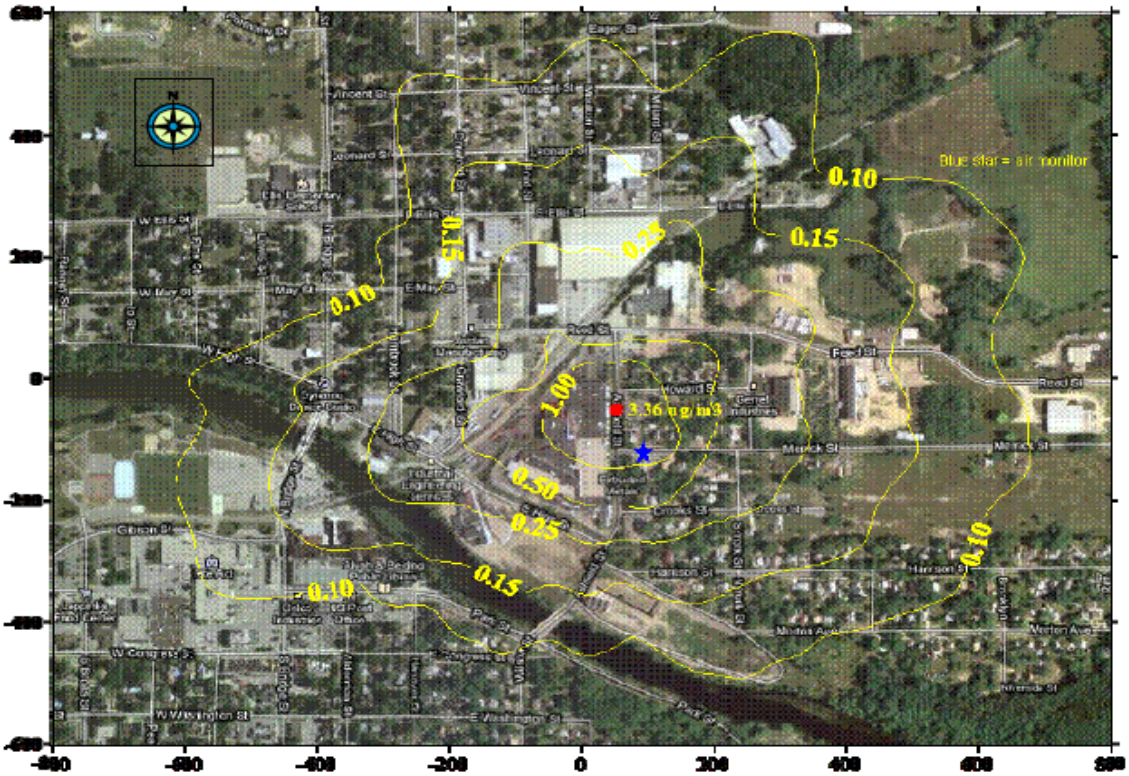

Figure 8: Air Dispersion Modeling for Mueller Industries (MDEQ)

The point of highest modeled impact (3.36 µg/m^3) is northeast of the facility. This direction is consistent with the meteorological data collected at Grand Rapids. The monitor is represented by the blue star in Figure 8, and rests very close to the modeled 1.00 µg/m^3 isopleth. Referring to Table 3, the design value for this monitor between 2008 and 2010 was 0.28 µg/m^3, or 28% of the modeled value. This result also supports the notion that the use of PTE emissions instead of actual emissions results in a more conservative (larger) nonattainment area. In other words, the modeling analysis performed by MDEQ over-predicts the lead concentrations in the Mueller Industries vicinity.

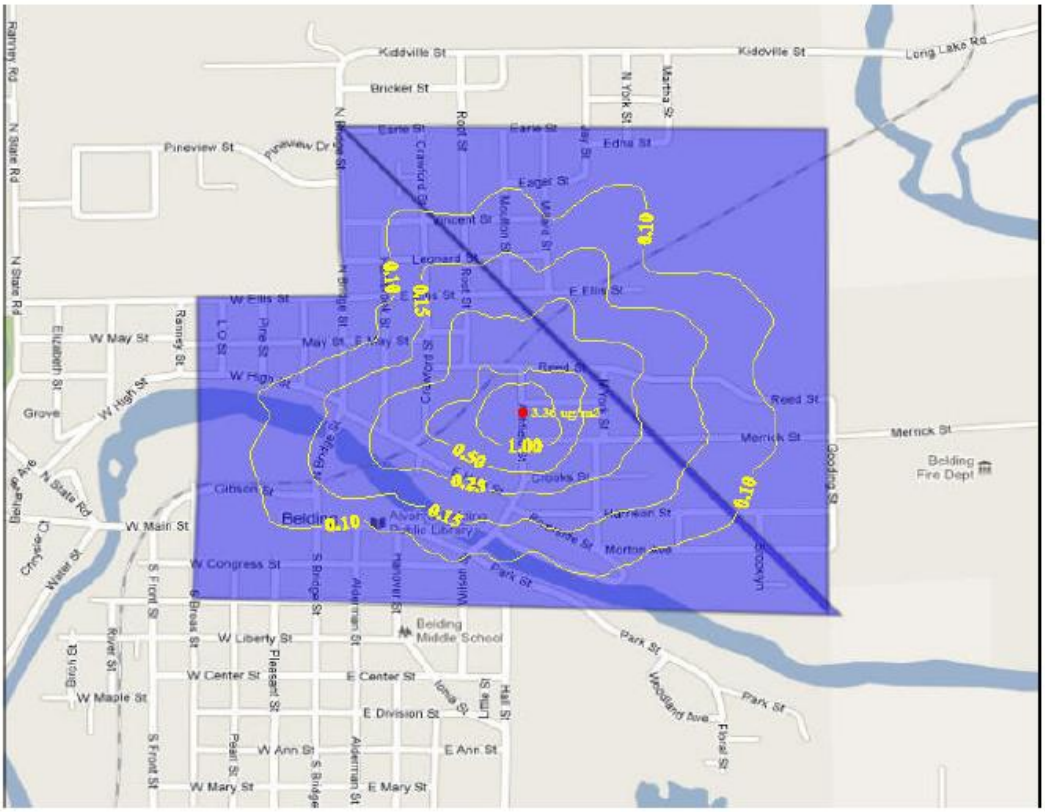

Figure 9: Air Dispersion Modeling Analysis and State Recommended Nonattainment Area (MDEQ)

As seen above in Figure 9, the State recommended nonattainment area for Belding encompasses all likely effects of lead emissions from Mueller Industries equal to, or below, the 0.10 µg/m^3 modeled ispoleth. As noted above, the modeling performed by MDEQ over-predicts lead concentrations in the area when compared to the monitored values; as a result, the area outside of the 0.10 µg/m^3 isopleth most likely experiences an impact of less than 0.10 µg/m^3.

EPA concludes that although the modeling performed by MDEQ may not meet the requirements for an attainment demonstration, the air dispersion modeling using PTE emissions performed for Ionia County in relationship to the entire State recommended nonattainment area is useful in determining a boundary for the nonattainment area.

Conclusion

After considering the factors described above, EPA has determined that it is appropriate to designate a portion of Ionia County as nonattainment for the 2008 lead NAAQS.

The air quality monitor in Ionia County shows a violation of the 2008 lead NAAQS, based on 2008-2010 air quality data. Mueller Industries is located in Belding, and is almost entirely responsible for all lead emissions in Ionia County. There are no other major sources of lead emissions in the State recommended nonattainment area, and the cumulative process of the multi-factor analysis in conjunction with the relevant air dispersion modeling that MDEQ provided ultimately leads to the final nonattainment area.

EPA finds it appropriate to designate as nonattainment the portions of Ionia County that are encompassed by the coordinates listed below.

Boundary Location	Longitude	Latitude
Southeast Corner	-85.2130771	43.0956705
Southwest Corner (Intersection of S. Broas St. and W. Washington St.)	-85.2324027	43.0960358
Northeast Corner	-85.2132313	43.1074942
Western Boundary 1 (Intersection of W. Ellis St. and the vertical extension of S. Broas St.)	-85.2322553	43.1033277
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Western Boundary 3 (Intersection of N. Bridge St. and Earle St.)	-85.2279722	43.1074479

Table 7: Belding, Michigan Nonattainment Area Boundaries

Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundaries described herein encompass the entire area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the 2008 lead NAAQS.

Definition of important terms used in this document:

1) **Designated "nonattainment" area –** an area which EPA has determined, based on a State recommendation and/or on the technical analysis included in this document, has violated the 2008 lead NAAQS, based on the most recent 3 years of quality assured air quality monitoring data from 2008-2010 including at least a singular valid 3-month site mean above the level of the 2008 lead NAAQS, or that contributes to a violation in a nearby area.

2) **Designated "unclassifiable/attainment" area** – an area which EPA has determined does not contribute to a violation of the 2008 lead NAAQS in a nearby area and either: (1) meets the 2008 lead NAAQS, based on the most recent 3 years of quality assured air quality monitoring data from 2008-2010 including 36 consecutive valid 3-month site means (including the last 2 months of 2007), or (2) has no monitors or has incomplete air quality monitoring data for 2008-2010 but has no violations of the 2008 lead NAAQS.

3) **Designated "unclassifiable" area** – an area which EPA has determined cannot be classified on the basis of available information as meeting or violating the 2008 lead NAAQS, based on the most recent 3 years of quality assured air quality monitoring data from 2008-2010, but for which available monitoring data from the same or a recent period indicate a significant likelihood that the area may be violating the 2008 lead NAAQS.

4**) Recommended nonattainment area –** an area a State or Tribe has recommended to EPA be designated as nonattainment.

5) **Violating monitor –** an ambient air monitor whose valid design value exceeds 0.15 micrograms per cubic meter (ug/m3). As described in Appendix R of 40 CFR part 50, a violation can be based on either Pb-TSP or Pb-PM10 data and only 3 months of data are necessary to produce a valid violating design value.

6) **1978 lead NAAQS –** 1.5 $\mu g/m^3$, National Ambient Air Quality Standard for lead promulgated in 1978. Based on Pb-TSP indicator and averaged over a calendar quarter.

7) **2008 lead NAAQS –** 0.15 $\mu g/m^3$, National Ambient Air Quality Standard for lead promulgated in 2008. Based on Pb-TSP indicator and a 3-month rolling average. Pb-PM10 data may be used in limited instances, including to show nonattainment.