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GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT  
LANSING



REBECCA A. HUMPHRIES  
DIRECTOR

December 15, 2010

Ms. Susan Hedman, Regional Administrator  
U.S. Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard, R-19J  
Chicago, Illinois 60604-3507

Dear Ms. Hedman:

In accordance with Section 107(d) of the Clean Air Act, the Michigan Department of Natural Resources and Environmental (DNRE) is updating its October 9, 2009, recommendations for designations for the lead National Ambient Air Quality Standard (NAAQS) revised on October 15, 2008. This recommendation for a nonattainment area in the City of Belding, Michigan, results from new source-specific ambient air monitoring data indicating elevated lead levels in violation of the new lead NAAQS.

The recommended geographic boundary of the nonattainment area is supported by an analysis of factors in the enclosed Technical Support Document. This analysis is consistent with the process described in the U.S. Environmental Protection Agency guidance memorandum issued on August 21, 2009, for the determination of appropriate lead nonattainment areas.

Meeting the air quality standards is very important to protect the health of the people of Michigan. The Michigan DNRE will expeditiously develop a plan to bring the area into attainment for this pollutant.

If you have questions regarding this recommendation, please contact Mr. G. Vinson Hellwig, Chief, Air Quality Division, at 517-373-7069; hellwig@michigan.gov; or Department of Natural Resources and Environment, P.O. Box 30260, Lansing, Michigan 48909-7760; or you may contact me.

Sincerely,

Rebecca A. Humphries  
Director  
517-373-7917

Enclosure

cc: Mr. John Mooney, U.S. EPA  
Mr. Andrew Chang, U.S. EPA  
Mr. Jim Sygo, DNRE  
Mr. G. Vinson Hellwig, DNRE  
Ms. Mary Maupin, DNRE

Technical Support Document  
for  
Recommended Nonattainment Boundaries in Michigan  
for the  
Lead National Ambient Air Quality Standard



December 2010

Michigan Department of  
Natural Resources and Environment  
Air Quality Division

TABLE OF CONTENTS

	<u>Page No.</u>
Designation Recommendation .....	1
Introduction .....	1
Nonattainment Area Boundary Analysis.....	3

TABLES

Table 1	Geographic Coordinates of Recommended Lead Nonattainment Area in Belding, MI.....	2
Table 2	Summary of 24-Hour Lead Levels in Belding, MI .....	5
Table 3	2008 Lead Emissions Inventory for Ionia County, MI .....	6

FIGURES

Figure 1	Map of Recommended Lead Nonattainment Area in Belding, MI .....	2
Figure 2	Recommended Nonattainment Area Boundaries with Modeled 3-Month Rolling Average Lead Impacts .....	3
Figure 3	Belding, MI Lead Monitor .....	4
Figure 4	Belding, MI Air-lead Levels (2010 Data) .....	4
Figure 5	Location of Belding, MI .....	7
Figure 6	Wind Rose Using Data from the Grand Rapids Monroe St. Site .....	9
Figure 7	Mueller Industries – Belding, MI 3-Month Rolling Average (2005-2009) – Lead Impacts.....	10
Figure 8	Average Concentration by Wind Direction (Jan 2010-Aug 2010).....	11

# Technical Support Document for Recommended Nonattainment Boundaries in Michigan for the Lead National Ambient Air Quality Standard

## Designation Recommendation

The Michigan Department of Natural Resources and Environment (DNRE) is amending the state's lead designation recommendation of October 9, 2009, to add a recommendation for a nonattainment area in the city of Belding. This recommendation is due to new ambient air quality data indicating that the lead National Ambient Air Quality Standard (NAAQS) has been exceeded at a source-oriented ambient air monitor sited in Ionia County. The proposed boundary of the nonattainment area is in the immediate vicinity of the lead emitting source and is described in detail in this document.

## Introduction

On October 15, 2008, the U.S. Environmental Protection Agency (EPA) revised the lead NAAQS to provide increased protection from adverse health effects associated with exposure to lead. Numerous research studies have linked lead exposure to adverse health effects, as well as impacts on IQ, learning and behavior in children.

The primary lead NAAQS was strengthened by the EPA from 1.5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) set in 1978, to a level of  $0.15 \mu\text{g}/\text{m}^3$ . The revised lead standard is measured as the concentration of lead in Total Suspended Particulates (TSP). The EPA also modified how attainment with this standard is determined. The averaging time was changed from a calendar quarterly average to a rolling three-month average period with a maximum form that is evaluated over a three-year period. In addition, the EPA strengthened the secondary lead standard to provide increased protection against adverse public welfare effects associated with impacts on organisms and ecosystems. The secondary standard is identical to the primary standard. In conjunction with changing the lead NAAQS, the EPA required an improved lead monitoring network with source-oriented monitors located near facilities emitting more than one ton per year (tpy) of lead and non-source-oriented monitors in urban areas with populations greater than 500,000 people.

Section 107(d) of the Clean Air Act (CAA) governs the process for area designations. Following the promulgation of a new or revised standard, the CAA requires the Governor to recommend initial designations of the attainment status for all areas of the State. Areas can be designated as **nonattainment** (does not meet, or contributes to a nearby area that does not meet the NAAQS), **attainment** (meets the NAAQS), or **unclassifiable** (cannot be classified based on available data).

On October 9, 2009, the DNRE recommended that the counties of Wayne, Kent, Washtenaw, Genesee, and Missaukee be designated as attainment for the new lead NAAQS based on the most recent data from lead monitors in the state. The DNRE recommended that the remainder of the state be considered unclassifiable.

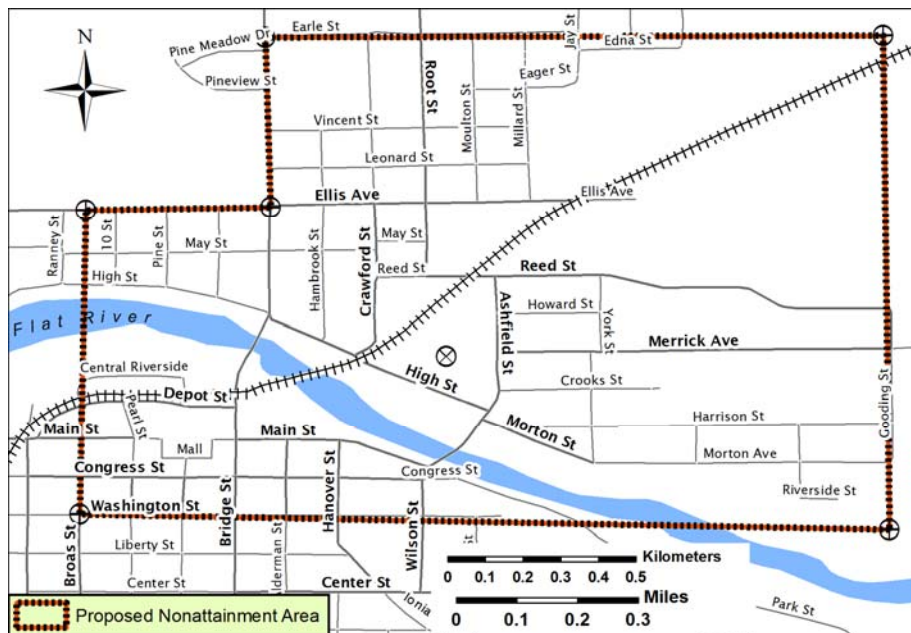
In January 2010, additional source-oriented and population-oriented monitoring sites were established to comply with the new monitoring requirements. The new source-oriented monitor in the city of Belding, Michigan, east of Mueller Industries, indicates levels of lead exceeding the new lead standard. As a result, the DNRE is recommending a nonattainment designation for an area in Belding. The recommended boundary of the nonattainment area is based on a combination of factor analysis and dispersion modeling.

The recommended area is bounded by the geographic coordinates listed in Table 1 and depicted graphically in Figure 1. Figure 2 shows the modeled impact of Mueller Industries emissions in conjunction with the DNRE recommended nonattainment area boundaries.

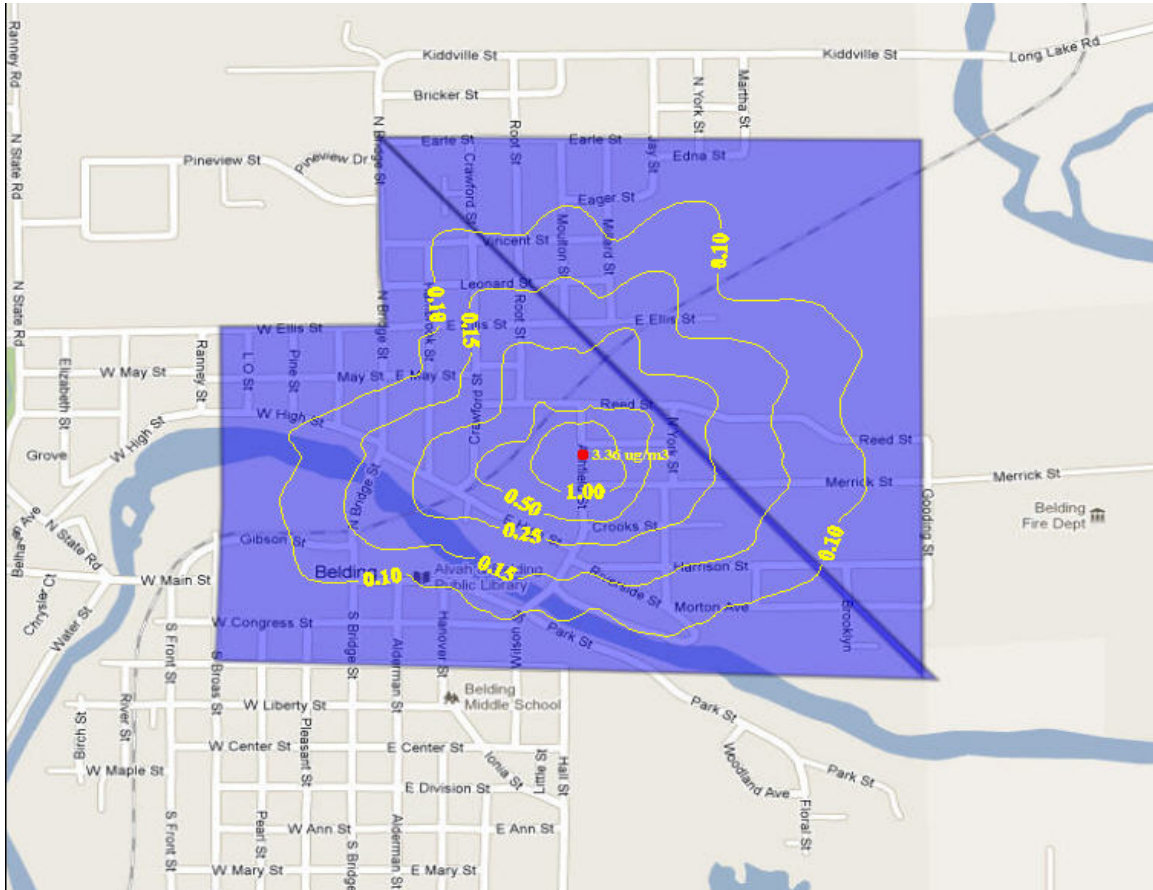
**Table 1**  
**Geographic Coordinates of Recommended Lead Nonattainment Area in Belding, MI**

Point Location	X_UTM16N	Y_UTM16N	X_Longitude	Y_Latitude
South East Corner	645424.57	4772988.55	-85.2130771	43.0956705
South West Corner	643850.91	4772995.77	-85.2324027	43.0960358
Ellis Ave Btw Ranny and 10th	643845.83	4773805.82	-85.2322553	43.1033277
Ellis Ave and Bridge Street	644204.45	4773820.43	-85.2278464	43.1033911
Ellis Ave and Earle Street	644184.69	4774270.74	-85.2279722	43.1074479
North East Corner	645384.03	4774301.35	-85.2132313	43.1074942

**Figure 1**  
**Map of Recommended Lead Nonattainment Area in Belding, MI**



**Figure 2**  
**Recommended Nonattainment Area Boundaries with Modeled**  
**3-Month Rolling Average Lead Impacts**



**Nonattainment Area Boundary Analysis**

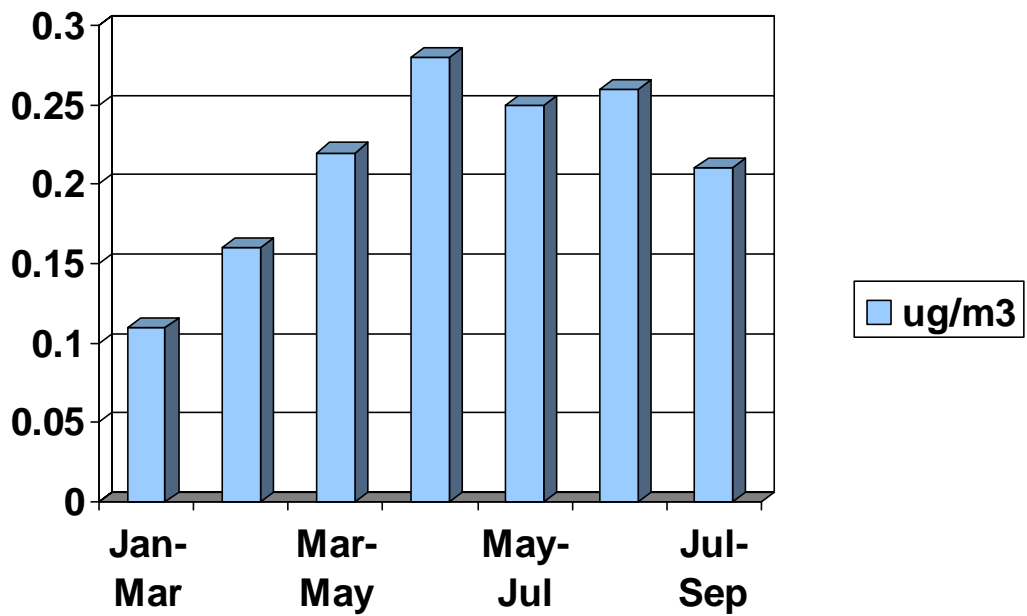
*Monitored Air Quality*

The federal lead regulations issued in November 2008 required states to determine if monitoring for airborne lead was necessary near sources emitting one ton or more per year. Four facilities in Michigan were emitting lead at this level. Subsequent modeling as described in DNRE’s 2010 *Air Monitoring Network Review* predicted that the impact from Mueller Industries was greater than one half the lead NAAQS. The predicted impact from the other three sources did not exceed this level. Lead monitoring in close proximity to Mueller Industries began in January 2010. A high volumetric filter based monitor was installed approximately 60 yards to the east of the facility in a residential neighborhood (Figure 3). The monitor has detected levels of lead with a three-month average as high as 0.28 µg/m<sup>3</sup>, which violates the new NAAQS set at 0.15 µg/m<sup>3</sup> (Figure 4 and Table 2). The monitor data has been quality assured and submitted to the EPA’s Air Quality System.

**Figure 3**  
**Belding, MI Lead Monitor**



**Figure 4**  
**Belding, MI Air-lead Levels (2010 Data)**



**Table 2**  
**Summary of 24-Hr Lead Levels in Belding, MI**

\* Expressed to four significant figures using truncation at local conditions.

Updated 12/08/2010

\*\* NAAQS = 0.15 ug/m3 as a rolling 3 month average.

\*\*\* WD shown if wind is from 1 direction for 8hr or more. Otherwise, see Belding Met Summary Sheet

Date	Avg WS, mph	WD***	24-Hr Lead Value*, ug/m3	NAAQS**	Monthly Avg	3 Mo Avg
1/02/10	<i>no met avail</i>		0.04735	0.15	0.09350	
1/08/10	4	NNW, N,	0.02713	0.15		
1/14/10	9	SW, WSW, ENE, E,	0.03434	0.15		
1/20/10	5	NE	0.00906	0.15		
1/26/10	10	WSW, W,	<b>0.3496</b>	0.15		
2/01/10	2	SW, SW,	0.03047	0.15	<b>0.2025</b>	
2/07/10	2	E, ENE, WNW,	0.009812	0.15		
2/13/10	5	WNW,	<b>0.5787</b>	0.15		
2/19/10	5	WSW, W, NW, NNW,	<b>0.3383</b>	0.15		
2/25/10	6	WNW	0.05544	0.15		
3/03/10	2	N, NNE, NNE	0.02818	0.15	0.02368	0.10657
3/09/10	2	E, ESE,	0.02424	0.15		
3/15/10	3	NNE, N,	0.02818	0.15		
3/21/10	3	ENE, NE, ESE, SSE,	0.01798	0.15		
3/27/10	4	SE	0.01984	0.15		
4/02/10	6	SW, S, SSW WNW, SW,	0.0286	0.15	<b>0.2645</b>	<b>0.164</b>
4/08/10	9	SW	<b>1.033</b>	0.15		
4/14/10	4	SE, SE, E	0.0120	0.15		
4/20/10	2	WSW, W,	<b>0.2342</b>	0.15		
4/26/10	5	NNE, NE,	0.0147	0.15		
5/02/10	3	N, ,	<b>0.1590</b>	0.15	<b>0.3609</b>	<b>0.216</b>
5/08/10	12	NW, WSW,	<b>1.219</b>	0.15		
5/14/10	9	WSW, W,	<b>0.2966</b>	0.15		
5/20/10	1	SE, SE, ESE, ESE,	0.03139	0.15		
5/26/10	1	ESE	0.09832	0.15		
6/01/10	2	SSW, SSW,	0.1491	0.15	<b>0.2264</b>	<b>0.284</b>
6/07/10	2	W, NW,	<b>0.3541</b>	0.15		
6/13/10	2	W, W, WSW, W,	0.1209	0.15		
6/19/10	7	SW	<b>0.4629</b>	0.15		
6/25/10	2	SW, ,	0.04510	0.15		
7/01/10	1	NE, ,	0.0817	0.15	0.1540	<b>0.247</b>
7/07/10	3	WSW, ,		0.15		
7/13/10	2	ENE, E,	0.02224	0.15		
7/19/10	2	WNW, ,	<b>0.4512</b>	0.15		
7/25/10	1	NNE, N,	0.06077	0.15		



Date	Avg WS, mph	WD***	24-Hr Lead Value*, ug/m3	NAAQS**	Monthly Avg	3 Mo Avg
7/31/2010	2	E, ENE,	0.06815	0.15		
8/06/10	4	W, WNW,	<b>1.155</b>	0.15	<b>0.4131</b>	<b>0.2645</b>
8/12/10	1	NE, WNW,		0.15		
8/18/10	3	WSW, ,	0.1120	0.15		
8/24/10	1	ENE, , WSW,	<b>0.3645</b>	0.15		
8/30/10	2	SSW,	0.0210	0.15		
9/05/10	5	WSW	<b>0.1821</b>	0.15	0.0752	<b>0.2141</b>
9/11/10	3	E, E	0.01431	0.15		
9/17/10	1	variable	0.01653	0.15		
9/23/10	no data	no data	0.01072	0.15		
9/29/10	no data	no data	<b>0.1524</b>	0.15		

### Lead Emissions

The DNRE's 2008 emissions inventory for Ionia County shows two stationary sources reporting lead emissions in Ionia County (Table 3). Mueller Industries, formerly Extruded Metals, reported 1,685.080 pounds (lbs) of lead emissions in 2008. Ventra Ionia Main, LLC, formerly Meridian Automotive Systems, reported emissions of 0.040 lbs. Historically, Riverside Correctional Facility has emitted lead but has ceased operation.

**Table 3**  
**2008 Lead Emissions Inventory for Ionia County, MI**

EIYR	State Facility Identifier (SRN #)	Facility Name	Location Address	City	Zip Code	Total Pb Emissions in Lbs
1999	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	2,420.000
2000	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	2,140.000
2001	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	2,024.000
2002	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	2,149.000
2003	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	2,113.000
2004	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	1,964.000
2005	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	1,857.000
2006	B1650	EXTRUDED METALS	302 ASHFIELD	BELDING	48809	2,053.120
2007	B1650	MUELLER INDUSTRIES	302 ASHFIELD	BELDING	48809	1,754.480
2008	B1650	MUELLER INDUSTRIES	302 ASHFIELD	BELDING	48809	1,685.080
1998	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	-
1999	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	-
2000	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	40.000
2001	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	2.000
2002	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	2.000
2003	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	1.000

EIYR	State Facility Identifier (SRN #)	Facility Name	Location Address	City	Zip Code	Total Pb Emissions in Lbs
2004	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	1.000
2205	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	2.000
2006	K2120	RIVERSIDE CORRECTIONAL FACILITY	777 W RIVERSIDE DR	IONIA	48846	41.500
1999	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	0.036
2000	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	0.030
2001	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	-
2002	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	-
2003	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	-
2004	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	-
2005	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	-
2006	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	0.040
2007	N0923	MERIDIAN AUTOMOTIVE SYSTEMS	14 N BEARDSLEY RD	IONIA	48846	0.040
2008	N0923	VENTRA IONIA MAIN, LLC	14 N BEARDSLEY RD	IONIA	48846	0.040

*Population Density and Expected Growth*

The Mueller Industries plant is located at 302 Ashfield in the city of Belding, Michigan, shown in Figure 5. Belding is a small community with an estimated 2009 population of 5,668, which is a decrease of 3.6 percent since 2000. Belding is located in Ionia County that has an estimated 2009 population of 62,574. The county is considered to be 43 percent urban and 57 percent rural with population density at 109 people per square mile.

**Figure 5  
Location of Belding, MI**



### *Geography and Topography*

The area surrounding the Mueller Industries facility is mainly residential with a few parking lots and commercial buildings in the near neighborhood. The terrain is gently rolling with forested and farmed acreage adjacent to the city. The Flat River runs through the recommended nonattainment area.

### *Jurisdictional Boundaries*

The entire area being recommended for a nonattainment designation is within the city of Belding.

### *Level of Control of Emissions Sources*

Lead is a component of the brass used at Mueller Industries. Lead is emitted during the brass rod making process. Processes that emit lead at Mueller Industries have DNRE New Source Review (NSR) air use permits that restrict emissions. Primary sources of lead emissions at Mueller Industries include the following:

- West Chip Dryer
- East Chip Dryer
- Induction Furnace No. 7
- Induction Furnace No. 8
- Induction Furnace No. 9

The west chip dryer is a rotary kiln that has a design capacity of 10 tons of brass chips per hour. The west chip dryer is currently the only chip dryer in operation at the facility. The unit is permitted under state NSR permit No. 505-93. Air emissions from the chip dryer are controlled by a multi-clone unit followed by a thermal oxidizer and a pre-cooler/wet scrubber. In September 2010, the facility installed enhancements to the pre-cooler/wet scrubber to increase its control efficiency. These enhancements include the installation of a new spray nozzle system as well as the addition of a de-mister unit.

The east chip dryer is a rotary kiln that has a design capacity of 7.5 tons of brass chips per hour. The facility has not operated the east chip dryer since August 9, 2010. The facility has agreed not to restart the dryer unless compliance testing is conducted on the unit. The unit is permitted under NSR permit No. 281-86A. Air emissions from the chip dryer are controlled by a multi-clone unit followed by a thermal oxidizer and a pre-cooler/wet scrubber.

The facility has three electric induction furnaces for the melting of brass. The furnaces are identified as Furnaces No. 7, 8 and 9. Furnaces No. 7 and 8 are permitted under state NSR permit No. 30-83B, while Furnace No. 9 is permitted under state NSR permit No. 30-83C. The furnaces are commonly controlled by two fabric filter collectors (east baghouse: 60,000 cubic foot per minute (cfm), and west baghouse: 60,000 cfm). The east baghouse is preceded by a cyclone collector.

### *Air Dispersion Modeling*

Air dispersion modeling of lead emissions show that all predicted NAAQS exceedances fall within the recommended nonattainment boundary.

The DNRE conducted air dispersion modeling of the Mueller Industries lead emissions source using the most current modeling parameters and associated permitted allowable emission rates. Land use and terrain, building wake effect (the effect on local air concentrations and particle deposition resulting from air flows around the buildings), and meteorological data were all taken into consideration in modeling parameters, resulting in a recommended nonattainment area that includes the entire area where concentrations exceeding the NAAQS are predicted.

A review of the climatological profile from this area (using Grand Rapids data) showed winds are primarily from the southwest, as depicted by the wind rose in Figure 6.

**Figure 6**  
**Wind Rose using Data from the Grand Rapids**  
**Monroe St. Site (260810020)**

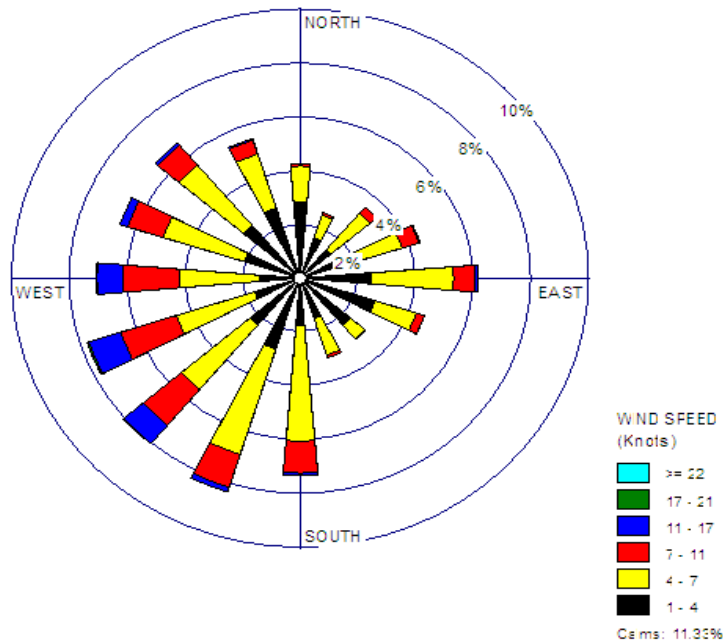
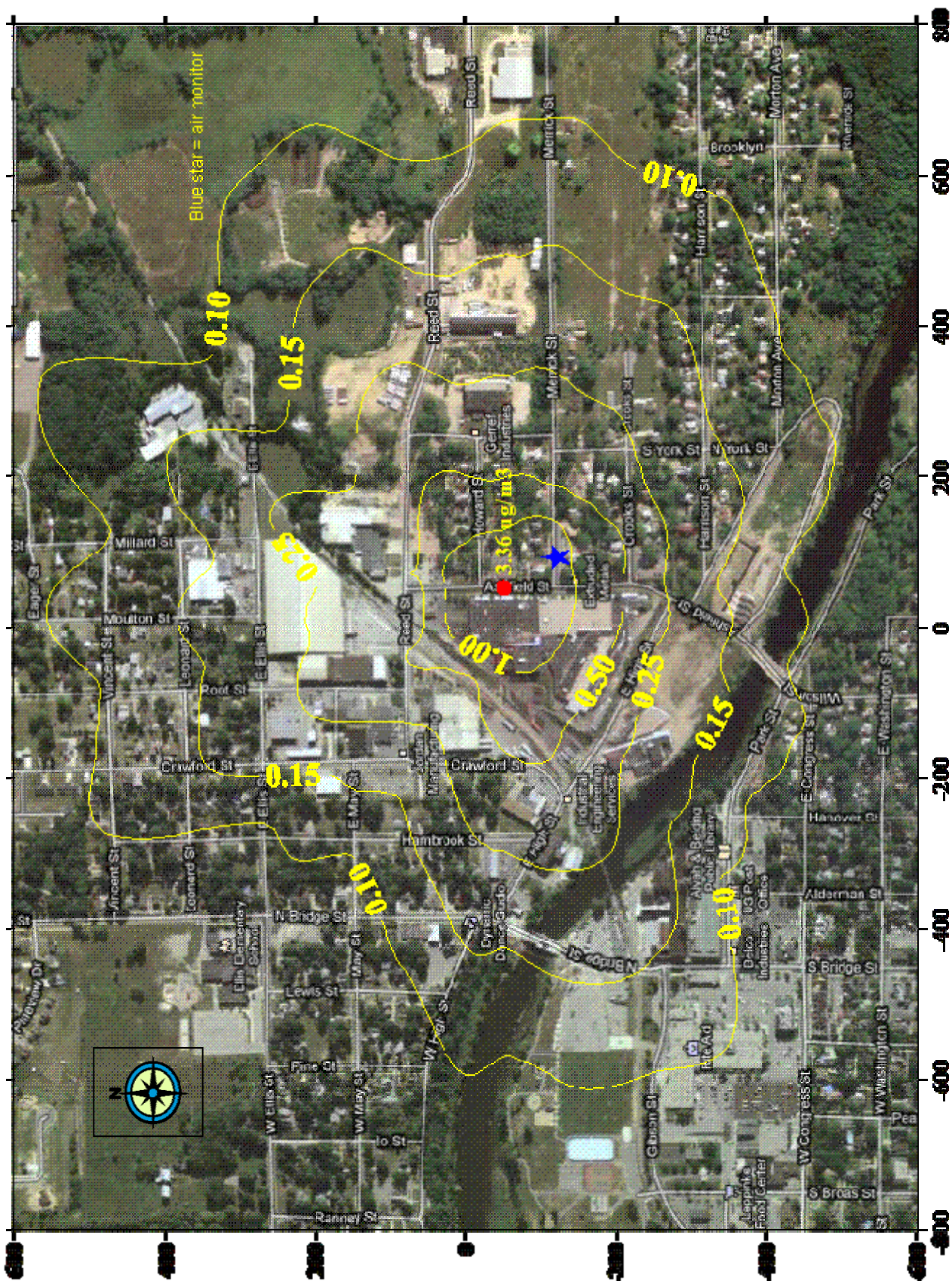


Figure 7 is the final modeling impact plot depicting lead isopleths based on the permitted or Potential-to-Emit (PTE) emissions of likely operations (i.e. 0.3 lb/hr for the primary chip dryer and 5 micrograms/dry standard cubic foot from the furnace). Based on the predominant southwest winds, maximum 3-month average impacts were expected to fall northeast of the emission sources. Additionally, the relatively short facility stacks are subject to building downwash and maximum impacts were anticipated near the facility structure. As expected, the point of maximum predicted impact was located a short distance northeast of the stack location and is indicated on the Figure 7 by a red dot ( $3.36 \mu\text{g}/\text{m}^3$ ). Modeled impacts are based on a 3-month rolling average during 2005-2009 (Grand Rapids meteorology data). Map scale is in meters.

Figure 7  
 Mueller Industries – Belding, MI  
 3-Month Rolling Average during 2005-2009 – Lead Impacts



The required monitor was sited as close to the point of maximum predicted impact as practicable. As indicated by the blue star on Figure 7, the monitor location is slightly less than 100 meters to the south-southeast of the point of maximum predicted impact. Based on the monitor location, maximum impacts to the monitor would be expected when winds are from the west to northwest. This was verified by the monitoring data when correlated with the paired wind direction data, as shown in Figure 8. As shown in the previous plot (Figure 7), maximum predicted impacts at the monitor location would be slightly more than  $1.0 \text{ ug/m}^3$ . The actual maximum monitored values are less than the maximum predicted impact, thus there is an adequate margin of safety for the nonattainment area as described by the  $0.15 \text{ ug/m}^3$  threshold. Despite this fact, the DNRE is proposing to extend the nonattainment area beyond the predicted  $0.10 \text{ ug/m}^3$  modeled area as an added margin of safety.

Figure 8

**Average Concentration by Wind Direction  
Jan 2010 - Aug 2010**

